Transformational Technologies for Global Industries

April 2024

ASX: SPN

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Corporate Snapshot

86m
Shares on issue

$24m
Market Cap*

$0.28
Share price*

$2.3m
Cash**

~38.5%
Top 20 s/holders

7.7%
University of Adelaide

BOARD OF DIRECTORS

Nick O'Loughlin
Managing Director

Stephen Hunt
Non-Exec Chairman

Daniel Eddington
Non-Exec Director

EXECUTIVE MANAGEMENT TEAM

Denis Wright
General Manager
Graphene Materials

Kristen Kubank
Chief Financial Officer

Paul Baccanello
Innovation, Growth & Sustainability

* As at 17 April 2024

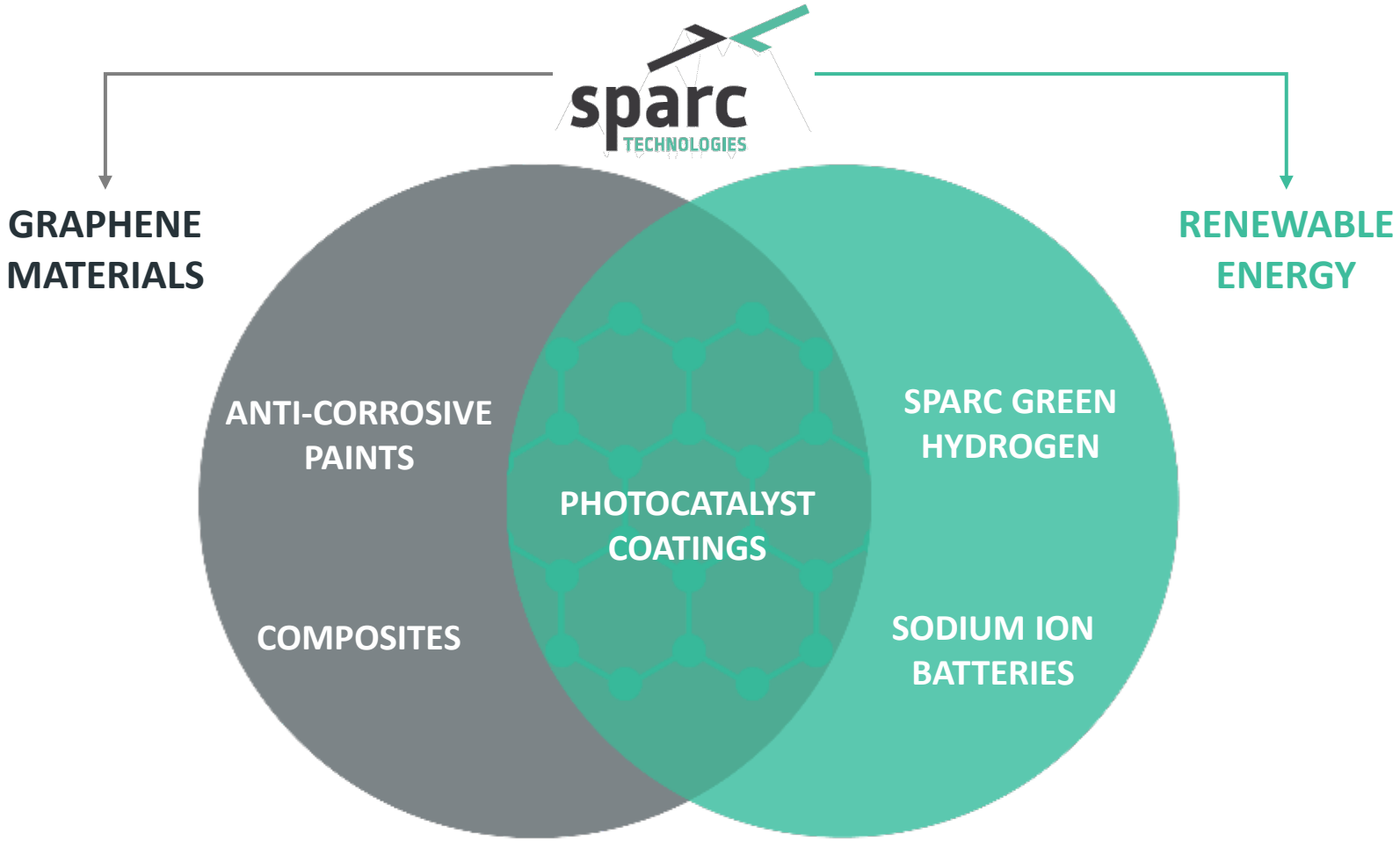
** As at 31 December 2023 adjusted for R&D rebate announced 23 January 2024

Unique Technology Portfolio

- Sparc is developing a **portfolio of technologies** that target a world increasingly focused on **sustainability** and **environmental outcomes**
- Sparc has two core technology focuses:

  Graphene Materials developing additive for high performance anticorrosive paints and other protective coatings

  Renewable Energy photocatalysis to produce green hydrogen and sodium ion batteries



SPARC GREEN HYDROGEN

Next Generation Green Hydrogen Technology

sparc TECHNOLOGIES

Fortescue.

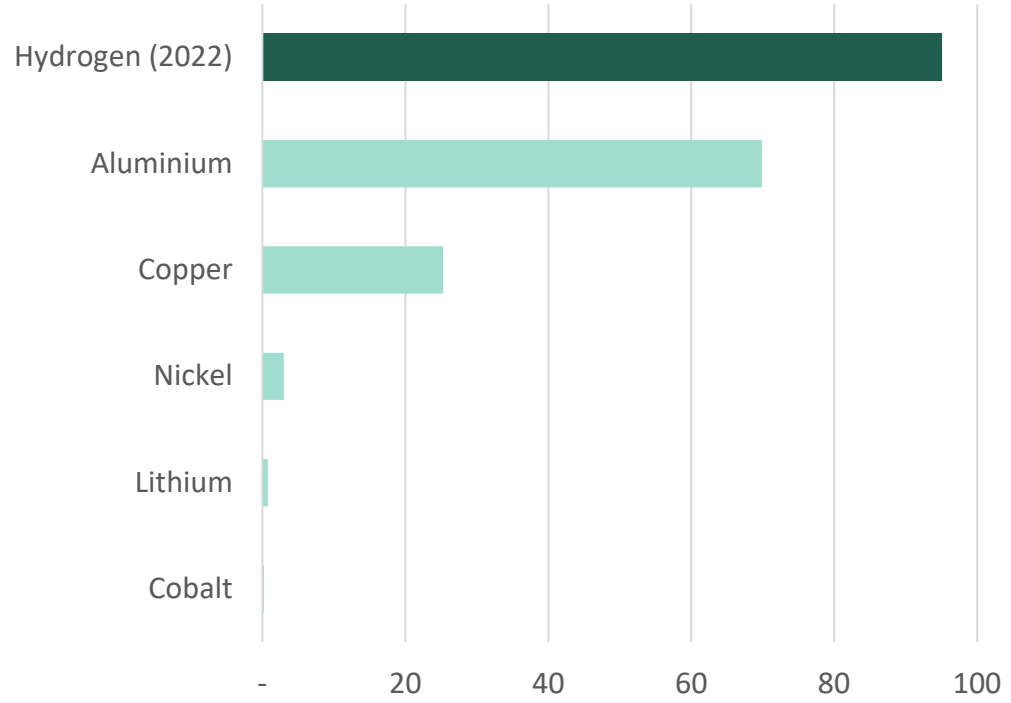
THE UNIVERSITY of ADELAIDE

Flinders UNIVERSITY

Why is **Green** Hydrogen Required?

- Hydrogen (H_2) is **currently a ~95Mtpa** global market
- It is primarily used as a feedstock in ammonia, petroleum refining and heavy industry
- Current production of hydrogen generates **>1Gt of annual CO_2** emissions (2.5% of global emissions), on par with the entire aviation sector
- There is an urgent need to decarbonize the current hydrogen industry through 'green' hydrogen
- Green hydrogen is considered key to decarbonizing **hard-to-abate industries** such as steelmaking, chemicals, cement, high-temperature heating, aviation, shipping, and heavy road transport which could see **demand increase 6x by 2050**[1]

Commodity demand (Mtpa)



Source: Public filings

1. Green hydrogen: Energizing the path to net zero, Deloitte Economics Institute, 2023

The Problem – Electrolysis

Significant barriers remain before green hydrogen via electrolysis is commercially and technically ready at scale

Transmission lines

- Social licence issues
- Lengthy development times

Solar PV + Wind + Batteries

- Mature technologies
- Limited cost improvements
- Social licence issues
- Supply chain risks

Electrolysers

- Expensive
- RE compatibility issues
- Yet to be effectively scaled
- Supply chain risks

Introduction to Sparc Hydrogen

- **Globally disruptive** green hydrogen technology
- **NO ELECTROLYSER** required
- Flexible and **scalable infrastructure**
- Huge potential to deliver **industry leading costs**
- **Best-in-class partners**

No Wind or Solar PV Farms

No Electrolysers

sparc TECHNOLOGIES

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Best-in-Class Partners

- 52% Sparc Hydrogen shareholder[1]
- JV management and coordination
- Technology commercialisation expertise

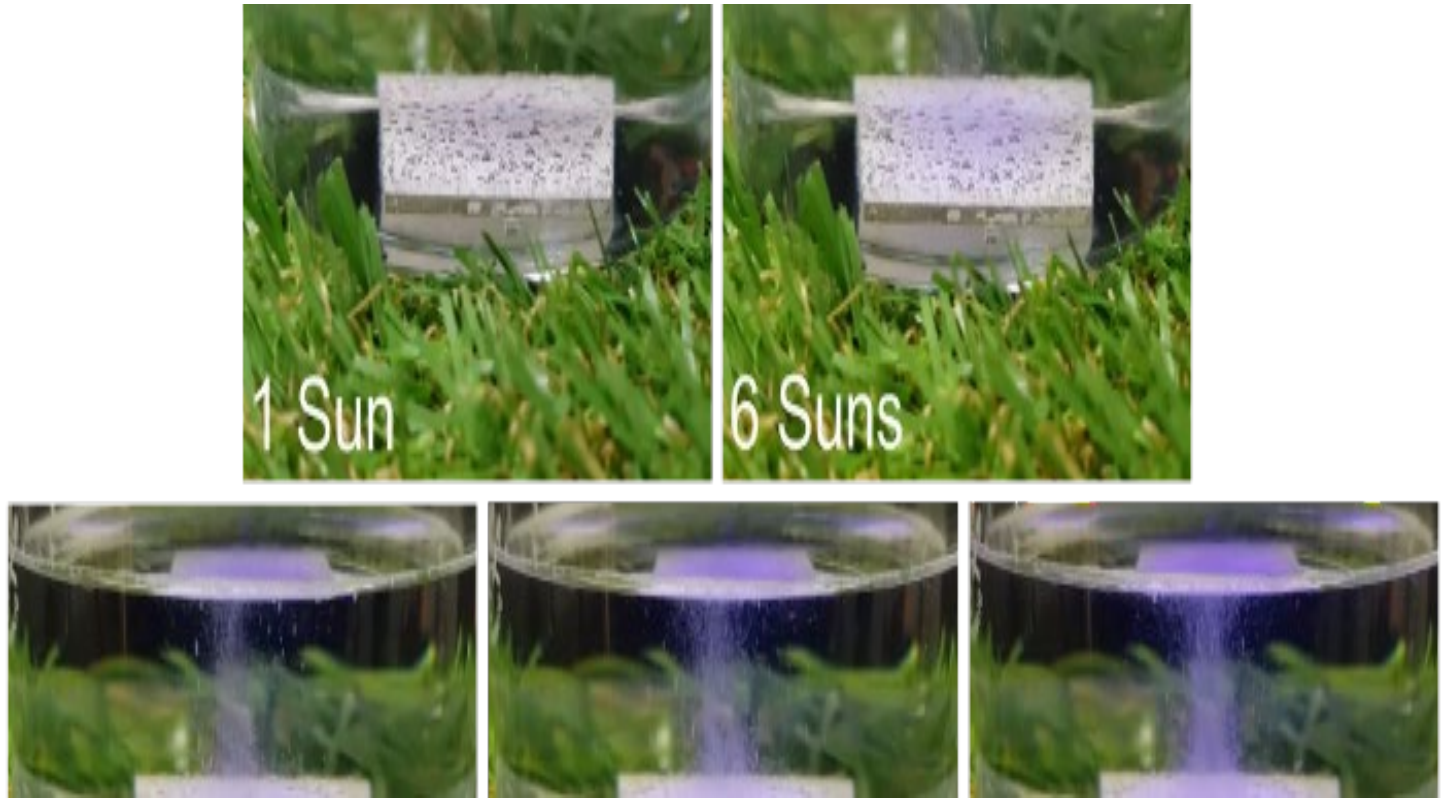
- 20% Sparc Hydrogen shareholder[1]
- Global leader in green hydrogen
- Substantial project development experience

- 28% Sparc Hydrogen shareholder[1]
- Developer and contributor of IP[2]
- Leading R&D work and providing lab facilities

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

Sparc Hydrogen's Unique Approach

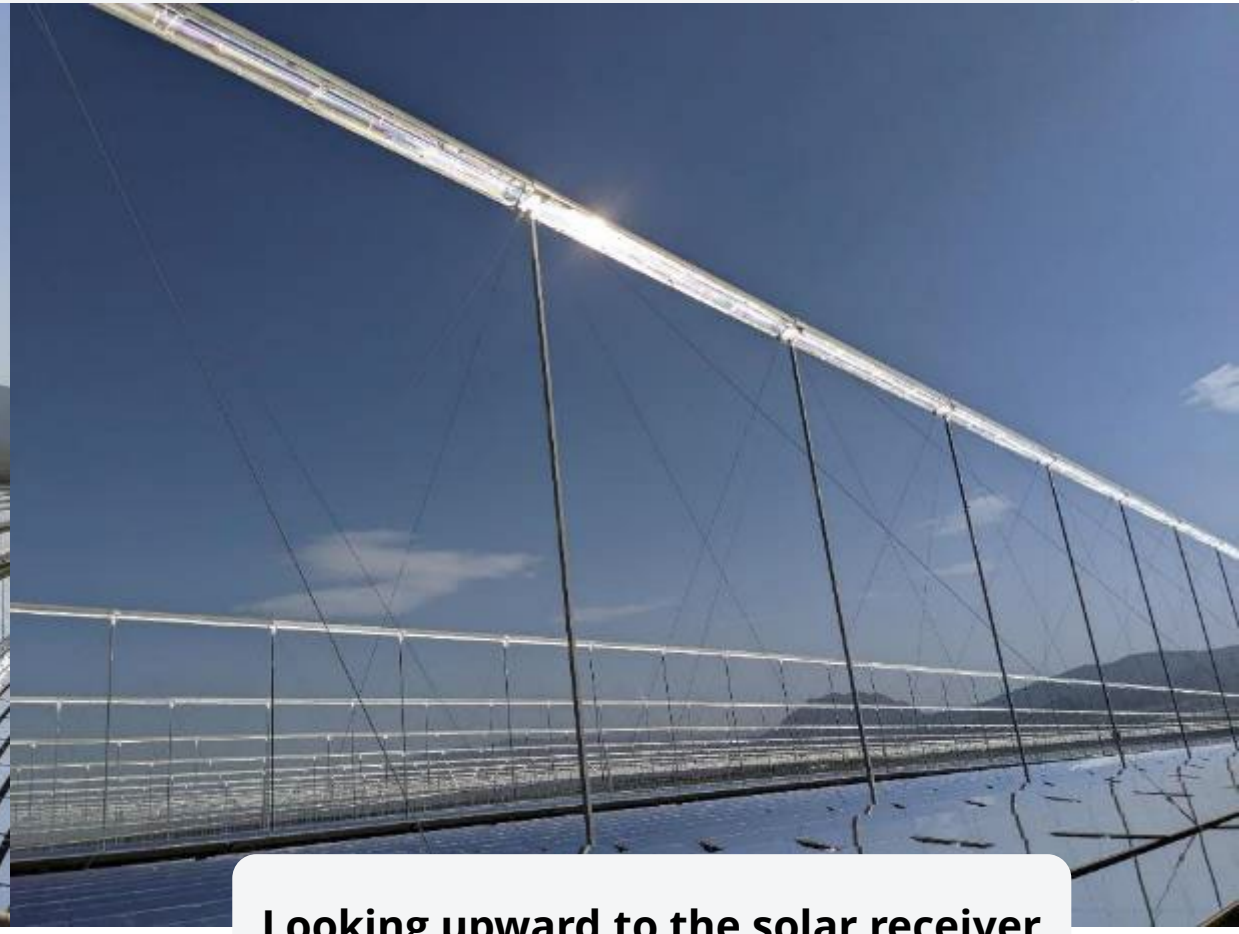
- Sparc Hydrogen is one of the only companies combining concentrated solar with photocatalytic water splitting (PWS), advantages being:
  - Reduced photocatalyst use.
  - Modular and scalable mirror fields.
- Sparc Hydrogen's reactor is being designed to:
  - Slot into an off-the-shelf linear Fresnel field.
  - Utilise by-product heat for industry use or power generation.
- Sparc Hydrogen is working with a leading photocatalyst developer incorporating their materials into reactor testing.



Sparc Hydrogen's Unique Approach

Site visit photos from a linear Fresnel field in Europe

View overlooking the mirror field



Looking upward to the solar receiver

Prototype Testing at CSIRO Energy Centre

- Sparc Hydrogen recently completed the first phase of prototype testing its PWS reactor at the CSIRO Energy Centre in Newcastle.
- Represents the first demonstration of the technology outside of the laboratory and has produced vital information for reactor scale up towards a pilot plant.
- Prototype has advanced the technology readiness level (TRL)[1] of Sparc Hydrogen's reactor from 4 to 5.
- Support and funding provided through CSIRO's Kick-Start Program.

1 ARENA, Technology Readiness Levels for Renewable Energy Sectors, Commonwealth of Australia (Australian Renewable Energy Agency) 2014

Development Pathway

✓ Sparc Hydrogen joint venture **established beginning 2022**

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

✓ **Reactor prototype** for on-sun testing at CSIRO in **Q4 2023 – Q1 2024**

~A$470k AEA grant funding awarded Oct-23

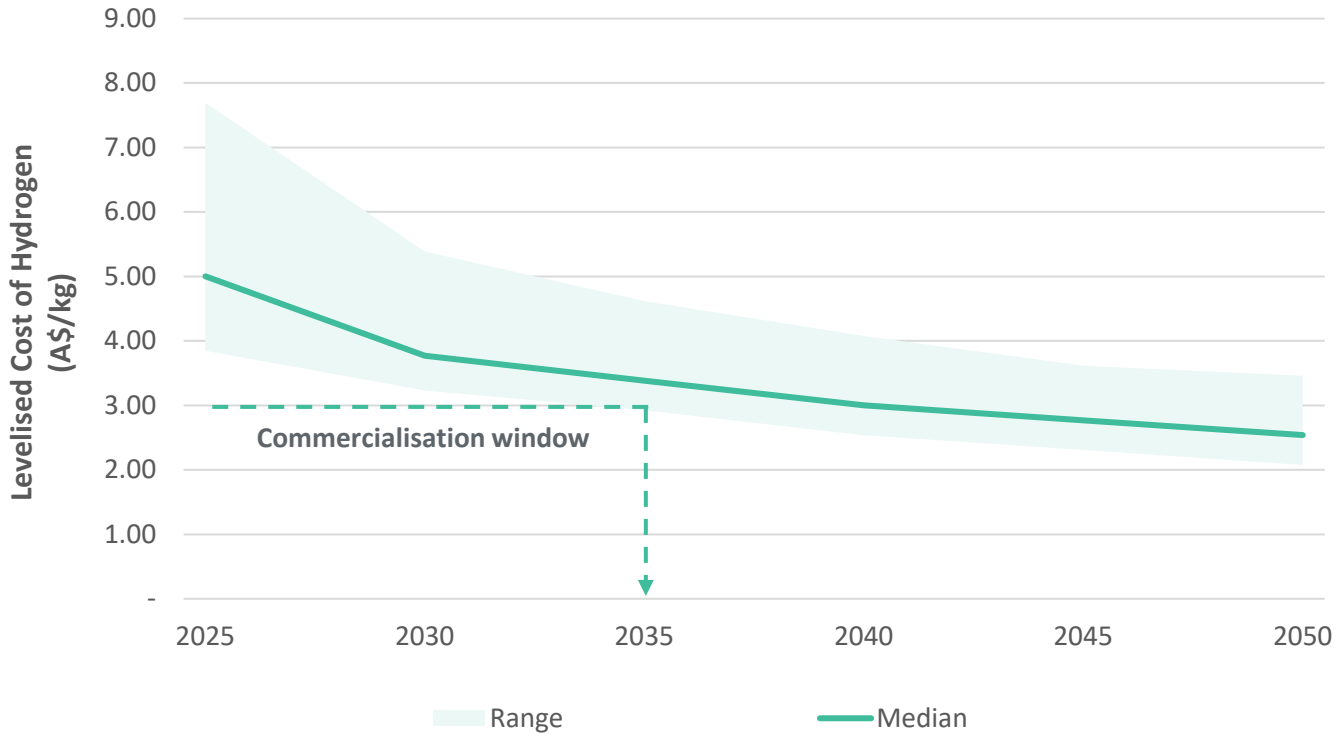
Pilot plant engineering, design and funding workstreams **H1 2024**

Increasing technology and commercial readiness

The Green Hydrogen Race is On

- Conventional green hydrogen (electrolysis) projects will not reach industry and Government cost targets until well into the 2030s, at best.
- There is a **substantial window of opportunity** for **new technologies** such as Sparc Hydrogen to commercialise **low-cost hydrogen** production.
- Sparc Hydrogen is well placed to benefit from funding support from Australia, the US, EU and other jurisdictions with clean hydrogen policies.

Forecast cost of green hydrogen via electrolysis[1]



1. Green hydrogen: Energizing the path to net zero, Deloitte Economics Institute, 2023

GRAPHENE

Unique Approach to a Next Generation Super-material

The Problem – Corrosion of Steel

The Cost and Carbon Problem

- **~$6 trillion** direct and indirect costs associated with the impact of corrosion globally per annum[1]
- Corroded steel replacement accounts for up to **3.4% of global greenhouse gas (GHG) emissions[1]**

The Business Interruption Problem

- Asset shutdowns
- Loss of productivity
- Personnel safety risks

1. Iannuzzi, M., Frankel, G.S. The carbon footprint of steel corrosion. *npj Mater Degrad* **6**, 101 (2022)

Introduction to ecosparc®

Sparc Technologies has developed **ecosparc®** on the back of **>5 years** of research and development.

ecosparc® is a drop-in **graphene-based additive** which is added to currently used **marine and protective coatings** for steel infrastructure.

ecosparc® significantly enhances the anti-corrosive properties of these **paints**.

About ecosparc®

ecosparc® is not a paint and Sparc is not a paint company.

ecosparc®, when added in tiny amounts, supercharges coatings currently used to protect steel assets from corrosion.

The benefits of **ecosparc®**, including cost and emissions savings, are the direct result of **ecosparc®** extending the time between maintenance events.

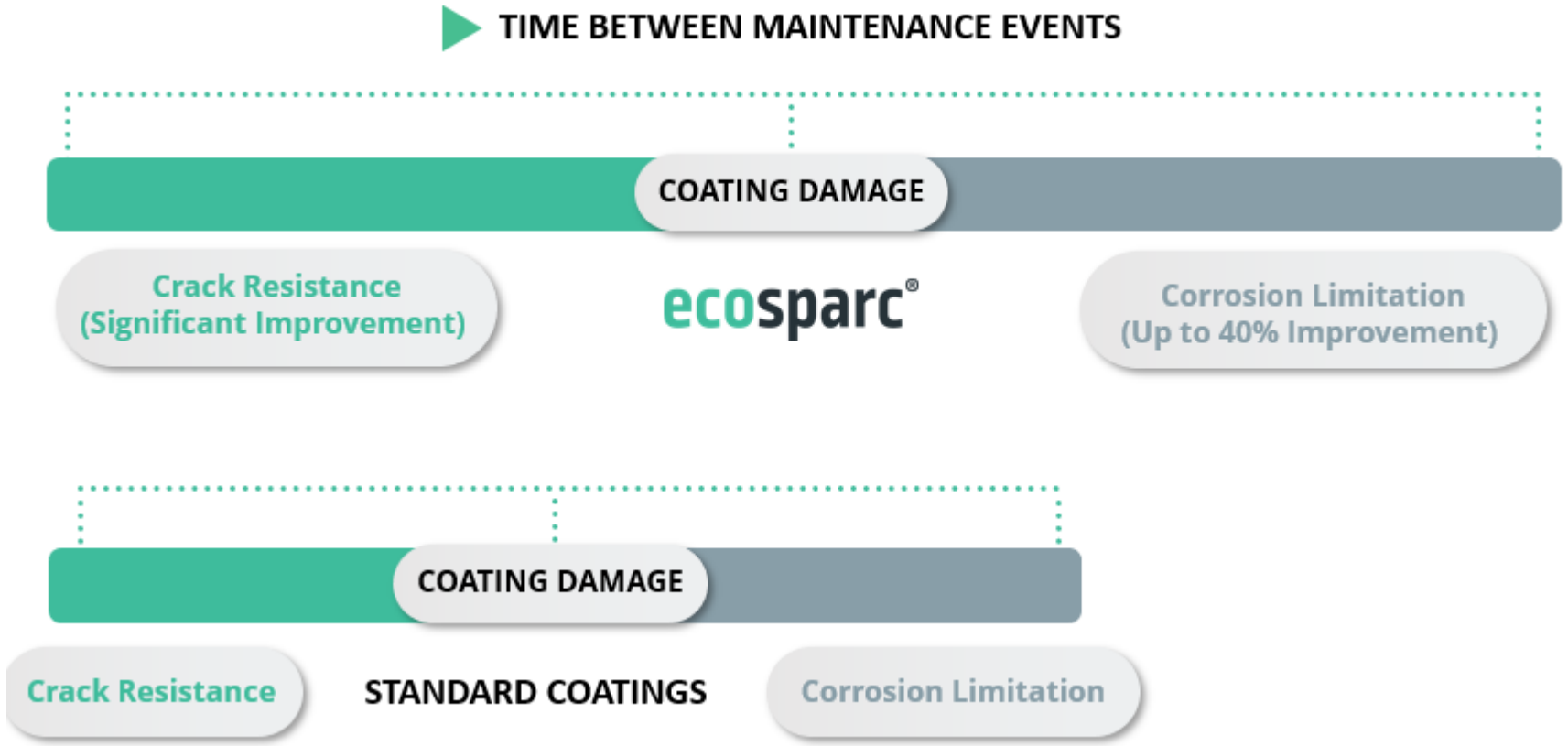
reduction in carbon emissions

lower maintenance costs

Dual Anti-Corrosion Mechanism

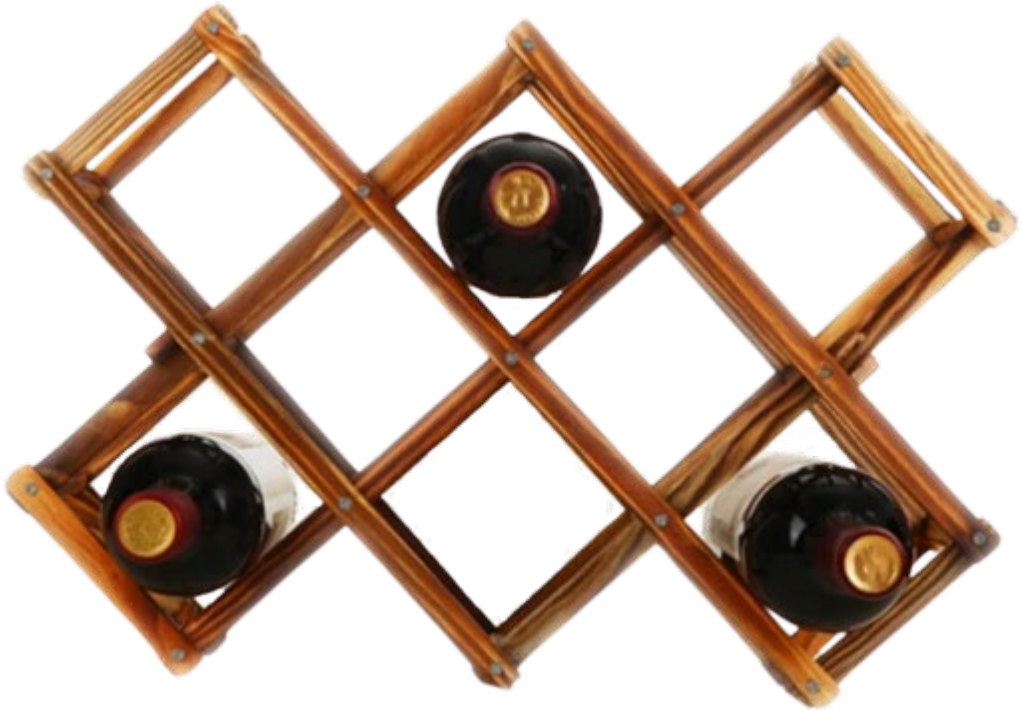
ecosparc enhanced coatings:

- Delay coating cracking. This delays the onset of corrosion.
- When damage does eventually occur, **ecosparc** further limits corrosion spread by up to 40%.[1]



1 See ASX Announcements 23 December 2021 and 28 November 2023

How Graphene Inhibits Cracking



- Wine rack analogy – graphene flexes laterally and takes up stress from the polymer matrix, increasing resiliency

- Fractured surface of graphene modified epoxy at high magnification shows cracks terminating at graphene particles

Ease of Manufacture and Use

- Commercial production facility can produce enough **ecosparc®** to dose **7 million litres of paint** per annum.
- Simple and easy to incorporate into existing coatings with only 2% volume of additive required.
- No change to current paint application or removal methods.

The specialist **ecosparc®** formula is manufactured at our Adelaide facility

Ecosparc is added to conventional coatings at the point of paint manufacture

To produce graphene enhanced high performance coatings

Significant Value-in-Use for Asset Owners

LCA CASE STUDY[3]

- Independent lifecycle assessment (LCA) completed in August 2023
- Modelled impact of using **ecosparc®** enhanced paint on a major Australian port with 57,883m^2 of re-coatable steel
- Cost and emissions savings over 50-year asset life were based on a 26% improvement in corrosion resistance leading to reduced maintenance events[4]

LESS MATERIALS USED

FEWER MAINTENANCE EVENTS

LONGER LASTING ASSETS

~750t

Lifetime reduction in carbon emissions[1]

~A$34m

Lifetime savings in steel recoating costs[1,2]

1 Bontick, P.A. (2023), Carbon footprint of ecosparc graphene additive for protective coating applications, Lifecycles, Melbourne, Australia
2 Cost savings accruing from both the reduction in paint use and fewer maintenance events
3 See ASX Announcement 30 August 2023
4 See ASX Announcement 12 September 2023

Field Trials

- Sparc and the South Australian Department for Infrastructure and Transport (**DIT**) are conducting collaborative field trials involving the application of **ecosparc®** enhanced coatings on Streaky Bay Jetty and West Beach Bridge.
- The DIT has approximately A$45 billion in assets in South Australia.

Government of South Australia
Department for Infrastructure and Transport

Streaky Bay Jetty, Eyre Peninsula, SA

West Beach Bridge, Adelaide, SA

Pathway to Market

Dual track approach to commercialising ecosparc® within the US$43 billion[1] global anti-corrosive coatings market:

1. Actively working with global tier 1 **coatings companies**, regional coatings companies and additive suppliers on testing and trials.

2. Partnering with large **asset owners** to test **ecosparc®** on relevant steel infrastructure under real-world conditions via field trials. Infrastructure owners being targeted include government, defence, mining, and oil and gas companies.

1. Estimate of the global anti-corrosion coating market by 2029. Sourced from Exactitude Consultancy https://exactitudeconsultancy.com/reports/3960/anti-corrosion-coatings-market/

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 2028[1]

Composites

- Composites are 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

1. Sourced from imarc group 2022 https://www.imarcgroup.com/antifouling-paints-coatings-market

Sparc's Unique Position in Graphene

Based in Kent Town, Adelaide

Commercial additive manufacturing facility

>120 years of global coatings experience

IP barriers and protection

SODIUM ION BATTERIES

Emerging Low-Cost Alternative to Lithium-ion Batteries

The Problem – Lithium Ion Batteries

"Faulty ebike battery sparks fire that guts Sydney apartment" (Dec-23, The Guardian)

"Water shortage: Chile's lithium industry in the Atacama Desert under scrutiny" (May-23, The Rio Times)

"Local miner in strategic review as lithium price loses charge" (Dec-23, InDaily)

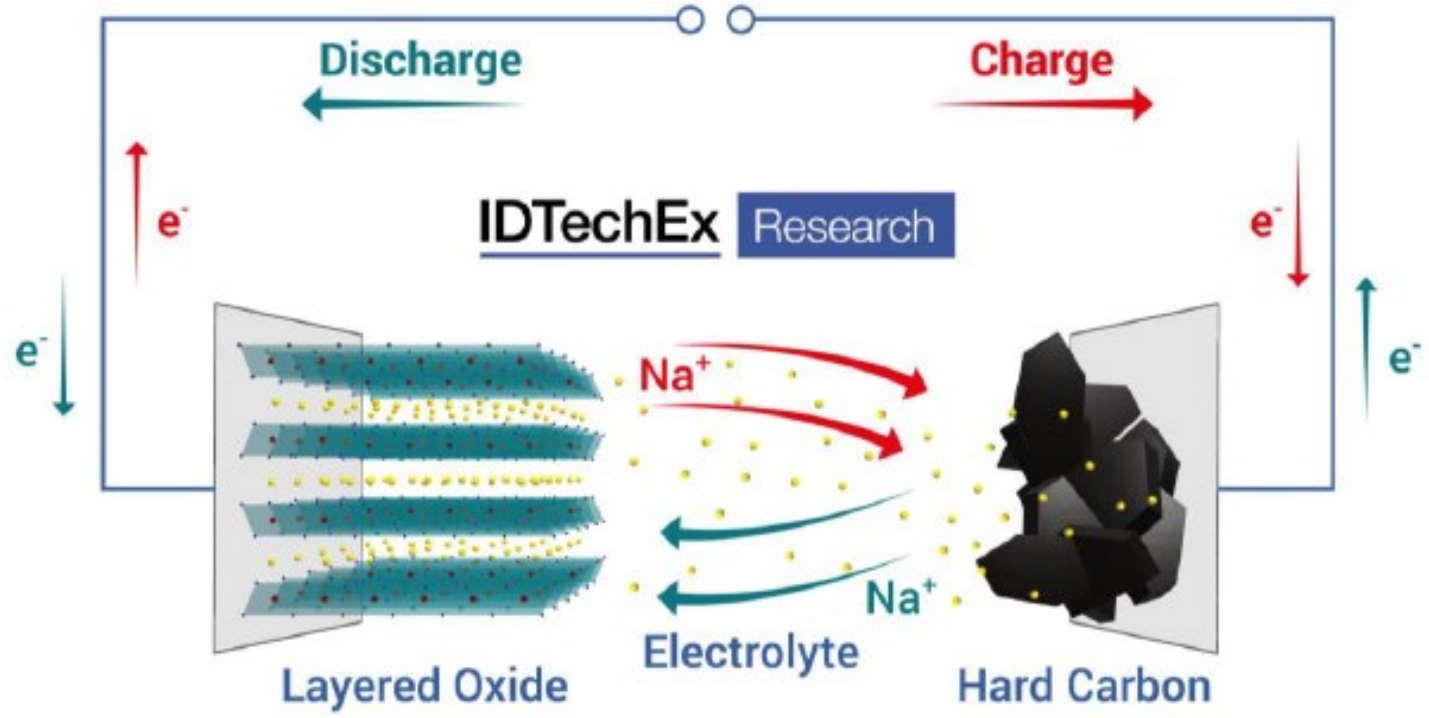
"Consumers urged to use and store lithium-ion batteries safely to prevent deadly fires" (Oct 23, ACCC)

"Lithium prices hit record high as market pricing takes hold" (Dec-22, Benchmark Minerals Intelligence)

"Despite reforms, mining for EV metals in Congo exacts steep cost on workers" (Aug-23, The Washington Post)

Introduction to Sodium-Ion Batteries

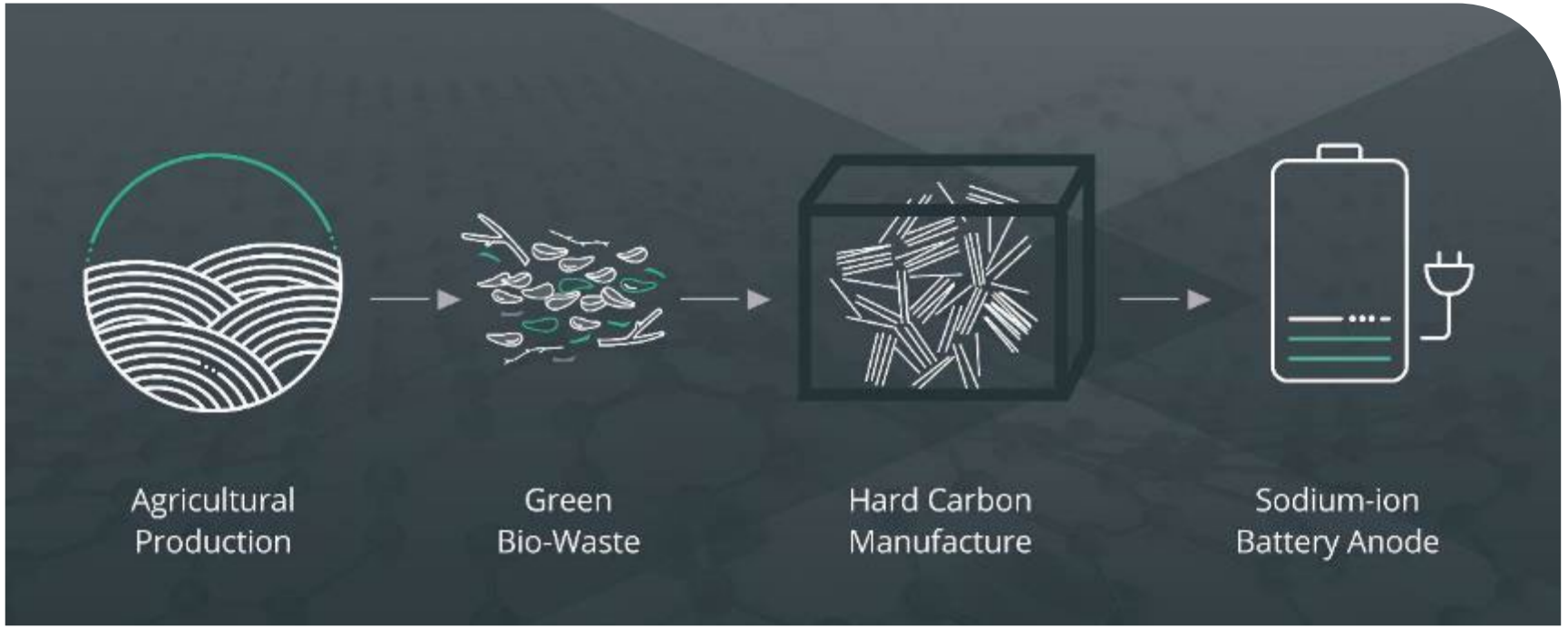
- Sodium ion batteries (SIBs) are an **alternative to lithium-ion batteries** (LIBs) which are safer and use **cheaper** and **more sustainable** materials
    - Sodium is over 1,000 times more abundant than lithium in the earth's crust
- SIBs have higher thermal stability and therefore have **lower risk** of thermal runaway causing **fire and explosion** than LIBs
- According to IDTechEx research, the market value for SIBs is expected to grow to **US$11.6bn in 2033** (**39% CAGR**) driven by rapid uptake in stationary storage and light-duty EV applications



Source: IDTechEx

Hard Carbon Anode Project

- Sparc, in collaboration with Queensland University of Technology, is developing a high performing hard carbon anode material for SIBs.
- Key features of the technology under development include:
  - Low cost, sustainably sourced green bio-waste feedstock.
  - Faster, less energy intensive processing.
- Development of hard carbon materials for SIBs is analogous to synthetic graphite for lithium-ion batteries.



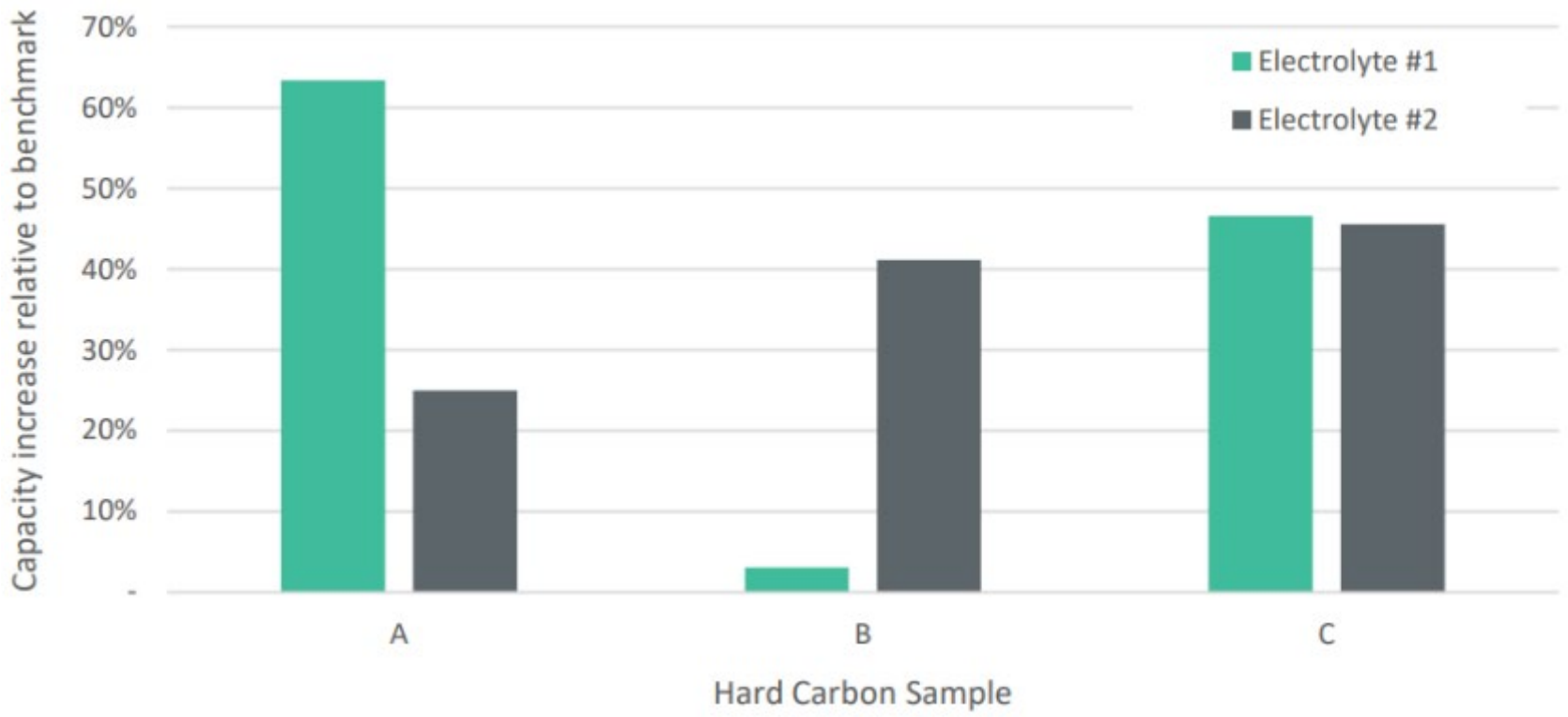
Lower cost and no scarcity of raw materials

Safety and ease of transport

Similar manufacturing techniques to Li-ion

Positive Capacity Results Achieved

- Testing has demonstrated up to **63% improved reversible capacity**[1] versus commercially available hard carbon materials.
- The process technology under development has the potential to **reduce the carbon footprint** of SIB anode material whilst improving performance.
- Sparc is engaging with industry partners to assess appetite for collaborating on the project.



1 Refer to Sparc Technologies' announcement on 29 September 2023 for further detailed results.

Momentum Building in Sodium-Ion

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

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

Dec-22

NGK

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

Jan-23

BYD

"BYD to build 30GWh sodium battery plant"

Nov-23

Jul-21

CATL

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

Oct-22

CATL

"Will Mass Produce Sodium-Ion Batteries in 2023"

Dec-22

UNITED AIRLINES

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

Feb-23

大众安徽 VOLKSWAGEN ANHUI

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

Nov-23

northvolt®

"State of the art sodium-ion battery with best-in-class energy density of 160Wh/kg"

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Released with the authority of the Board – April 2024