



Transformational Technologies for Global Industries

May 2023

ASX: SPN

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SPARC TECHNOLOGIES

Sparc is pioneering new technologies to disrupt and transform industry whilst delivering a more **sustainable** world

1

World leading global team and partners including Fortescue Future Industries

2

Seeking to reshape multi-billion dollar global markets by employing exclusive IP*

3

Target markets are driven by sustainability and environmental outcomes

* Cautionary Note: Access to markets is subject to the Company being able to successfully develop and commercialise its technologies. Sparc does not have any distribution or offtake agreements for graphene in place at this stage. As with any entity seeking to enter into a global marketplace, any product developed by Sparc will have applications that are constrained by market segment, relevant regulations, industrial application and geographical barriers.

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Corporate Snapshot



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85m

Shares on issue

\$26m

Market Cap*

\$0.30

Share price*

\$2.8m

Cash (31 Mar 2023)**

~38.5%

Top 20 s/holders

7.7%

University of Adelaide

BOARD OF DIRECTORS



Stephen Hunt
Executive Chairman



Stephanie Moroz
Non-Executive Director



Daniel Eddington
Non-Executive Director

EXECUTIVE MANAGEMENT TEAM



Denis Wright
General Manager
Graphene Materials



Nick O'Loughlin
General Manager
Renewable Energy



Kristen Kubank
Chief Financial Officer

* As at 4 May 2023
** On 24 April 2023 Sparc received \$934,000 R&D Tax Rebate for FY23

Technology Portfolio



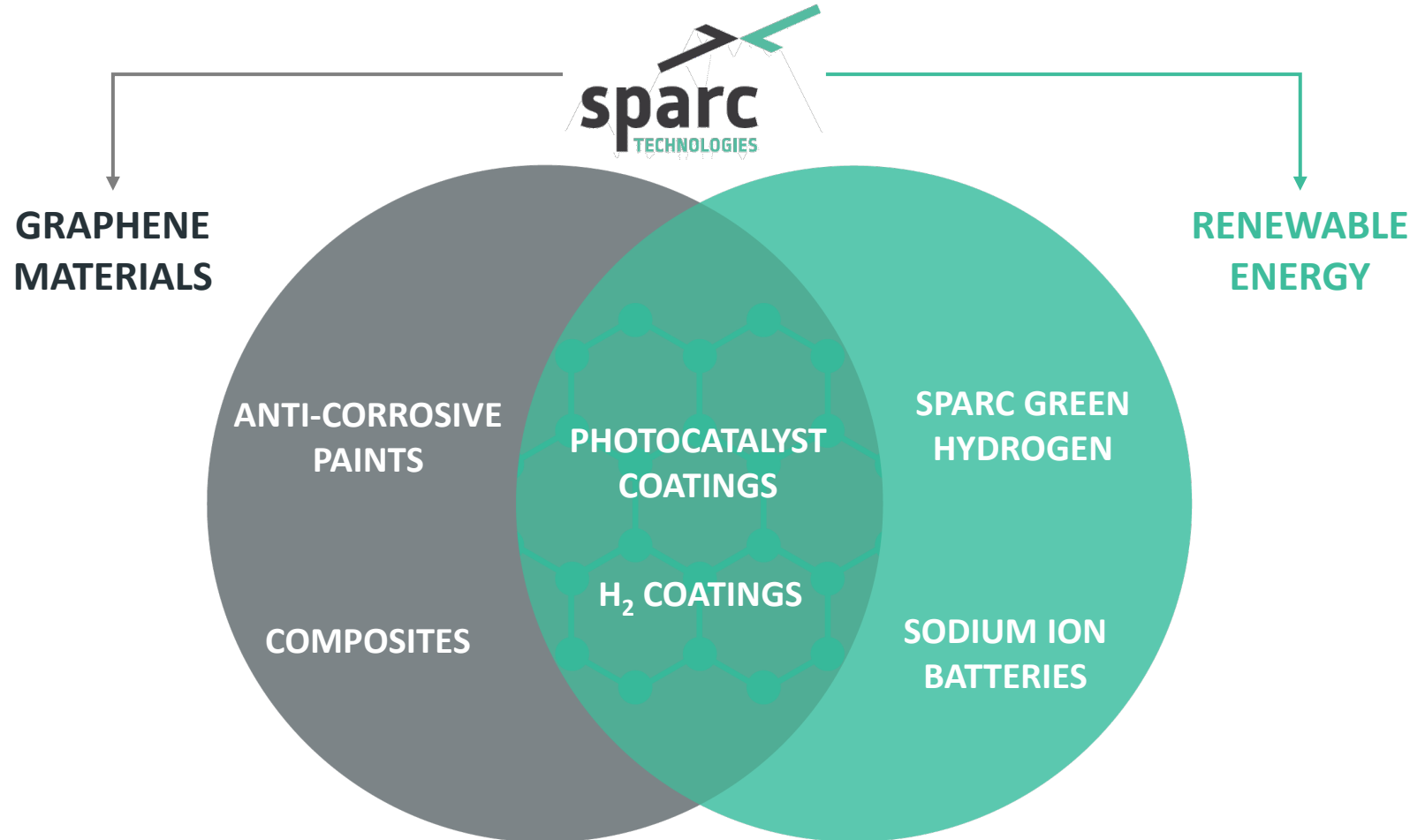
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Sparc is developing a **portfolio of technologies** that target a world increasingly focused on **sustainability** and **environmental outcomes**

Sparc has two core business lines:

Graphene Materials focusing on developing high performance anticorrosive paints and other protective coatings

Renewable Energy with a majority shareholding in Sparc Hydrogen and an emerging project in sodium ion batteries



Sparc's Target Markets



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Graphene Materials



COATINGS (PAINT)

- ▶ **Marine & Protective Coatings:** Graphene enhanced coatings suitable for steel infrastructure in corrosive environments including offshore, coastal and above-water
- ▶ **Antifouling:** Graphene enhanced environmentally friendly coatings for underwater applications i.e. large ship hulls



COMPOSITES

- ▶ Graphene enhanced **carbon fibre** and **polymer composites** with a multitude of applications
- ▶ Graphene is demonstrated to improve strength, flexibility, elasticity and/or conductivity

Renewable Energy



HYDROGEN

- ▶ **52% shareholder in Sparc Hydrogen**, a joint venture with Fortescue Future Industries and the University of Adelaide
- ▶ Next generation green hydrogen technology using only sunlight, water and a photocatalyst
- ▶ Process does not use electricity to split water



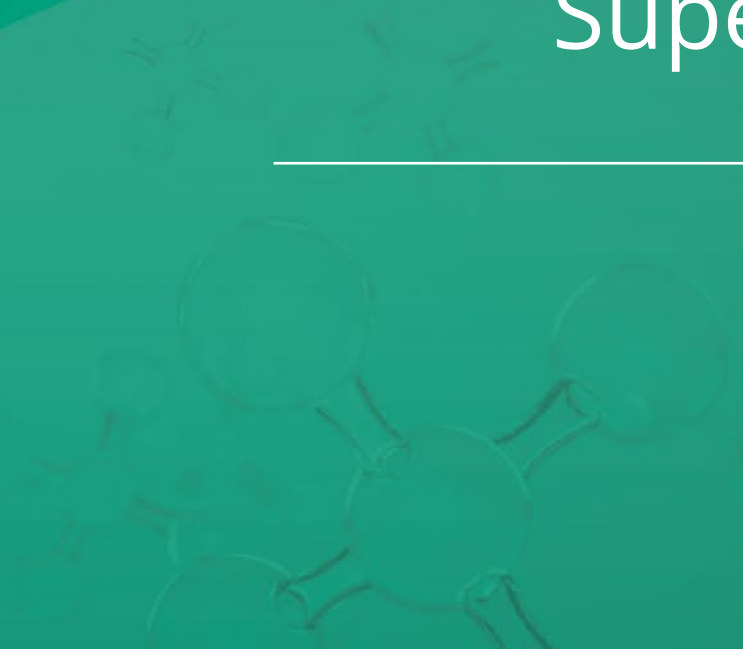
BATTERIES

- ▶ **Sustainable Hard Carbon Anode Project** with Queensland University of Technology
- ▶ High performing, low cost, sustainable anode material for next generation sodium ion batteries (SIBs)
- ▶ Significant potential to replace Li-ion batteries in certain applications

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GRAPHENE

Unique Approach to
a Next Generation
Super-material



Market Ready Product



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Sparc has developed **ecosparc**[®], a *graphene based additive* for targeted applications within **anticorrosive paints** and **composites**

ecosparc[®]

- ▶ **Commercial production** facility commissioned in March 2023
- ▶ Extensive product testing to **ISO standards**
- ▶ **Drop-in** product into existing manufacturing processes
- ▶ Proven up to **40% improvement in anti-corrosive performance** leading to:
 - Extending life to first maintenance
 - Lower paint and maintenance costs for asset owners
 - Reduced carbon footprint
- ▶ Significant testing, engagement and validation with **target customers**

Substantial Anti-Corrosive Improvement



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Up to 40% improvement in anticorrosive performance of coatings subjected to globally recognised ISO standards testing with **ecosparc**[®]

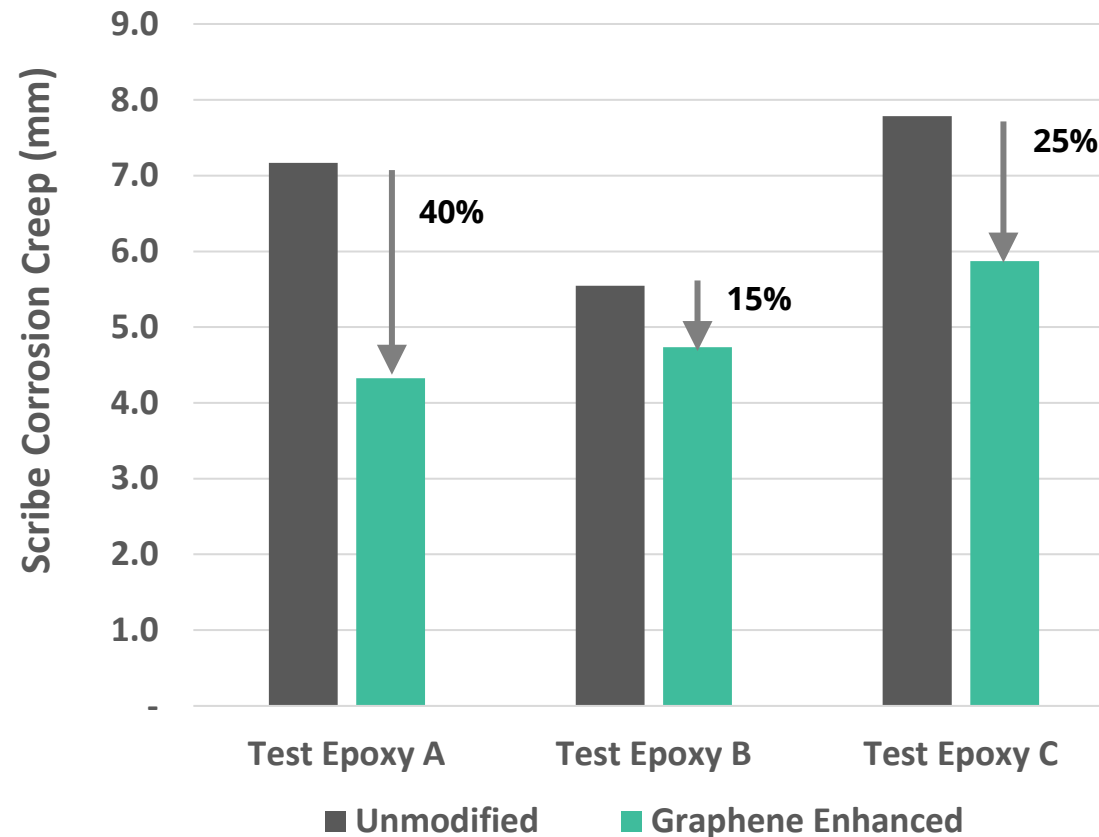
Epoxy coatings used for testing are commercially available from global manufacturers

Drop in **ecosparc**[®] additive does not require re-qualification of any particular paint formulation

Improved anticorrosive performance translates into an extension in the life of a coating thereby *'time to first maintenance'*

▶ This drives **lower lifetime cost** for asset owners both in terms of volume of paint used and maintenance costs and **delivers environmental and sustainability benefits**

Scribe Corrosion Creep ISO12944-6: 4,200 Hours



*Chart illustrates improvement in corrosion performance achieved by addition of a Sparc graphene-based additive to commercially available anticorrosive coatings.

**Note: the 6-month (4,200 hours) test referenced above is designed to simulate high durability performance (15-25 years' service) in severe offshore environments, e.g., offshore oil platforms, wind towers and bridges.

Significant Addressable Markets



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1. Sourced from Coatings World 2022 <https://www.coatingsworld.com/heaps/view/10269/1/>
 2. Sourced from Exactitude Consultancy <https://exactitudeconsultancy.com/reports/3960/anti-corrosion-coatings-market/>
 3. Sourced from Research and Markets 2016 <https://www.prnewswire.com/news-releases/australia-us11-billion-corrosion-protective-coatings-cpc-acid-proof-lining-apl-market-analysis-and-opportunity-assessment-2016-2026---research-and-markets-300345758.html>

Manufacturing Facility Commissioned

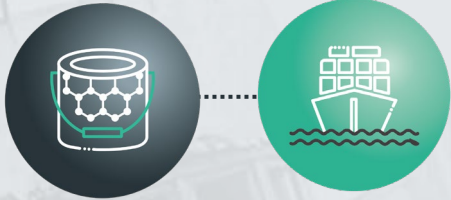


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- ▶ **ecosparc**[®] commercial production facility now **fully commissioned**
- ▶ Facility enables Sparc to provide various grades and commercial quantities of **ecosparc**[®] for trials with global coatings companies and support nearer term commercial opportunities with domestic customers
- ▶ Ability to manufacture sufficient **ecosparc**[®] materials to modify millions of litres of paint annually
- ▶ Results from **testing and qualification work with multiple global and domestic paint companies** expected during H2 2023

Other Target Applications



Anti-fouling Paints

- ▶ Fouling is the result of accumulation of marine growth, resulting in reduced vessel speed, increased bunker consumption and the accrual of cleaning costs
- ▶ Sparc is developing antifouling technology which would substantially reduce fouling on marine vessels and structures
- ▶ Global market size is estimated to be growing at 8.2% CAGR reaching US\$13.5bn in 2028¹



Composites

- ▶ Two or more distinct materials that, when combined, create a new material with enhanced properties
- ▶ Composite materials are widely used in aerospace, automotive, construction, and other industries where high performance and lightweight materials are required
- ▶ Sparc's graphene additives are being tested in multiple applications targeting improved flexibility, strength, conductivity and elasticity

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World Leading Team & Partners

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- ▶ World leading team of graphene and coatings specialists coupled with market knowledge
- ▶ Fully functioning laboratory with coatings testing performed to ISO standards
- ▶ Sparc subsidiaries established in the USA and UK in support of commercial activities
- ▶ Strategic Partnership Agreements with the University of Adelaide and QUT and ongoing work with other world-leading Australian Universities



Sparc's Unique Graphene Position



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Production of commercially applicable graphene based materials



Established expertise in **graphene**



Comprehensive in-house testing delivering **industry recognised data**



Know-how that supports safe handling and **commercial manufacture**



Ongoing product testing supporting **commercial adoption by global customers**



Patent application for graphene based additive filed

Next Generation Super-material



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WHAT IS GRAPHENE?

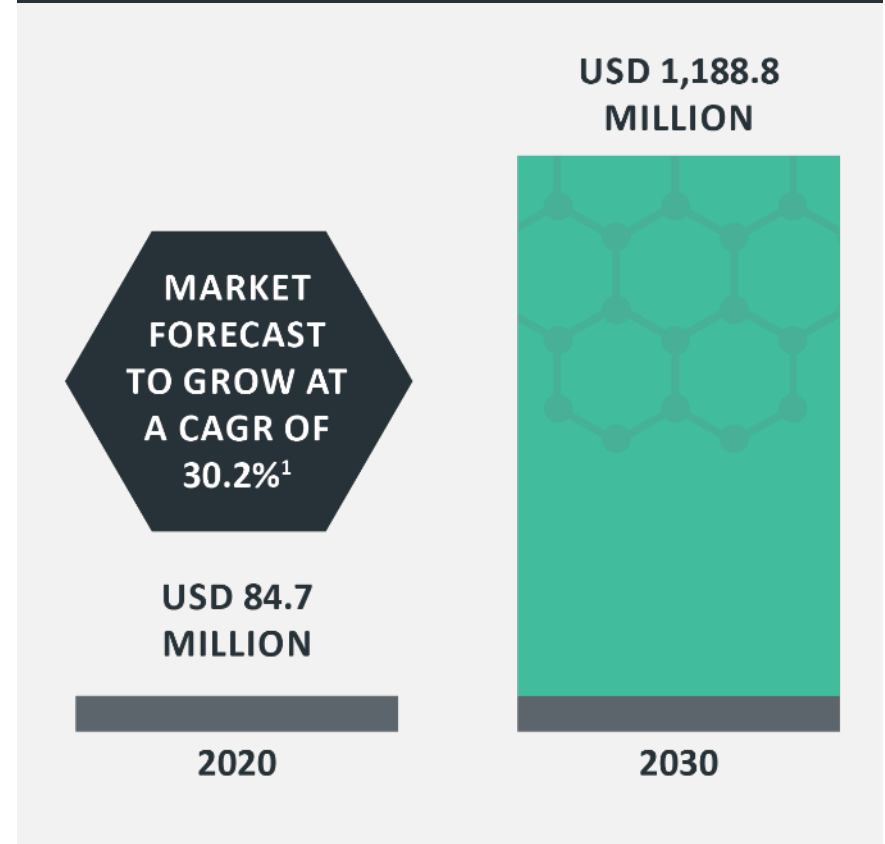
Graphene is a 2D material made of carbon atoms arranged in a hexagonal lattice which creates unique and powerful properties capable of transforming and disrupting global industries.



PROPERTIES OF GRAPHENE



GRAPHENE MARKET



1 <https://www.researchandmarkets.com/reports/5128907>

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SPARC GREEN HYDROGEN

Next Generation Green Hydrogen Technology

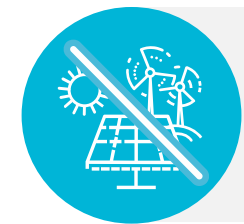


Technology Highlights

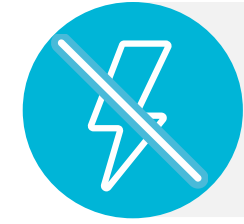


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- ▶ **Globally disruptive** green hydrogen technology
- ▶ **NO ELECTRICITY REQUIRED** to split water
- ▶ Opportunity for **scalable deployment and efficient resource use**
- ▶ **Prototyping and pilot development** underway
- ▶ Targeting a system with **industry leading costs**



No Wind or Solar PV Farms



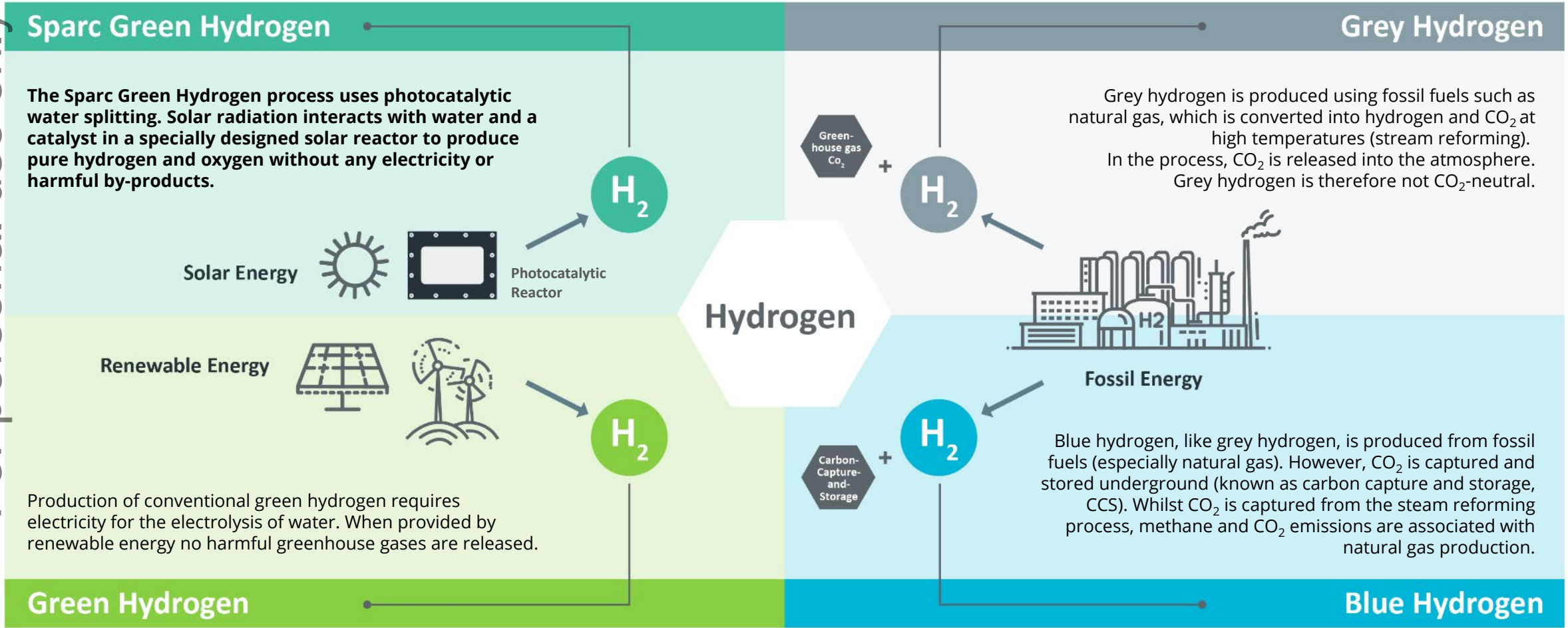
No Electrolyzers

The bottom section of the slide features a light blue rounded rectangle containing four logos. On the left is the SPARC Technologies logo, which includes the stylized lightning bolt icon above the text 'sparc TECHNOLOGIES'. To its right is the Fortescue Future Industries logo, consisting of the text 'FORTESCUE FUTURE INDUSTRIES' and a green circular icon. Below these are the logos for The University of Adelaide and Flinders University, each featuring a crest and the university's name.

The 'Colours' of Hydrogen



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Sparc Green Hydrogen Advantages

“Such systems (**photocatalytic water splitting**) offer great potential for cost reduction of electrolytic hydrogen, compared with conventional two-step technologies.” (CSIRO National Hydrogen Roadmap¹)

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| | Sparc Green H ₂ | Green H ₂ | Blue H ₂ | Grey H ₂ |
|--|----------------------------|--|---|--|
| Description | Photocatalysis | Wind and solar farms with electrolysis | Using SMR with CCS* | Steam methane reforming |
| Feedstock | ✓ Water | ✓ Water | ✗ Natural gas, Water | ✗ Natural gas, Water |
| By-product | ✓ Oxygen | ✓ Oxygen | • Emissions sequestered | ✗ CO ₂ , NO _x , SO _x , PM |
| Scope 1 & 2 emissions² | ✓ Nil | ✓ Nil | ✗ 0.76kg CO ₂ / 1kg H ₂ | ✗ 8.5kg CO ₂ / 1kg H ₂ |
| Location | ✓ Solar resource | ✗ Solar +/- wind & HV infrastructure | ✗ Natural gas source and suitable storage | ✗ Natural gas source |
| Requisite scale | ✓ Scalable | ✗ Very large | ✗ Very large | ✗ Large |

* Carbon capture and storage

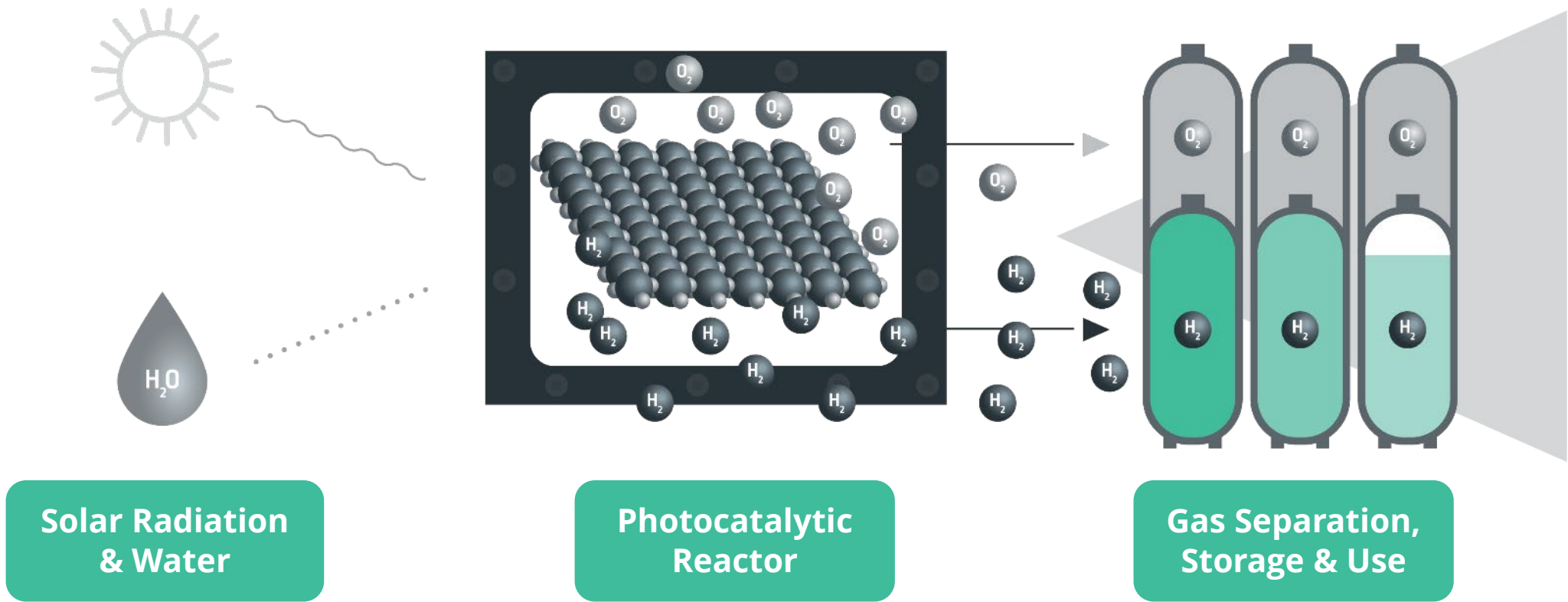
1 Sourced from Bruce S, Temminghoff M, Hayward J, Schmidt E, Munnings C, Palfreyman D, Hartley P (2018) National Hydrogen Roadmap. CSIRO, Australia
 2 Sourced from Commonwealth of Australia, 'Australia's National Hydrogen Strategy', 2019

What is Photocatalytic Water Splitting (PWS)



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Sparc Green Hydrogen utilises photocatalytic water splitting (or artificial photosynthesis) to split water into hydrogen and oxygen, using sunlight



WATCH SPARC GREEN HYDROGEN VIDEO HERE: <https://sparctechnologies.com.au/sparc-green-hydrogen/>

Sparc Hydrogen's Unique Approach to PWS

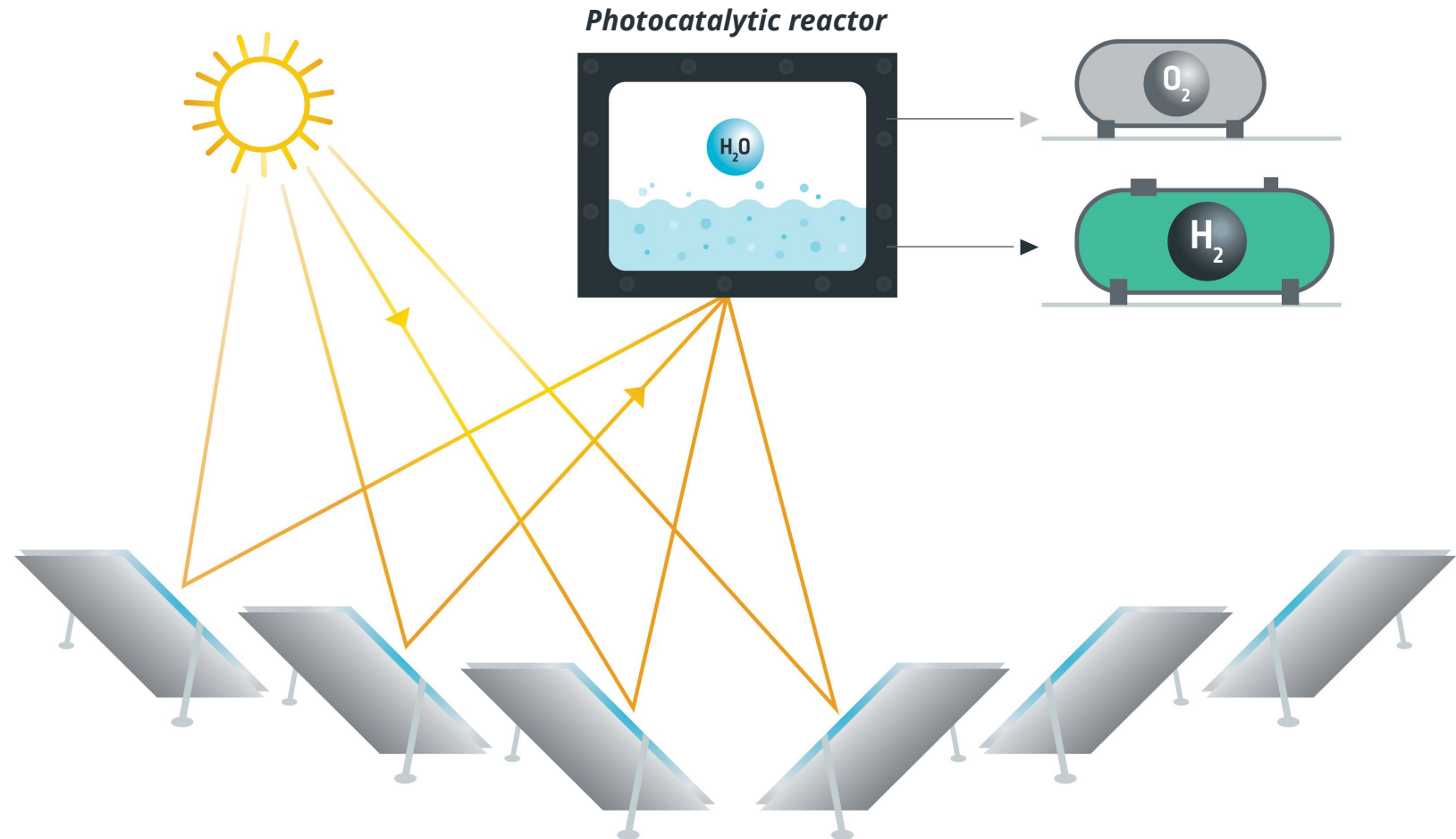


The Sparc Green Hydrogen process is one of the only known technologies globally combining **concentrated solar (CS)** with **photocatalytic water splitting**

Key breakthrough which allows for reduced photocatalyst use and integration with existing concentrated solar systems

Sparc Hydrogen's reactor is being designed to:

- allow testing of new and improved photocatalysts as they are developed
- 'slot into' a linear Fresnel CS field





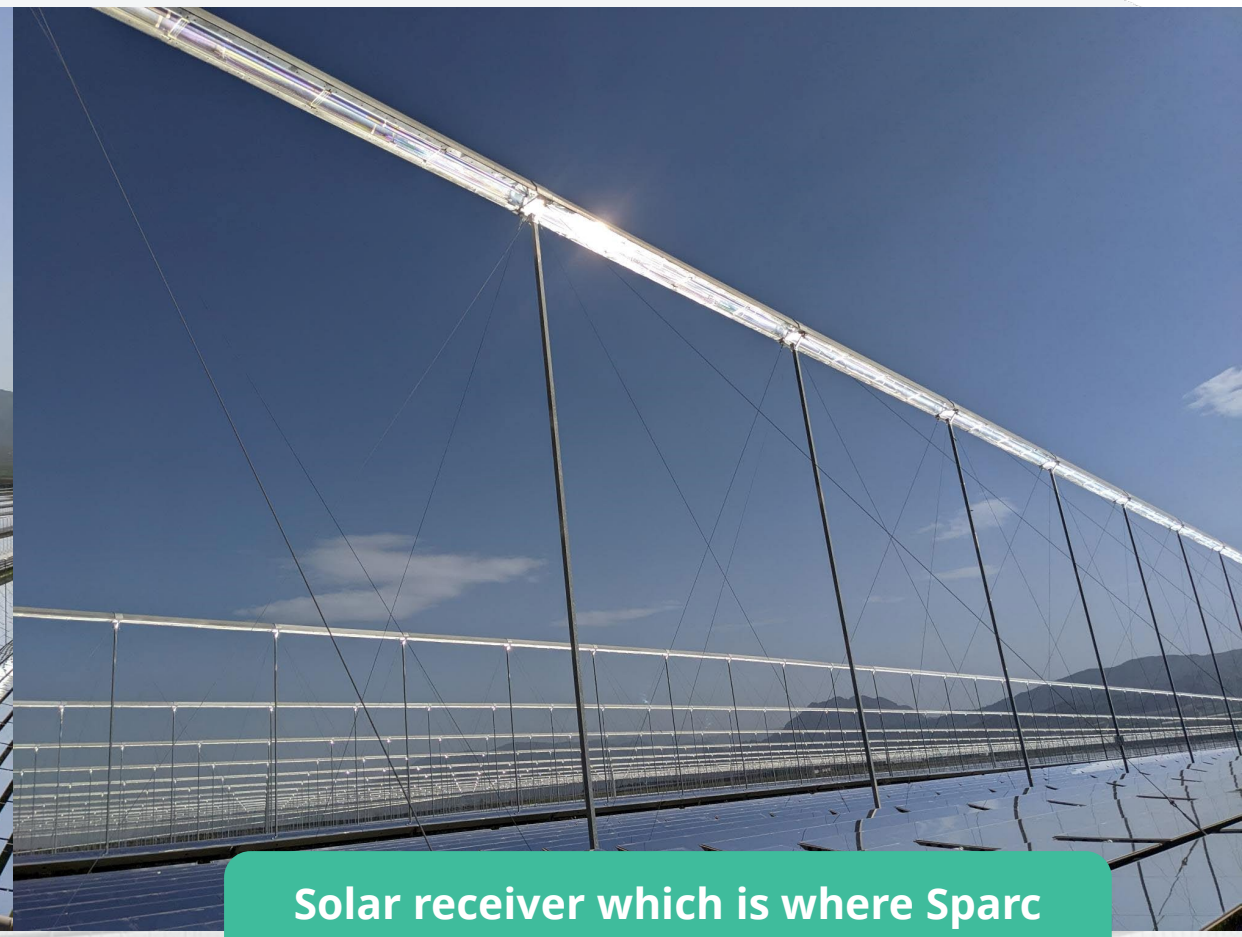
Sparc Hydrogen's Unique Approach to PWS

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Site visit photos from a linear fresnel CS field in Europe



Demonstrating the scale of the mirror field



Solar receiver which is where Sparc Hydrogen's PWS reactor would be used

Development Pathway



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✓
Sparc Hydrogen JV established in Q1 2022



✓
Preliminary TEA **confirms commercial potential** in Q4 2022



Development of **solar reactor prototype** for on-sun testing in **mid 2023**



Pilot plant development; construction decision due late 2023 / early 2024





Best-in-Class Partners

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- ▶ 52% Sparc Hydrogen shareholder¹
- ▶ JV management and coordination
- ▶ Technology commercialisation expertise



- ▶ 20% Sparc Hydrogen shareholder¹
- ▶ Global leader in green hydrogen
- ▶ Substantial project development experience



- ▶ 28% Sparc Hydrogen shareholder¹
- ▶ Contributor of IP²
- ▶ Leading R&D work and facilities

1. Stage 1 shareholdings; refer to SPN ASX release 2 February 2022
2. Together with Flinders University

The Green Hydrogen Race is on...



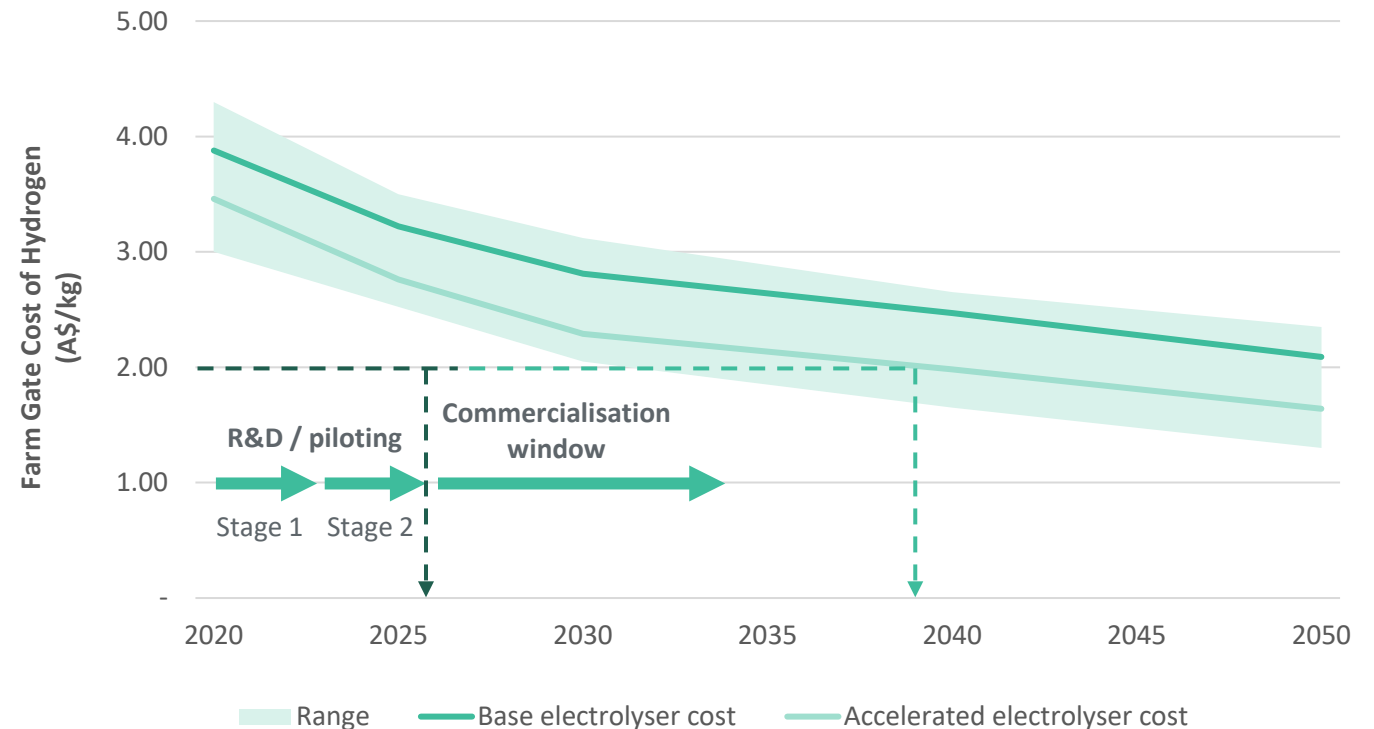
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Based on a 2021 report by Advisian, 'conventional' green hydrogen (electrolysis) projects will not reach industry cost targets until the **late 2030s**, at best

There is a **substantial window of opportunity** for new technologies such as Sparc Green Hydrogen to commercialise low-cost hydrogen production

Sparc Hydrogen is also well placed to benefit from funding support from the US, EU and other jurisdictions with clean hydrogen policies

Forecast cost of green hydrogen via electrolysis¹



Sparc Green Hydrogen



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Disruptive
green
hydrogen
technology



World leading
partners
in green
hydrogen



More flexible
and scalable
with less
infrastructure



Targeting
industry leading
low cost of H₂
production

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SODIUM ION BATTERIES



Sustainable Hard Carbon Anode Project

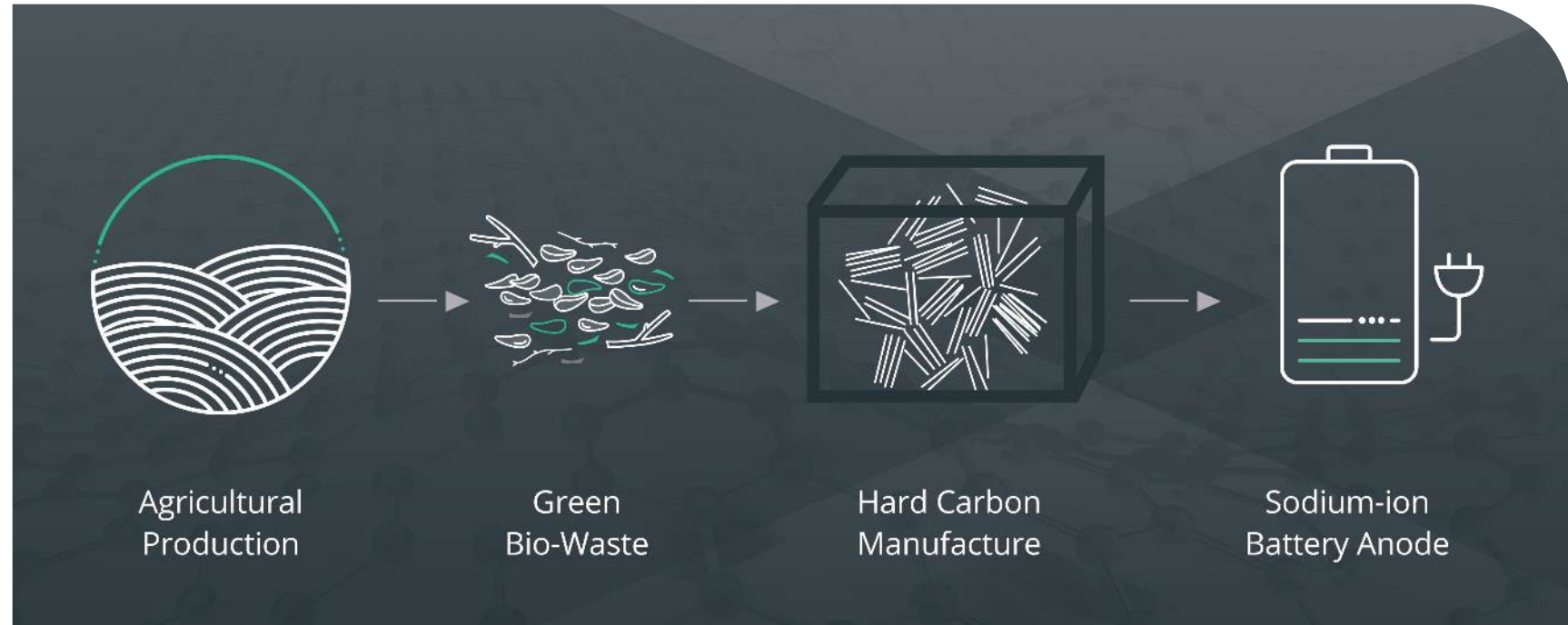


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Sparc, in collaboration with QUT, is developing a hard carbon material using low cost, sustainably sourced green bio-waste for the **sodium ion battery** industry

Production process significantly reduces processing time and energy use compared to existing methods

Sodium ion batteries have been identified by Sparc as an attractive future battery technology with advantages in grid and industrial scale applications



Lower cost and greater availability of raw materials

Safety and ease of transport

Similar manufacturing techniques to Li-ion

Sodium-Ion Battery Advantages



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Increasing interest in US, EU and Asia in developing sodium-ion battery technology as an alternative to lithium-ion

The use of lower cost, sustainable, abundant materials in sodium-ion batteries is a key advantage

Commercialisation is expected in 2023 from large battery producers including CATL, BYD, Reliance Industries and HiNa

- ▶ Sparc's exposure to sodium-ion batteries is a differentiator in the Australian market

| Parameters | Lead Acid | Lithium ion | Sodium ion |
|-------------------------------------|---|---|--|
| Materials Cost | Low | High | Low ✓ |
| Energy Density | Low | High | Moderate/High |
| Safety | Moderate | Low | High ✓ |
| Materials Availability | Toxic | Scarce / Critical Minerals | Earth-abundant ✓ |
| Stability | Moderate (high self-discharge) | High (negligible self-discharge) | High (negligible self-discharge) ✓ |
| Round Trip Energy Efficiency | Low (< 75%) | High (> 90%) | High (> 90%) ✓ |
| Temperature Range | -40 °C to 60 °C | -25 °C to 40 °C | -40 °C to 60 °C ✓ |
| Remarks | Mature technology; fast charging not possible | Transportation restrictions; critical materials | Less mature but developing as an alternative to Li-ion |

Source: adapted from www.evreporter.com

Momentum Building in Sodium-Ion



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Reliance
Industries Limited

"acquires battery tech firm Faradion for GBP100m"

Dec-21



MERCURIA

"Invests in Natron Energy's Sodium-Ion Battery Technology"

Nov-22



"BYD to launch electric hatchbacks with new Sodium-ion batteries"

Dec-22



"begins operation of NAS batteries for self-wheeling of renewable energy"

Jan-23

Jul-21

Oct-22

Dec-22

Feb-23



"Unveils Its Latest Breakthrough Technology by Releasing Its First Generation of Sodium-ion Batteries"



"Will Mass Produce Sodium-Ion Batteries in 2023"



"United Airlines is investing in sodium-ion battery development"



"Hina Battery becomes 1st battery maker to put sodium-ion batteries in EVs in China"



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