

HYDRH2OGEN

S O L U T I O N S

Enabling clean energy and the
hydrogen economy

Hydrogen Solutions Limited holds key technology in Solid Oxide Fuel Cells
for Clean Power Generation + Solid Oxide Electrolyser Cells for the
production of Green Hydrogen

October 2024



Table of Contents

1. Problem: Pain Points Felt by Target Market
2. Solution: How Hydrogen Solutions' Tech Solves These Problems
3. What's Unique and Defensible
4. Team & Business Model
5. Go-to-Market Strategy
6. Route to Exit: Value Inflection Points & Milestones

Problem: Pain Points Felt by Target Market

High Carbon Emissions from Current Hydrogen Production: 99% of hydrogen today is produced using fossil fuels, generating significant carbon emissions. This poses a major challenge for industries aiming to meet climate targets.

Inefficiency and Cost: Current electrolysis technologies (Alkaline and PEM) are inefficient (between 55 and 65%) and costly, limiting scalability and economic feasibility for large industrial applications. AEM shows promise of improved efficiencies but nowhere near SOEC.

Problem: Pain Points Felt by Target Market

Industrial Demand for Green Energy: Heavy industries like steel, cement, chemicals, backup power, green warehousing, and marine, rail, air, local, point to point, long-distance and heavy goods transportation are seeking cleaner energy sources to decarbonize their processes, but viable alternatives like green hydrogen are limited in supply and costly to produce.



Solution: How Hydrogen Solutions' Tech Solves These Problems

Solid Oxide Electrolyzer (SOEC) Technology: Hydrogen Solutions has developed a next-generation solid oxide electrolyzer (SOEC) that operates with >90% efficiency, significantly outperforming conventional Alkaline and PEM technologies.

Utilization of Waste Heat: The SOEC system can leverage high-temperature waste heat from industrial processes, enhancing efficiency and reducing the overall energy demand for hydrogen production.



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Solution:

How Hydrogen Solutions' Tech Solves These Problems

Scalability: The solution is designed for installation at industrial locations, making it ideal for industries that require massive amounts of hydrogen (e.g., steel production, heavy transportation) or simply have large amounts of high temperature waste heat.

Lower Operating Costs: By improving efficiency and utilizing available waste heat, the SOEC reduces electricity consumption, the largest component of operating costs, making green hydrogen more affordable. Economics, with current wind, solar and hydro costs bring hydrogen costs to near energy density parity with diesel. Future developments should reach or lower costs.

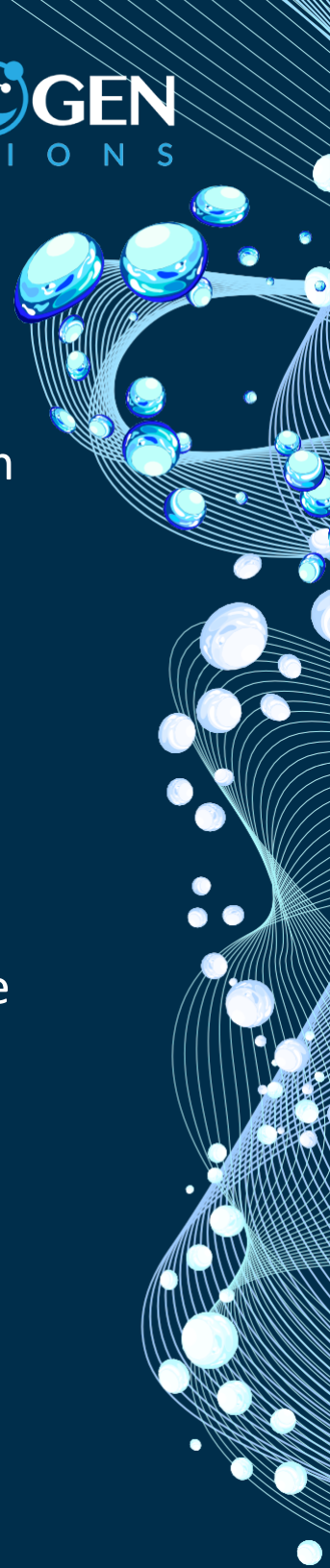


What's Unique and Defensible

Efficiency: Hydrogen Solutions' electrolyzer technology boasts an efficiency of >90%, the highest in the industry, positioning it as a leader in green hydrogen production.

Minimal degradation over 1000's of hours: Testing done, to date, show HS has achieved a solution to common Electrolyser problems – degradation over operating hours and leakage.

Proprietary Anode-Supported Design: This innovative design ensures the highest power density and efficiency while reducing costs compared to alternative electrolyzers. The system can operate at high temperatures with a robust seal and manifold design that ensures durability.



What's Unique and Defensible

Dual-Mode Capability: The system is designed to operate as both an electrolyzer and a fuel cell, offering flexibility in energy management and potential cost savings.

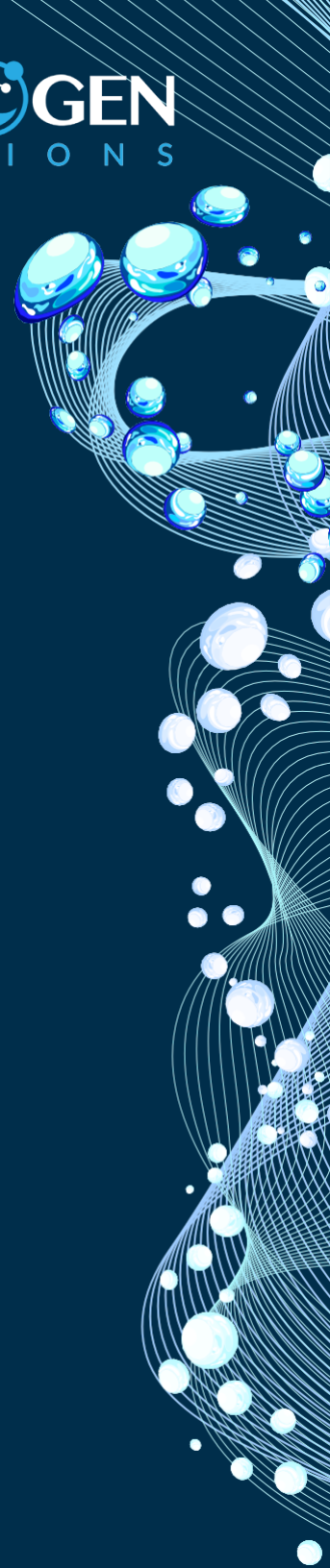
Intellectual Property (IP) and Partnerships: The technology has been developed with significant IP assets and proprietary engineering, forming a barrier to entry for competitors. Hydrogen Solutions is also actively pursuing partnerships with leading industrial players, ensuring strong market positioning.



Team & Business Model

Leadership Expertise: The founding team includes pioneers in hydrogen production, fuel cells, and electrolyzer technologies, with extensive experience in commercializing advanced energy solutions.

Business Model: Hydrogen Solutions aims to become the "Intel inside" of the hydrogen economy. By licensing its SOEC technology to large industrial partners and manufacturing the "hotbox" to retain aftermarket and service revenues, the company can scale rapidly with minimal capital expenditure, targeting over \$1.5 billion in revenue by 2030 through licensing deals, sale of stacks and servicing.



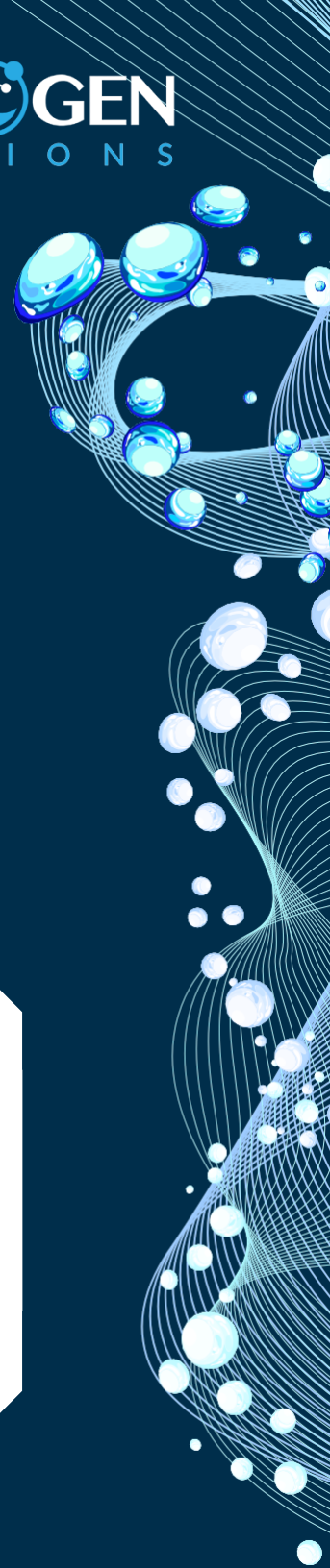
Team & Business Model

Strategic Partners: Engagement with industrial giants (potential partners like Siemens, Hydrogen Energy and Baker Hughes) to integrate Hydrogen Solutions' technology into the balance of plant they already have for their Alkaline and PEM Electrolysers. This saves Hydrogen Solutions time and money developing what already exists in Electrolyser companies.



Australian Government

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Team & Business Model

Led by **Industry Pioneers**



James Busche
CEO

Former CEO of hydrogen production, alternative energy and steel & cement projects in UK, US and Australia



John Henry Looney
Director

Experience in helping companies and countries engage and reduce their environmental impacts across a wide range of manufacturing, food and energy projects in over 30 countries.



Anthony Christodoulou
Director

Experienced individual working in diverse sectors including banking with focus on funding solutions for International projects.



Steve White
Managing Director

Decades of experience in successful business start-ups in energy and mining, including > 10 years of SOFC technology development, large scale thermal energy storage, and environmental clean up



Dr Nigel Brandon
Technical Advisor

Founder of Ceres Power, \$3 billion publicly-listed hydrogen fuel cell company spun out of Imperial College in 2000



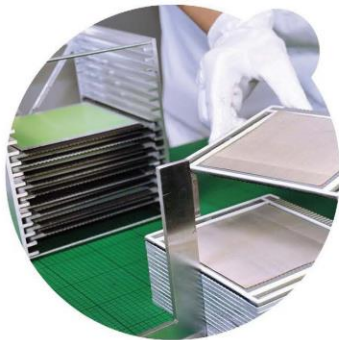
Prof John Zhu
Advisor

Expert in advanced catalysis, gas adsorption and separation, direct carbon fuel cells and solid oxide fuel cells



Dr. Paul Groves
Director

Former Managing Director of Petrofac and Commercial Director of Shell where he managed the \$20 billion Gas-to- Liquids plant in Qatar



Australian Development Team



Raj Ratnaraj
Principal Engineer & Lab Manager

Principal Engineer at Ceramic Fuel Cells. Designed, developed and tested fuel cells, stacks and BoP components resulting in a commercially viable product



Sathia Aruliah
Senior Ceramicist

Senior Ceramicist at Ceramic Fuel Cells. Developed fuel cell to produce highest power density and lowest degradation. Specialist in the optimisation of glass seals



Dr Maciej Kubiki
Chief Scientist

Senior Mech Eng at Ceramic Fuel Cells. Instrumental in providing technical solutions for product integrity, performance and manufacturing



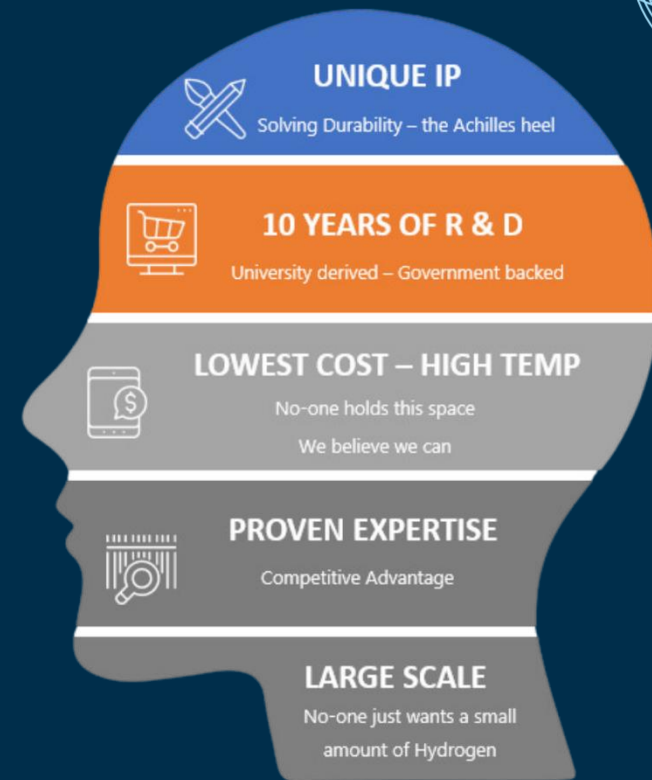
Lars Christiansen
Senior Scientist - Seals

Decades of experience in successful business start-ups in energy and mining, including > 10 years of SOFC technology development, large scale thermal energy storage, and environmental clean up

Go-to-Market Strategy

Target Markets: Hydrogen Solutions targets industrial sectors such as steel, cement, heavy transportation, and energy storage, which are essential for the green hydrogen transition.

Partnership Development: The company is focused on establishing joint development agreements (JDA) with major industry and industrial players. These partnerships will allow rapid adoption of SOEC technology across diverse sectors.



Go-to-Market Strategy

Licensing Model: Hydrogen Solutions will license its technology to existing Electrolyser companies, offering them an efficient, scalable solution for producing green hydrogen. This approach accelerates market entry while minimizing manufacturing overhead.

Leadership in Commercialization: CEO James Busche and technical advisor Nigel Brandon, with decades of hydrogen experience and experience in large-scale energy projects, leads the go-to-market strategy alongside technical and business development experts.

Route to Exit: Value Inflection Points & Milestones

Development Milestones: Within the next 24 months, Hydrogen Solutions aims to bring its SOEC technology to commercial readiness through extensive prototyping and testing in its new UK-based lab. Key milestones include:

- 1. Prototype Testing:** Demonstrating long-term stack durability with industrial partners.
- 2. IP Expansion:** Building a robust IP portfolio through additional patent filings.
- 3. Partnerships:** Securing joint development agreements with major industry and industrial players.



Route to Exit: Value Inflection Points & Milestones

Value Inflection Points:

- 1. Initial Partnerships:** Securing large partners will rapidly scale up deployment and revenue generation.
- 2. Licensing Revenue:** Achieving significant market share by 2030, delivering \$1.5 billion in revenue.
- 3. IPO or Acquisition:** The hydrogen sector is experiencing massive public market growth, making Hydrogen Solutions a potential acquisition target for established players looking to expand their electrolyzer offerings.



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