Enabling the industry of tomorrow

Stargate Hydrogen – Investor Presentation – May 2024

stargate hydrogen

Cover Letter

May 2024

Dear Sir or Madame,

Sustainability and preserving natural resources are among the most pressing challenges of this era. Ambitious climate neutrality goals, tightening climate regulations, and increasingly important ESG in every sector strongly increase demand for green options.

Green hydrogen (H_2) plays an important role in this by decarbonizing industry and heavy-duty transportation. However, many green hydrogen solutions are still too expensive, small or inefficient to meet energy needs of the customers.

Many planned green hydrogen investments lack economic rationale (high CAPEX & OPEX) and thus most final investment decisions have been canceled or significantly delayed. On top of electricity cost and utilization, the H_2 cost is dependent on electrolyser efficiency, capital cost and lifetime.

Stargate has developed a solution to the problem by developing next-generation alkaline electrolysers for green hydrogen production with increased efficiency and lifetime while reducing capital cost. The core IP relies on precious metal-free ceramic material-level innovation and innovative electrolyser stack design.

Stargate is now raising additional equity of EUR 10M to further develop its technology to reach target cost-down levels to compete with Chinese electrolyser manufactures, to build up additional capabilities for commercial operations and to complete the production capacity scale.

Stargate has delivered its already cost-competitive generation 1 products to multiple customers and due to growing sales pipeline, Stargate is now scaling its current MW -scale production capacity of electrolyser stacks and systems further. Stargate has received strong support from public funding to escalate the capacity ramp-up incl. EUR +34M of public grants.

On the following pages, you will find details about our project. In case you have any questions, please do not hesitate to contact us.

Marko Virkebau| CEO

Stargate is raising EUR 10M in equity to supply its growing clientele the novel alkaline electrolysis stacks and turnkey systems for green hydrogen production

Introduction & Transaction overview

- Stargate Hydrogen Solutions OÜ (“Stargate”, “the Company”) is an Estonian developer of electrolysis technology established in 2021.
- Stargate is looking to rase up to EUR 10 million in funding. The funding is used to further develop its technology to reach target cost reductions, and to scale its manufacturing of proprietary next-generation alkaline electrolysers.
- This document outlines the investment opportunity and provides information on the company, its business plan and market environment among other things.
- For further information, contact Stargate representatives listed below:

Stargate Hydrogen

Marko Virkebau, CEO
+372 5332 1454
marko.virkebau@stargatehydrogen.com

Rainer Küngas, CTO
+372 555 78 270
rainer.kungas@stargatehydrogen.com

Lasse Grannenfelt
+358 40 717 8572
lasse.grannenfelt@grannenfeltfinance.fi

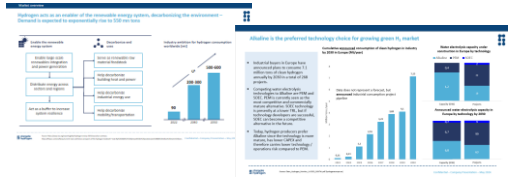
Jussi Kokkonen
+358 50 558 8009
jussi.kokkonen@grannenfeltfinance.fi

Contents

Stargate has proven technology know-how, strong market positioning, a clear strategy and an implementation plan

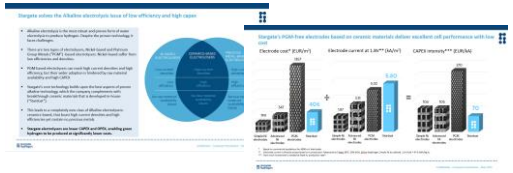
Market overview

- Green Hydrogen will become a multitrillion-euro commodity sector and transform the energy industry.
- Alkaline and PEM electrolysers are the most mature technologies to produce green hydrogen.
- Many green hydrogen investments lack economic rationale (high CAPEX & OPEX) and thus investment decisions have been significantly delayed.
- There is a lack of fundamental innovation at material level to Alkaline and PEM – electrolyser technologies.
- Stargate has developed a next-generation alkaline electrolyser with low cost.



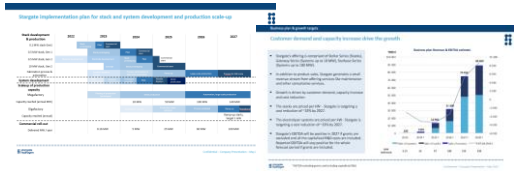
Technology

- Stargate offers highly efficient alkaline electrolysis stacks and systems as measured by several independent institutes and verified by customers.
- Stargate is the technology leader in alkaline electrolysers with a market-leading *patented IP. The core IP relies on precious metal-free ceramic material innovation ("Stardust") and electrolyser stack design.
- With Stargate's proprietary stack design and ceramics-based electrodes, Stargate is targeting to reach electricity-to-hydrogen conversion efficiency of 45 kWh/kg – corresponding to a market-leading efficiency of 88%.
- Proven production process and scalable opportunity – with processes having been refined through existing production facilities.



Implementation

- Based on customer demand and a strong future sales pipeline, Stargate is ramping up serial production - The capacity will be gradually scaled to 140 MW by end-2027.
- Stargate will continue with serial production and commercial roll-out of its electrolyser stacks. Stacks have already been delivered to multiple clients in e.g. Poland, Italy, France, and Germany.
- Followed by completion of 1 MW electrolyser system pilot by end 2024. Serial production of the systems will start in late 2025 together with commercial launch of the generation 2 products with Stardust.
- Stargate will continue to further develop its product portfolio and technology to reach target efficiency of 88% by 2028.



Funding & Investments

- Stargate is now looking to raise EUR 10M of equity to bring generation 2 product to the market and complete Megafactory investment.
- Stargate has received ~EUR 34M of public grants for further product development, and to complete the Megafactory and the Gigafactory investments.
- Stargate aims for 140MW capacity by the end of 2027 with Megafactory investment. Total CAPEX of EUR ~20M€.
- Followed by Gigafactory investment with a total CAPEX of EUR ~80M and a capacity of 1GW.

*Patents have been filed and are currently pending

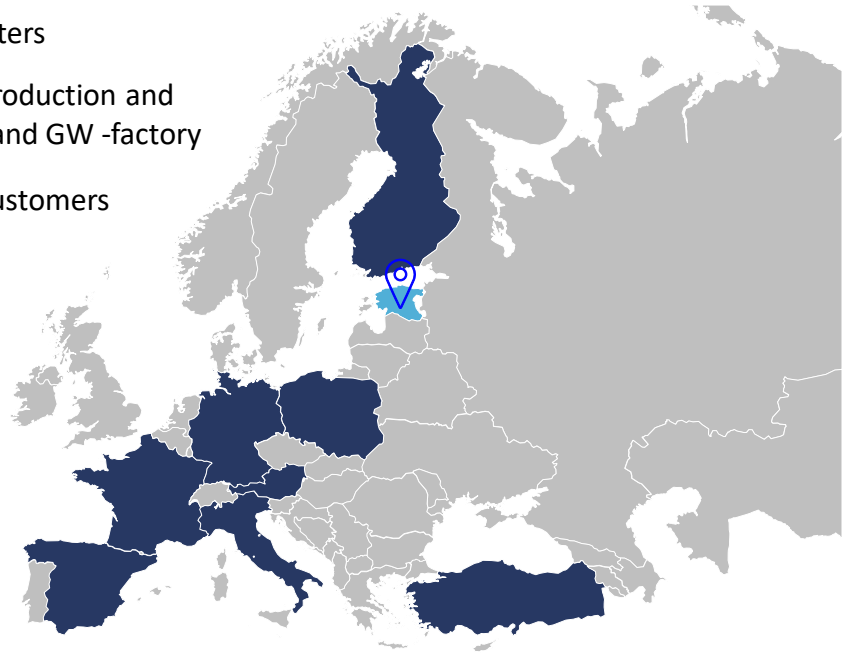
Stargate offers efficient alkaline electrolysis stacks for system integrators and alkaline electrolyser turnkey systems for industrial end-users

Existing footprint

Headquarters

Existing production and first MW and GW -factory

Existing customers



Selective partnerships

- Independent technology validation
- Demonstration projects
- Joint technology development
- R&D co-operation

KPIs

Stack cost

EUR 310/kW
Current cost

→

EUR 160/kW
Cost by 2028

Revenue

EUR 1.5 M
Forecast for 2024

→

EUR 90 M
Revenue by 2028

Efficiency

51 kWh/kg H_2
Current efficiency

→

45 kWh/kg H_2
Efficiency by 2028

Production capacity

20 MW
Current capacity

→

1 GW
Capacity by 2028

Founded in 2021
30+ years of electrolysis expertise

Rapidly growing company with a headcount of 50+

Scientific publications: 100+
Patents pending: 7

PhD: 7
Masters: 24

Gender balance: 50-50%
Nationalities: 10

An exceptional management team with strong expertise in electrolysis technology and scaleup

Core team with a strong industry expertise

1. Decades of R&D experience in electrolysis technology
2. Proven track record of scaling operations
3. Inventors of multiple patents

Team has extensive industrial and R&D know-how to produce and scale electrolysis technology

Marko Virkebau
CEO

- Previously, Co-Founder and CFO at Meetfrank
- Previously, CFO at MM Grupp, one of the largest family offices in Estonia
- First institutional investor and former Board Member at Skeleton Technologies

Rainer Küngas, PhD
CTO

- 16+ years of experience in fuel cells and electrolysers
- Inventor of 20 patent applications
- PhD in Chemical Engineering, University of Pennsylvania, Fulbright scholar
- Was responsible for designing the 500 MW SOEC factory for Haldor Topsoe

Jan G. Grolig, PhD
COO, Electrolysers

- 13+ years' experience in hydrogen technologies
- Previously Head of Technology and Innovation at Hexis
- PhD in Material Sciences / Chemistry, Chalmers University of Technology

Kristjan Lužkov
VP Product

- Designed ESS from scratch for automotive, railway and industry
- Built up a team of technical project managers at Skeleton and grew the revenue 9x over 2 years
- Defined the HW product strategy at Bolt and helped to grow the fleet to 250 000 vehicles

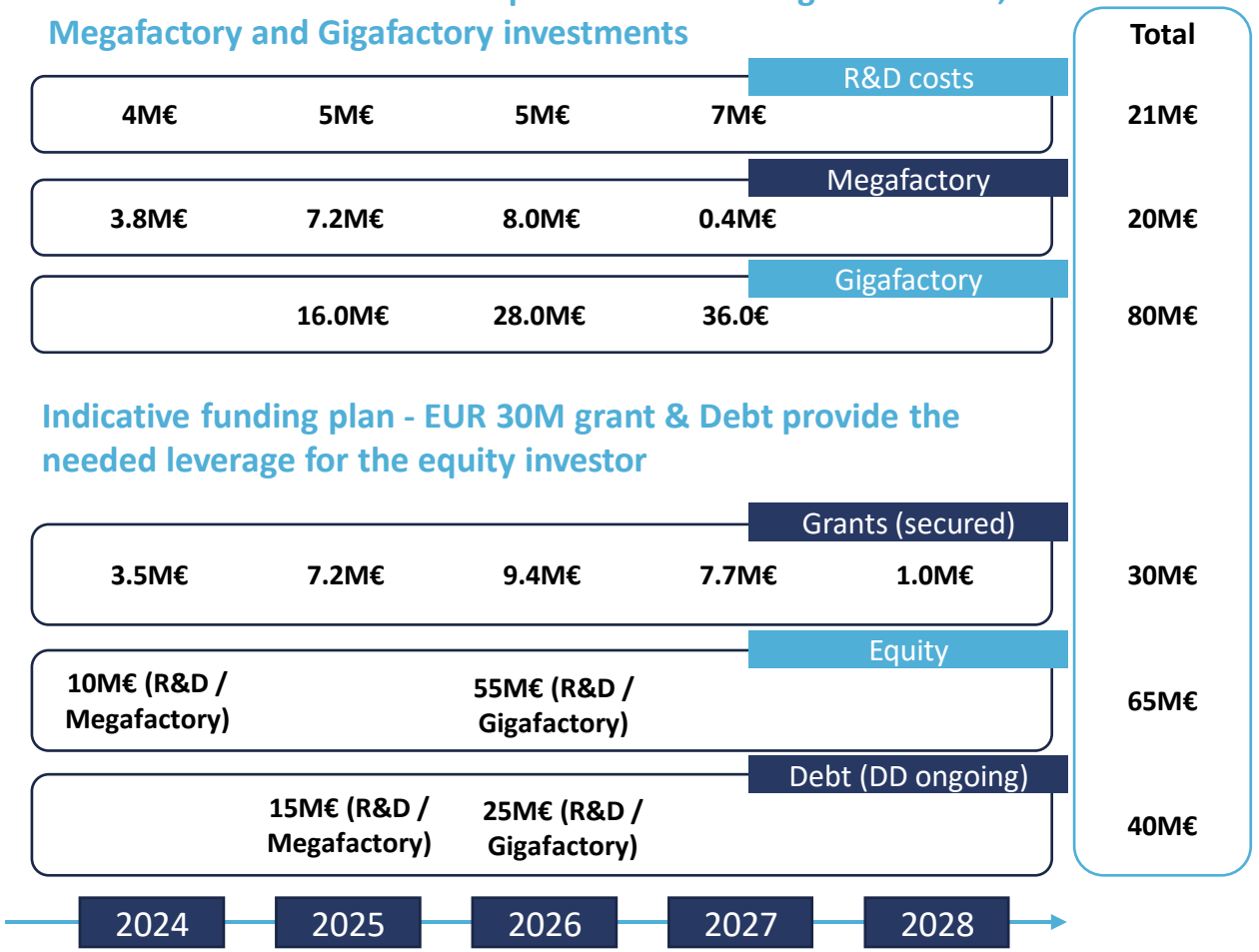
EUR 10M equity raise to bring Generation 2 products to the market and complete Megafactory investment– leverage from EUR 30M grant and debt funding

EUR 10M equity transaction – target closing H2/2024

- Stargate is looking to raise EUR 10 million in H2/2024. UG Investments will continue supporting the company with an investment of EUR 2.5M. Stargate has also received soft-indications for EUR +2.5M.
- Funding will be used for further product development to achieve target cost-down of 50% on a stack and system level, as well as to complete the Megafactory investment and reach 140 MW production capacity by 2027.
- On top of the equity investment Stargate has received ~EUR 30M grant, which will be used for futher product development and factory investments.
- Stargate is having an on-going Due Diligence process with a potential lender for up to ~EUR 40M of debt funding.

Use of funds and funding plan

Use of funds – Product development to reach target cost level, Megafactory and Gigafactory investments

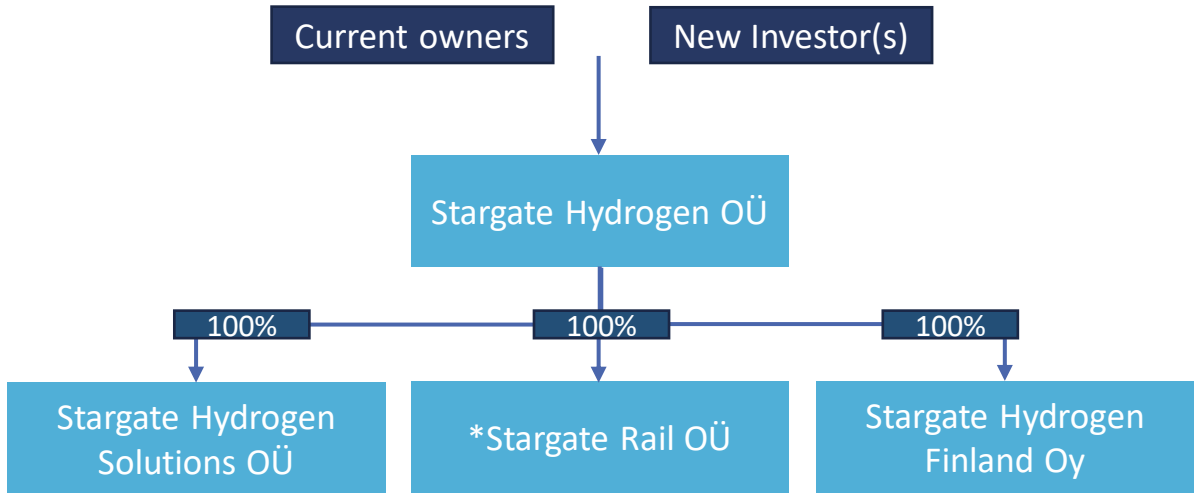


Stargate has secured EUR 42 M of funding so far and is backed by leading Estonian family office

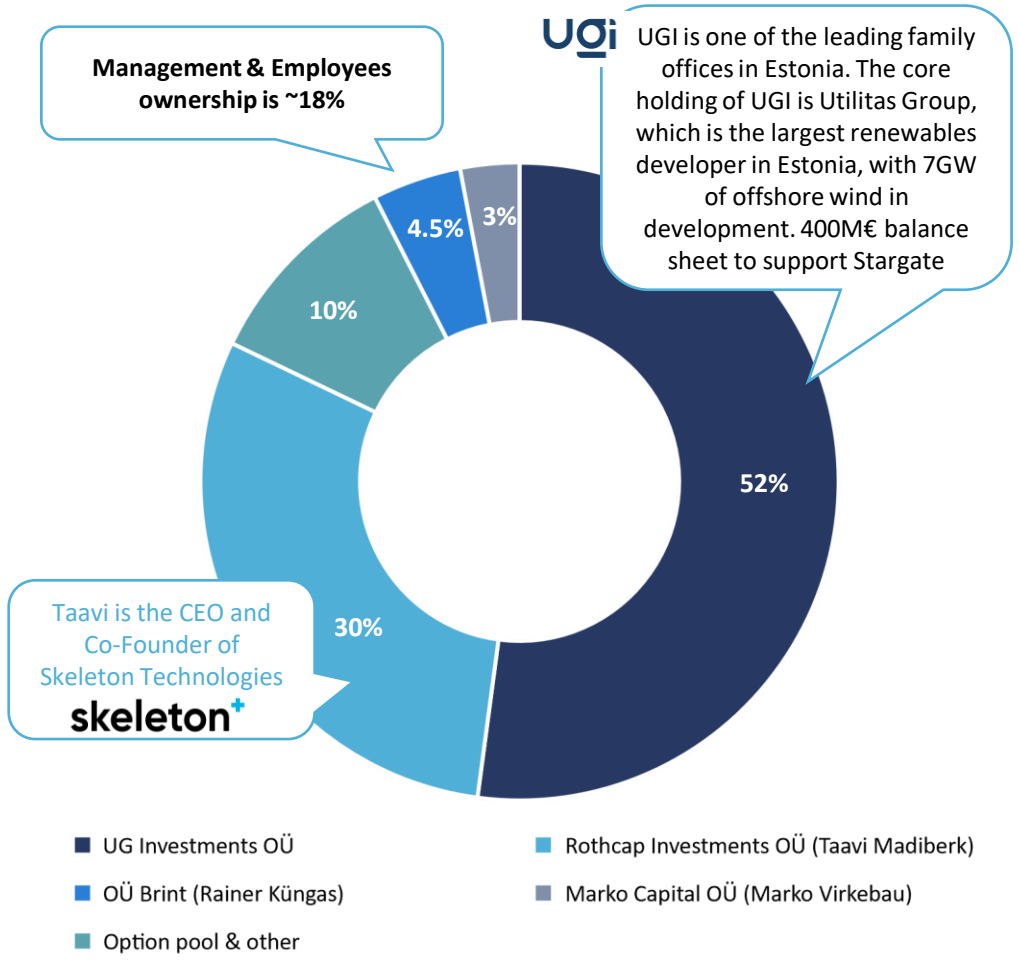
Past financing rounds

- Stargate has raised ~EUR 42 M of funding so far: ~EUR 34M in grants and ~ 8M in equity.
- Stargate is currently majority owned by UG Investments - one of the leading family offices in Estonia, focused on energy and sustainability-related investments. Core holding of UGI is Utilitas Group which is the largest renewable developer in the region with 7GW of offshore wind in development. A strong balance sheet exceeding €400 million, allowing to support Stargate over the long run.
- in July 2023, the European Commission approved Stargate for €29.16 M of state aid under the Hydrogen IPCEI mechanism. The funds have been made available in the form of a grant by the government of Estonia (payments are done quarterly, with final payments in end-2028).

Corporate structure



Stargate current ownership (%)



*No activities and will be liquidated

Hydrogen acts as an enabler of the renewable energy system, decarbonizing the environment – Demand is expected to exponentially rise to 550 mn tons

Enable the renewable energy system

Enable large-scale renewables integration and power generation

Distribute energy across sectors and regions

Act as a buffer to increase system resilience

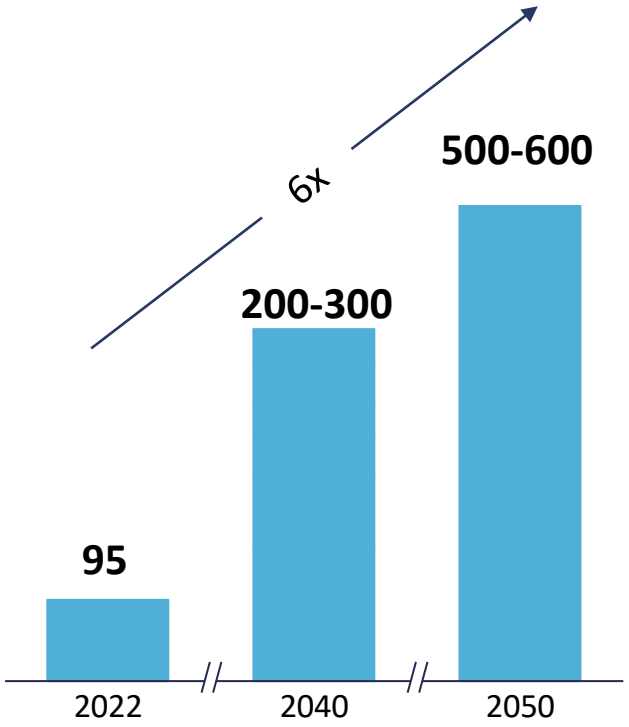
Decarbonize end uses

Serve as renewable raw material feedstock

Decarbonize steel and ammonia production and chemical industry

Decarbonize marine and aviation fuel and other heavy-duty traffic

Industry ambition for hydrogen consumption worldwide [mt]

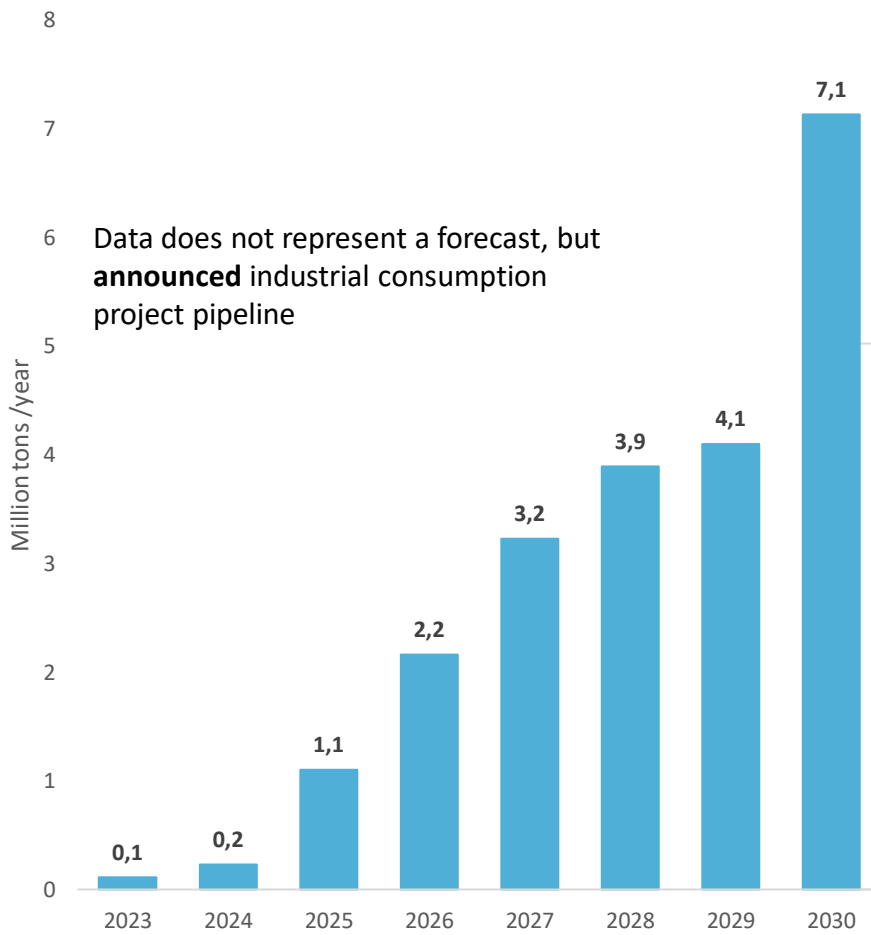


Source: https://www.iea.org/reports/global-hydrogen-review-2022/executive-summary
https://fimpec.com/en/News/current-state-and-future-prospects-of-the-hydrogen-market/#:~:text=By%202040%2C%20demand%20is%20predicted,to%20600%20million%20metric%20tons.

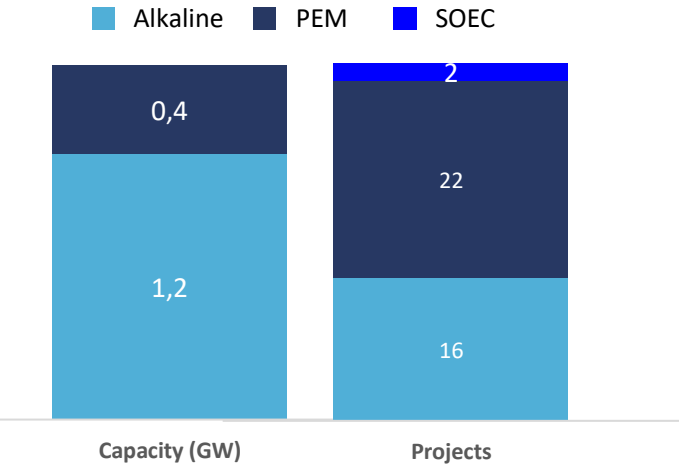
Alkaline is the most mature and preferred technology choice for growing green H_2 market

- Today, hydrogen usage of 95 million tons is mainly used in the refining and chemical sectors and **produced using fossil fuels.**
- Industrial buyers in Europe have **announced** plans to consume 7.1 million tons of **clean hydrogen annually by 2030** in a total of 268 projects – Alkaline is the preferred technology choice.
- Competing water electrolysis technologies to Alkaline are *PEM and **SOEC.
- PEM is currently seen as the most competitive and commercially mature alternative but is more expensive.
- SOEC technology is presently at a lower TRL, and not ready for scale. If technology developers are successful, SOEC can become a competitive alternative in the future, but no breakthrough has been seen.
- Today, hydrogen producers prefer Alkaline since the technology is more mature, has lower CAPEX and therefore carries lower technology / operations risk compared to PEM.

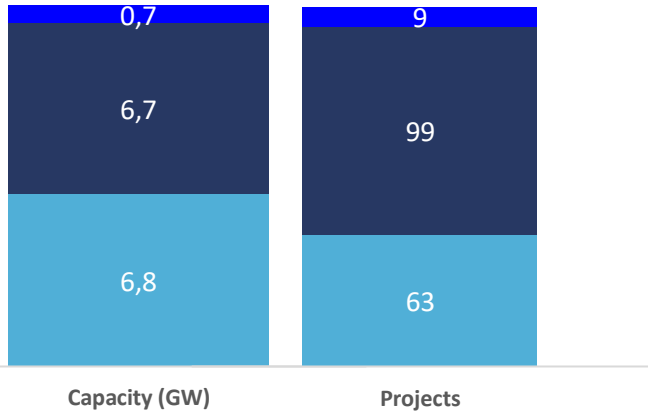
Cumulative announced consumption of clean hydrogen in industry by 2030 in Europe (Mt/year)



Water electrolysis capacity under construction in Europe by technology



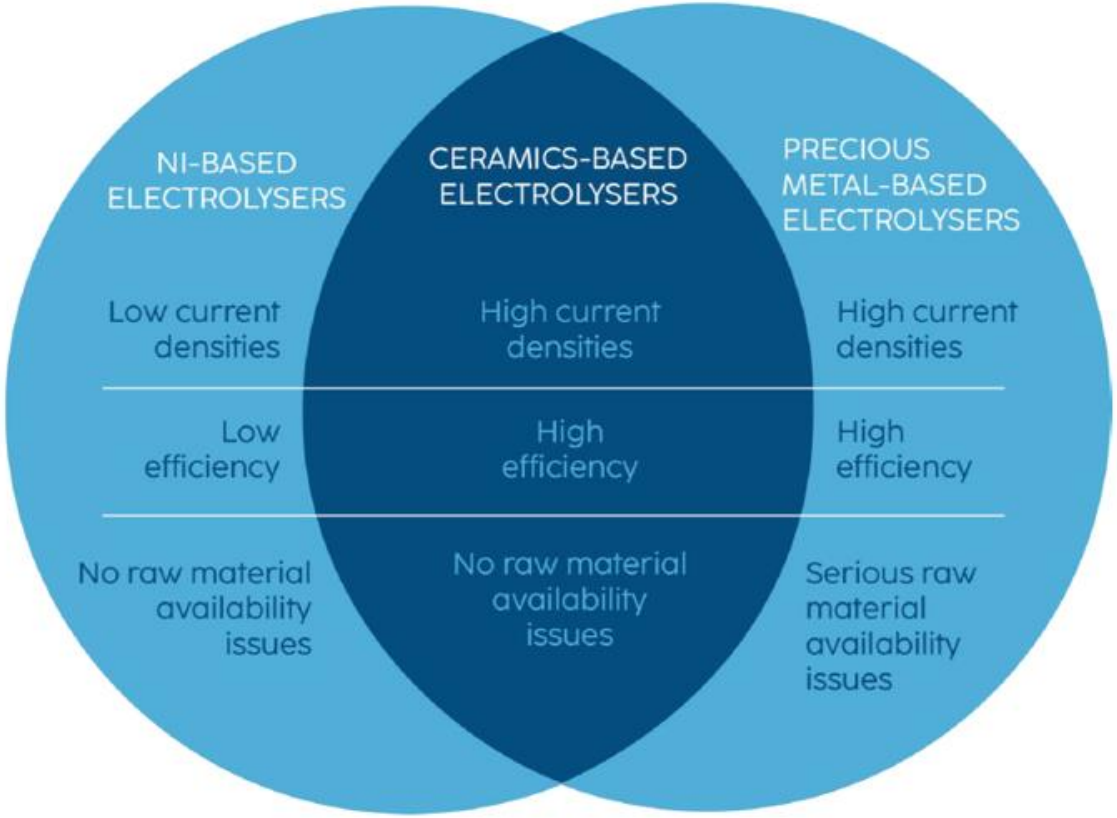
Announced water electrolysis capacity in Europe by technology by 2030



Source: Clean_Hydrogen_Monitor_11-2023_DIGITAL.pdf (hydrogeneurope.eu)
*Proton exchange membrane (PEM)
**Solid oxide electrolyzer cell

Stargate solves the electrolysis issue of relatively low efficiency and high capex

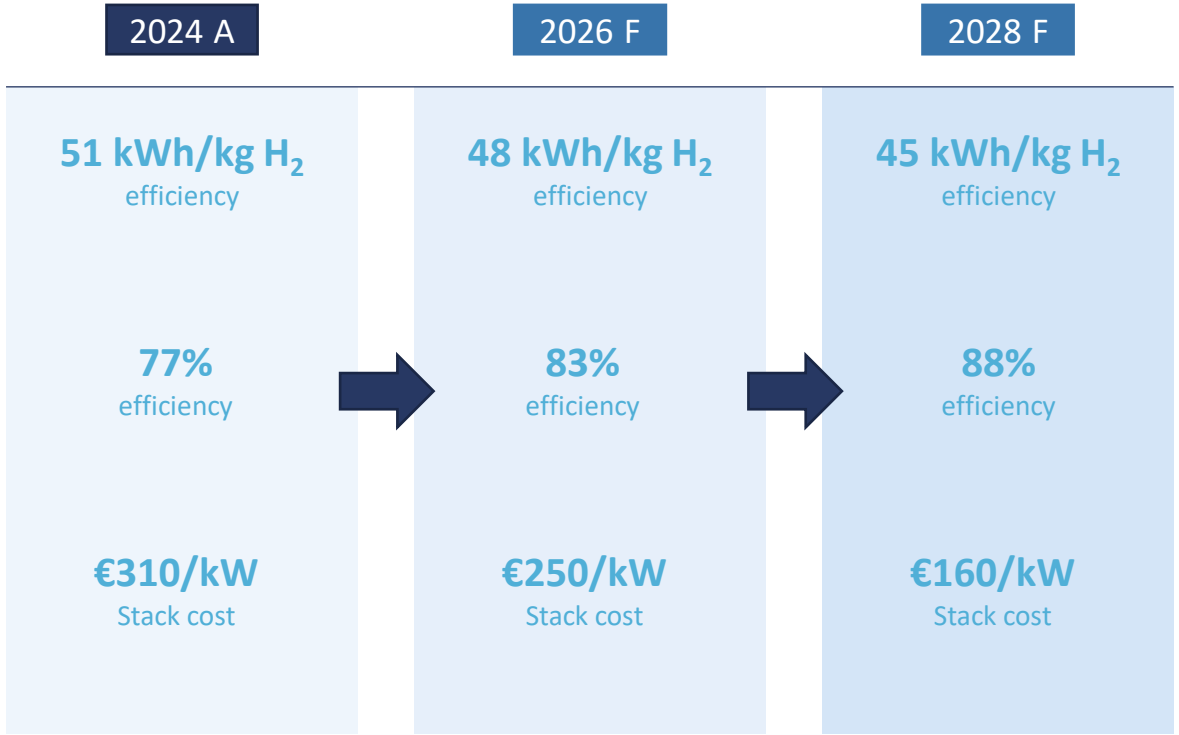
- Alkaline electrolysis is the most robust and proven form of water electrolysis to produce hydrogen. Reliability/lifetime is one of the top advantages of alkaline – there are still systems in use from the 1960's. Despite the proven technology, it faces challenges.
- There are two types of Alkaline electrolysers, Nickel-based and Platinum Group Metals ("PGM") -based. Nickel-based suffer from low efficiencies and densities.
- PGM-based electrolysers can reach high current densities and high efficiency, but their wider adoption is hindered by raw material availability and high CAPEX.
- Stargate's core technology builds upon the best aspects of proven alkaline technology, which the company complements with **breakthrough ceramic materials developed in-house called "Stardust".**
- This leads to a completely new class of Alkaline electrolysers: ceramics-based, that boast high current densities and high efficiencies yet contain no precious metals.
- **Stargate electrolysers are lower CAPEX and OPEX, enabling green hydrogen to be produced at significantly lower costs.**



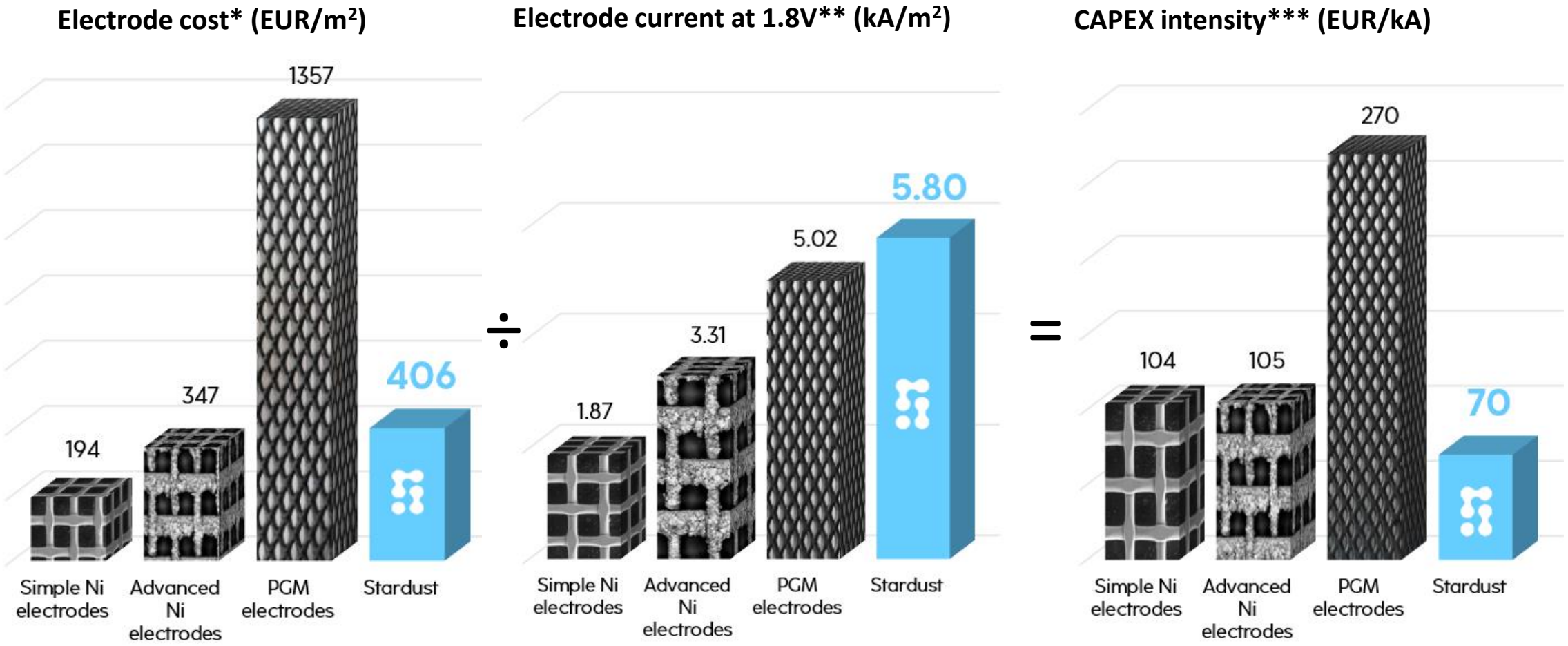
Stargate is on its way to make green H_2 cost competitive – heavy R&D focus for cost reductions

R&D Roadmap – cost reductions stem from product development and scale

1. **Electrode technology & manufacturing process development (Gen 2)**
   - This enables the launch of Gen 2 stacks (ceramics material), which will enable the targeted 45 kWh/kg electricity-to-hydrogen conversion efficiency
2. **Stack development, stack components fabrication process development & production capacity scale-up**
   - Further stack development to reach 160/kW cost level
   - First to MW scale and then to the GW scale
   - This enables planning & commissioning of production facilities.
3. **System optimization, development and system manufacturing capacity establishment**
   - This establishes the turnkey system delivery business
   - System optimization at MW scale to bring down costs
4. **Smart manufacturing & automation development for scalability**
   - First to MW scale and then to GW scale
   - This enables increased and more reliable quality and ability to produce at scale



Stargate's PGM[1]-free electrodes based on ceramic materials deliver excellent cell performance with low cost



* Based on commercial quotations for 4000 cm^2 electrodes

** Electrode current is directly proportional to H_2 production. Measured at 5 barg, 80°C, 30% KOH, Zirfon diaphragm, Simple Ni as cathode. 1.8 V/cell = 47.9 kWh/kg H_2.

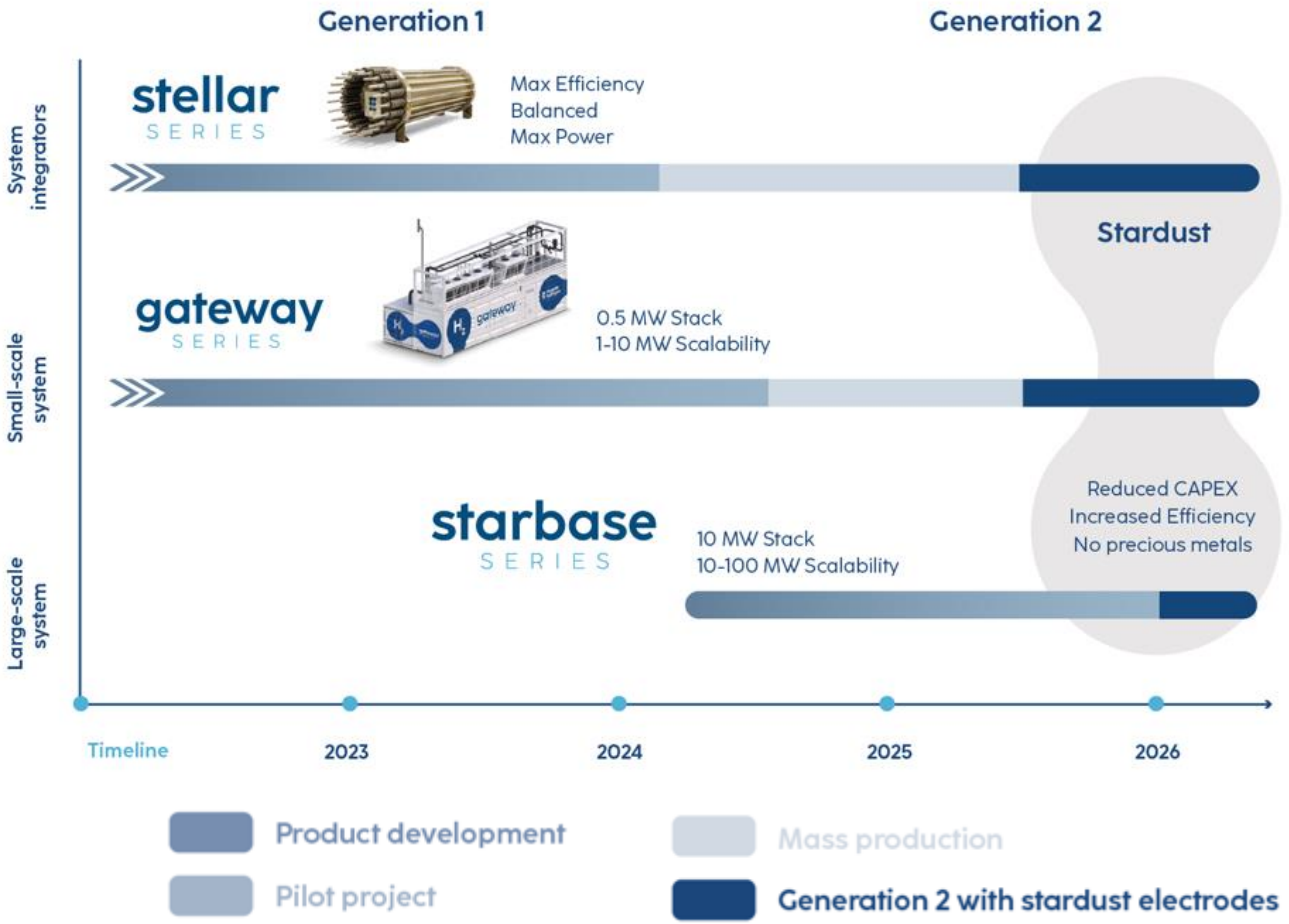
*** How much investment is needed at fixed H_2 production rate?

[1]Platinum Group Metals ("PGM")

Stargate's product evolution: from alkaline electrolysis stacks to modular hydrogen systems

- Stargate operates in two business segments – **it offers alkaline electrolysis stacks for system integrators and alkaline electrolyser turnkey systems for industrial end-users.**
- On the right is a summary of the stack and system products currently available and under development.
- The difference between generations 1 and 2 is the electrode catalyst material used. Gen 1 uses commercial (nickel-based) electrodes readily available on the market and Gen 2 uses Stardust-based ceramic electrodes. Between Gen 1 and Gen 2 several cost saving developments will be done.
- With Stargate's proprietary stack design, Gen 1 already offers reliability improvements and better efficiencies compared to competing stack designs. Stargate has delivered multiple stacks on commercial terms.
- Presently, detailed engineering of 1 MW containerised electrolysis systems is finished, and the construction phase is ongoing. Each 1 MW system includes two stacks of 0.5 MW + balance-of-stack. Larger system sizes (5-10 MW) can be achieved by modularly connecting multiple Gateway containers together – After completing first 1MW system, focus will be on cost-down.
- The future Starbase skid-mounted modular systems are built around Stargate 10 MW stacks. Starbase products are designed to serve large-scale hydrogen projects.

Product roadmap



Leading efficiency in green hydrogen: stargate's advanced and available alkaline electrolyser solutions

stellar SERIES

Alkaline electrolyser stacks for system integrators

Our pressurised alkaline electrolyser stacks are available with a 6-month lead time and come with an industry-leading performance guarantee.

Specifications:

- 100 Nm^3/h
- Performance guarantee
- Engineering support

Customizebly configurations

Performance guarantee for 10 years

Integration support

Fast delivery 6 monts lead time

Up to 100 Nm^3

High Efficiency

gateway SERIES

Gateway Electrolysers

Gateway electrolysers are containerised turn-key green hydrogen production systems using alkaline technology.

Specifications:

- Modular turn-key systems
- 0.5 – 10 MW
- Leading warranty on the market
- Flexible operation

Leading performance

Full Integration support

Low CAPEX

High Purity Hydrogen

High Efficiency

Stargate brings down the cost of hydrogen – enabling the hydrogen economy

Stargate has reached 51 kWh/kg electricity-to-hydrogen conversion efficiency and is targeting 45 kWh/kg with its Gen 2 stacks

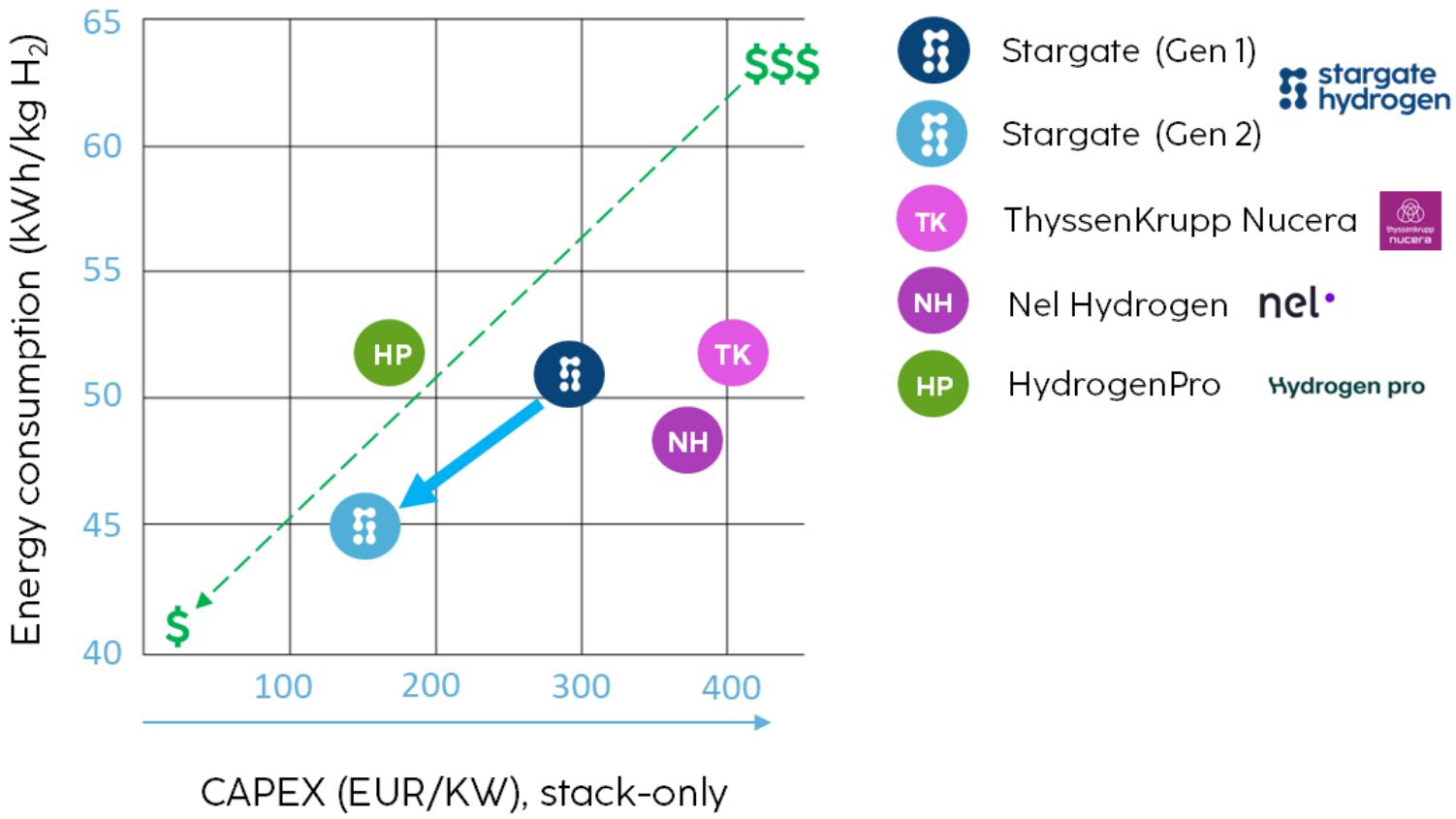
The cost of H_2 depends on:

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

stargate hydrogen

Stargate solution:

- Novel electrode material
- Stack design for
  - Higher reliability
  - Optimised for manufacturability
  - Fewer components



Stargate customizable stack is the most efficient and cost-effective compared to alternatives

Company	Technology	Product	Efficiency (HHV)	Stack pressure (bar)	*PGM free?	**Customisable stack?
stargate hydrogen	Alkaline	Stellar 100 MaxEff	77% Gen1 / 88% Gen2	32	✓	✓
nel	Alkaline	A485	80%	1	✓	✗
thyssenkrupp nucera	Alkaline	Scalum	79%	1	✗	✗
nel	PEM	MC500	79%	30	✗	✗
sunfire	Alkaline	HyLink 10 MW	76%	30	✓	✗
John Cockerill	Alkaline	5 MW	72%	30	✓	✗
ITM POWER	PEM	HGAS3SP	72%	30	✗	✗
H-TEC SYSTEMS	PEM	ME450	71%	30	✗	✗
McPhy	Alkaline	McLyzer 800-30	67%	30	✗	✗
Cummins	Alkaline	HyStat 100-10	66%	10	✓	✗

*Platinum Group Metals (“PGM”) ** While most competitors offer a limited range of stack sizes, Stargate stacks are highly customisable to best match customer’s needs.

Stargate material innovation Stardust has been validated, piloted and tested - no seen obstacles for scale

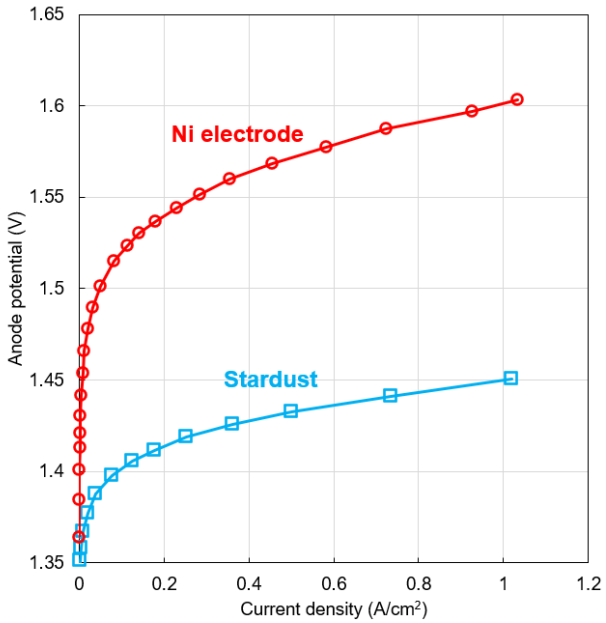
The University of Tartu validates Stargate Hydrogen's approach to developing iridium-free alkaline electrolysers.

- Novel precious metal-free catalysts developed by Stargate Hydrogen have been tested electrochemically by the **Institute of Chemistry at the University of Tartu**.
- The performance of Stargate materials approaches the performance of Iridium-based catalysts.

We have achieved highly promising results with Stargate's materials." **Jaak Nerut, PhD, professor at the Institute of Chemistry.**

Electrode performance validation by Fraunhofer Institute

- The Stardust current density outperforms the market standard nickel electrode



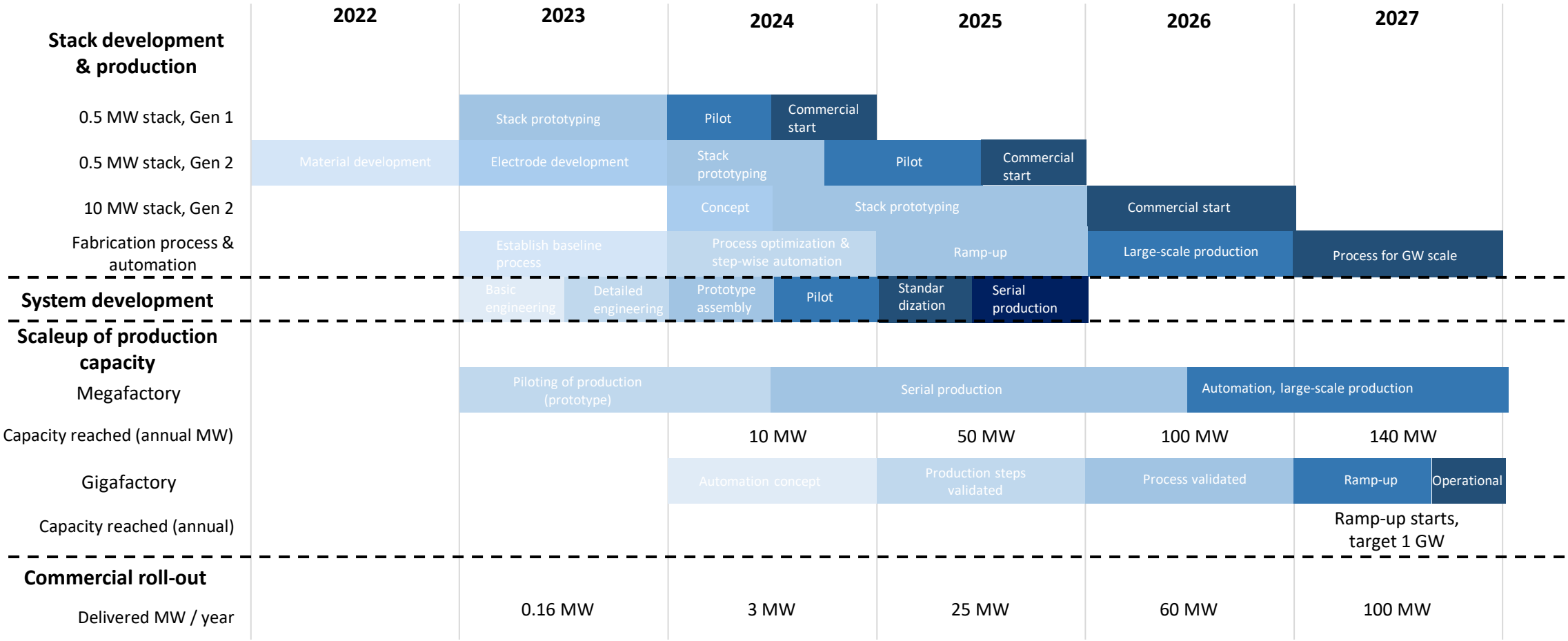
The results of the 3-electrode measurement of the coated electrode are impressive.

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

Dr. rer. nat. Christian Immanuel Bernäcker, Group manager Electrochemical Technology

Fraunhofer IFAM

Stargate's ambitious implementation plan for stack and system development and production scale-up



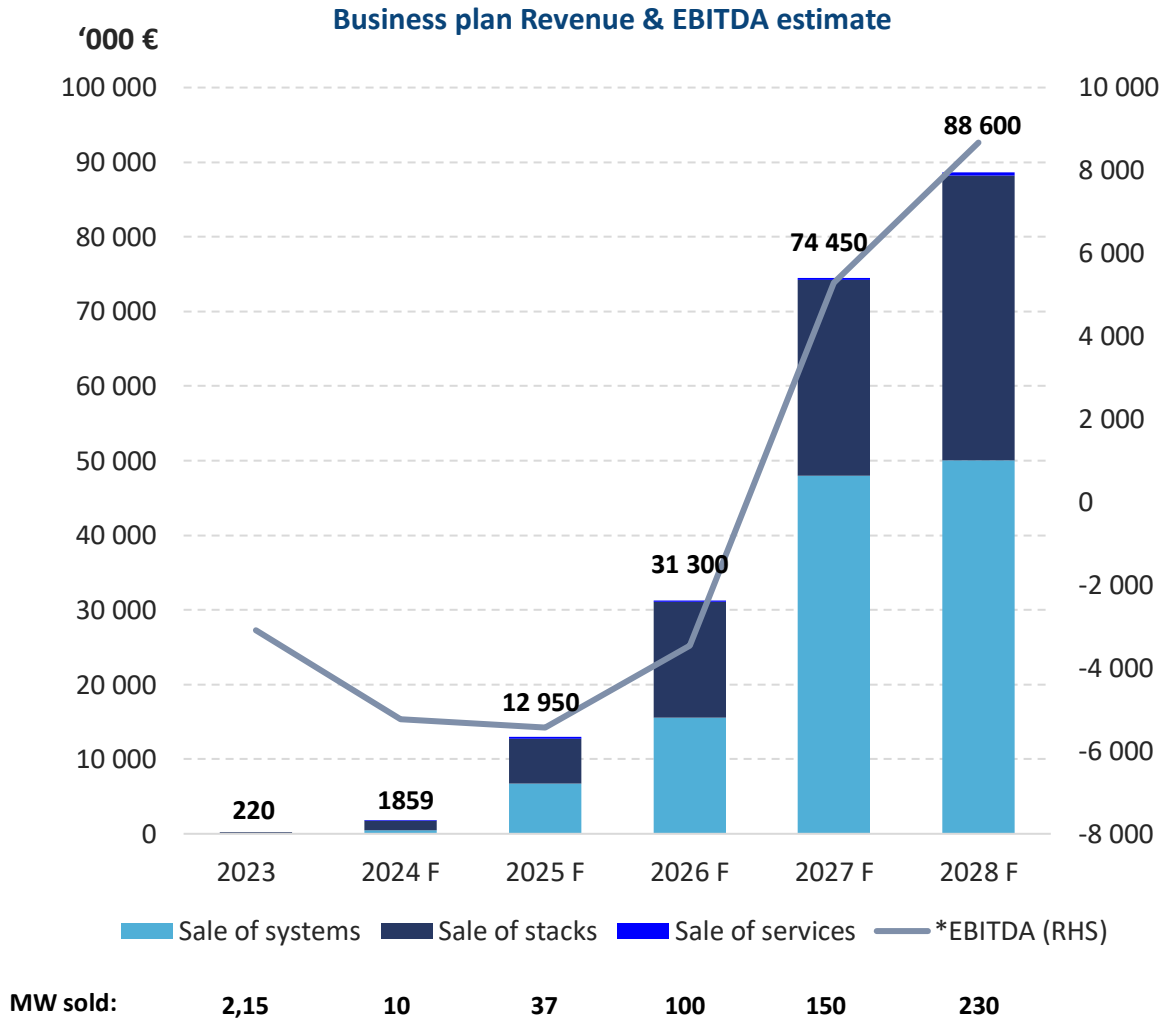
Commercial progress – customers have validated Stargate products and are ready to scale

- Stargate offers alkaline electrolysis stacks for system integrators and alkaline electrolyser turnkey systems for end-users.
- Stargate strives for a long-term frame agreements with system integrators. All the current system integrators clients are repeat customers with very high potential. Large part of Stargate business plan is to scale together with system integrators.
- Stargate has delivered four pressurized Gen 1 stacks on commercial terms to customers.
- Delivery of larger footprint (0.5 MW) Stellar stacks will begin in 2024 with purchase orders for four such stacks confirmed.
- Sales pipeline of EUR 40M + LOI-s for EUR ~100M€.
- One of the largest engineering companies in the world has selected Stargate´s stack technology for their whole hydrogen product line.
- Late-stage negotiations with large Nordic energy company for a 1 MW delivery, deal value EUR 1.7M
- Late-stage discussions for nine 0.5 MW stacks order. The expected deal value is worth €1.8 M.

Product	Size & details	Country	Timeline	LOI
	10 kW Stack	Poland	Delivered July 2023	100 MW
	10 kW Stack (mockup)	Austria	Delivered September 2023	N/A
	100 kW Stack	Italy	Delivered November 2023	50-100 MW
	30 kW Stack	France	Delivered December 2023	N/A
	Engineering support services	Germany	Delivered December 2023	N/A
	10x 5kW Stack	Finland	Delivery Q1/2024	N/A
	2x 0.5 MW Stack	Germany	Delivery in August 2024	N/A
	1 MW Gateway System	Estonia	Delivery Q3/2024	N/A
	1 MW Gateway System	Spain	Delivery Q2/2025	N/A

Customer demand and capacity increase drive the growth

- Stargate's offering is comprised of Stellar Series (Stacks), Gateway Series (Systems up to 10 MW), Starbase Series (Systems up to 100 MW).
- In addition to product sales, Stargate generates a small revenue stream from offering services like maintenance and other consultative services.
- Growth is driven by customer demand, capacity increase and cost reduction.
- Stargate is targeting stacks cost reductions from current €310/kW to €160/kW by 2028.
- Stargate's EBITDA will be positive in 2027 if grants are excluded and all the capitalised R&D costs are included. Reported EBITDA will stay positive for the whole forecast period if grants are included.



*EBITDA excluding grants and including capitalized R&D

Let's keep in touch

Marko Virkebau

+372 5332 1454

marko.virkebau@stargatehydrogen.com

Rainer Küngas

+372 555 78 270

rainer.kungas@stargatehydrogen.com

Scan the QR code to visit our website.

OÜ Stargate Hydrogen Solutions

Valukoja tn 8/2
Tallinn 11415
Estonia

www.stargatehydrogen.com

stargate hydrogen