



Green  
Investment  
Group

# H2 Newcastle

Port of Newcastle Hydrogen Hub

March 2022

# Introduction to the Project



## PROJECT PARTNERS & COLLABORATORS

### ENABLED BY



**ARENA**



### SUPPORTED BY



Port of Newcastle and Macquarie's Green Investment Group have launched a \$A3 million feasibility study into the development of a green hydrogen hub at the Port that includes the backing of a \$A1.5 million funding grant from ARENA, secured under its Advancing Renewables Program.

Port of Newcastle and Macquarie's Green Investment Group have also signed Memoranda of Understanding with Idemitsu, Keolis Downer, Lake Macquarie City Council, Snowy Hydro and Jemena, all of whom will participate in the feasibility study.

Macquarie's agriculture platform, which manages more than 4.5 million hectares of farmland across Australia, will also participate in the feasibility study, focusing on green ammonia for fertiliser production.

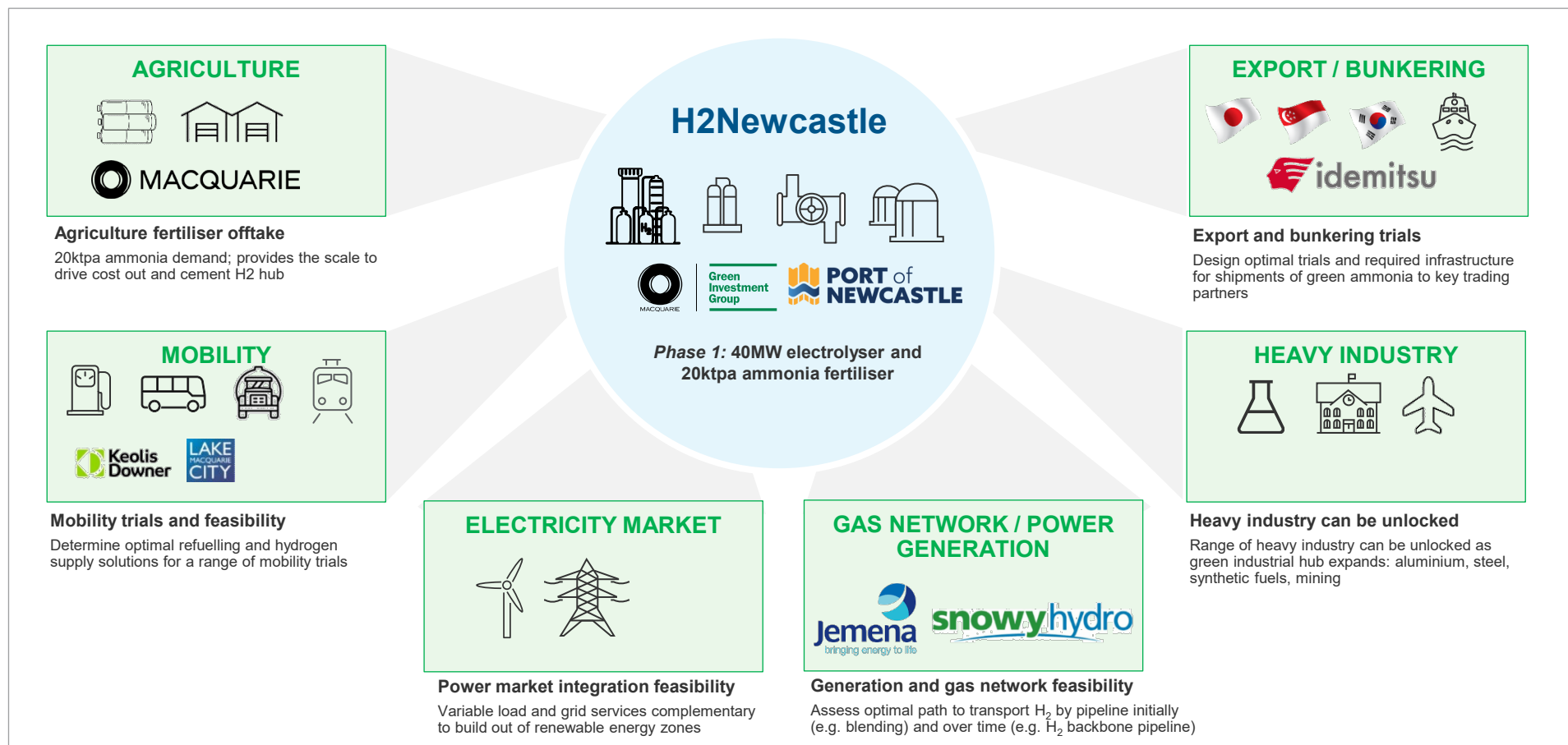
These partnerships represent key industries in the Hunter Region including agriculture, mobility, export and bunkering, energy generation and transport.

A Memorandum of Understanding has also been signed with the University of Newcastle as the project's research and development partner.

# Project scope

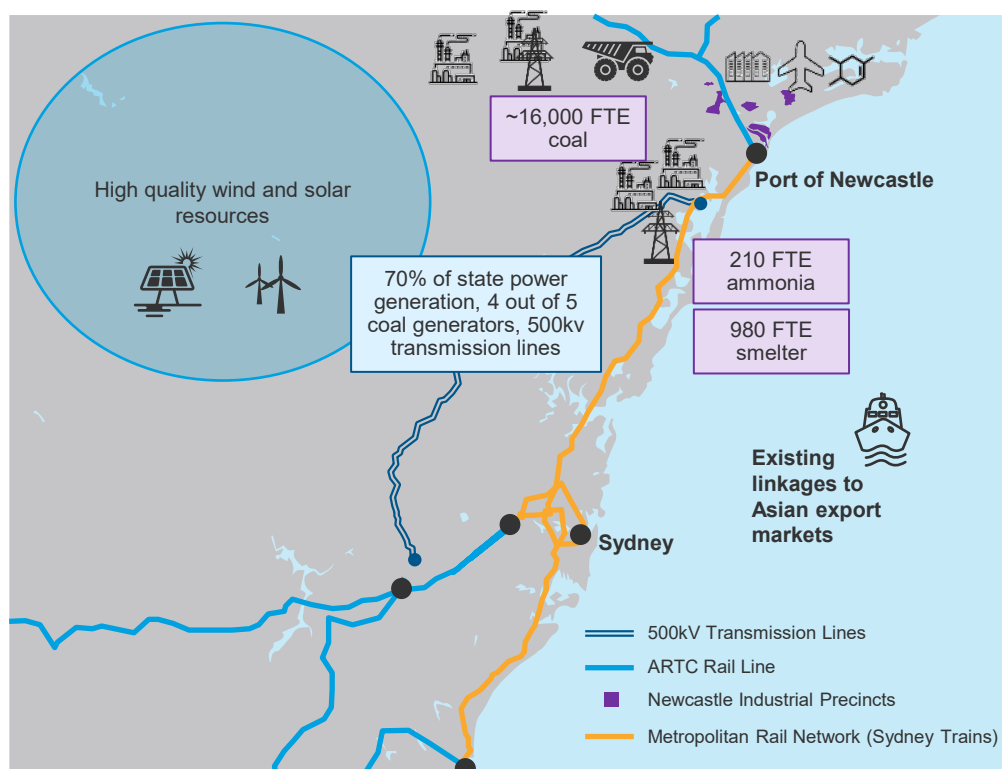
## H2Newcastle: a green industrial hub for Australia

H2Newcastle seeks to catalyse a **broader green eco-system in NSW** supported by partners who can decarbonise Australian supply chains adding value for domestic and export markets



# Port of Newcastle is a logical choice for a hub

The Port of Newcastle is a leading site to establish a hydrogen hub due to its existing infrastructure and proximity to key industry



## Competitive advantages

### Connected to domestic and export infrastructure

- **East coast connectivity:** linkages with key road/rail corridors
- **Electrical infrastructure:** grid infrastructure and proximate generation
- **Largest port on East Coast:** provides access to future export markets

### Proximate demand

- **Emerging H2 demand** across a range of industry
- Domestic scale provides a platform for **the export opportunity**

### Access to renewable energy

- **Proximate and complementary** to the build out of renewable generation in the region

### Skilled workforce and industry with potential to diversify into hydrogen

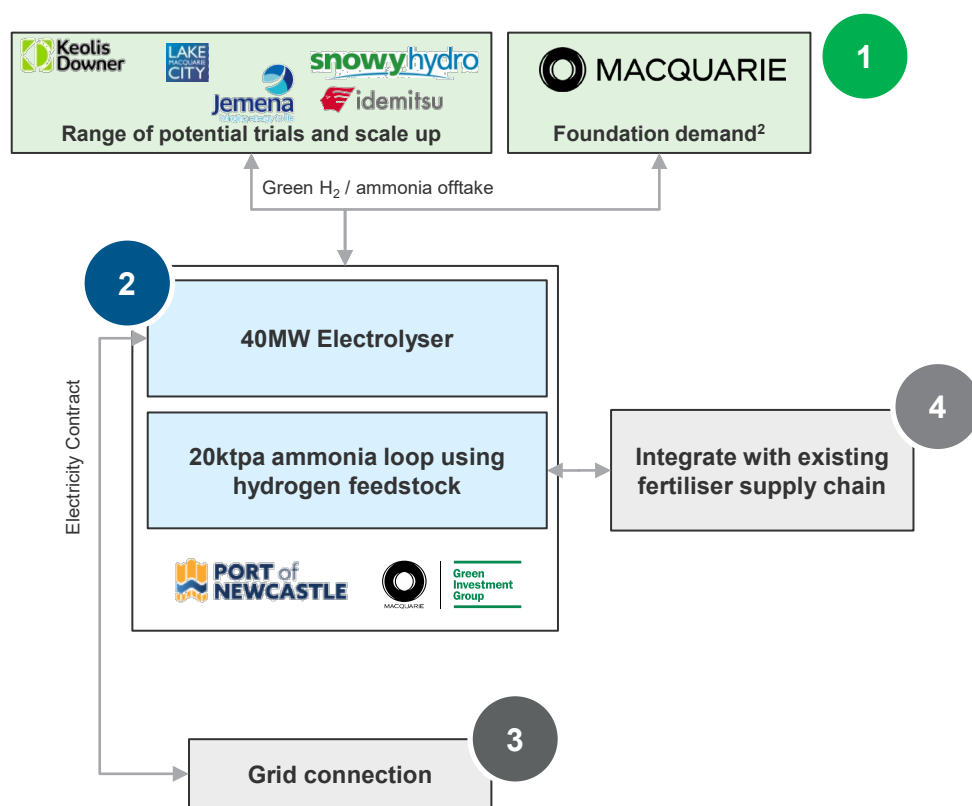
- **+16,300 workers** with manufacturing, tech and engineering expertise

The (1) existing infrastructure, (2) ability to scale and (3) access to renewable energy ensure the Port of Newcastle is well positioned to drive a path to the 'H2 under \$2/kg' government target

# Project overview: Phase 1

Creation of a hydrogen hub at the Port of Newcastle that can provide a platform for new green industries. The large plant can be leveraged to trial key H2 technologies

## The plant will leverage existing infrastructure and be integrated into key supply chains



**1 Partnerships provides the necessary scale to drive cost out and cement Newcastle as a H2 hydrogen hub**

- Cost of production is expected to be < \$5/kg
- Platform for trials and pilot projects across buses, rail, waste trucks, gas injection, power production, industrial heat, export and bunkering

**2 Green ammonia and hydrogen plants constructed with trajectory to cost competitiveness**

- 40MW electrolyser producing H2 / up to 20ktpa green ammonia

**3 Grid connection to achieve lowest cost of energy**

- Grid connection that optimises energy price through: (1) electrolyser dispatch optimisation (2) ancillary market participation (3) secure grid access concessions<sup>1</sup>

**4 Leverage existing supply chain at the Port of Newcastle**

- Green fertiliser product is chemically identical to fossil based production
- Options to engage existing ammonia operators and distributors or set-up an independent green operator

1. Subject to discussions with AEMO and the network operator  
 2. Note that the Macquarie logo refers to Macquarie's agriculture funds which have independent governance and funding from Macquarie Group Limited (refer to the Macquarie Agriculture letter of support for more detail)



# Ability to create a scalable platform to lead the decarbonisation of key industry

A clean hydrogen industrial hub at Newcastle provides a unique platform to lead the decarbonisation of heavy industry and green regional supply chains in across the Hunter and NSW

## Phase 1: project partners underpin significant infrastructure enabling trials and future scale up

H2Newcastle has a range of project partners underpinning the 40MW electrolyser / 20ktpa ammonia

## Phase 3: broader decarbonisation of heavy industry with hydrogen backbone in Hunter

Larger scale gas network blending and hydrogen pipeline backbone forms decarbonising heat

Expansion to other use cases like marine and aviation fuels for proximate demand

Opportunity to develop industry leading decarbonisation projects in aluminium and steel



## Phase 2: scale up mobility fleets, energy market integration and green ammonia

Scale up of mobility fleets: expansion across buses, waste trucks, rail, heavy goods vehicles trials

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Power to gas through the gas network  
Co-firing of gas power generation

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Scale up of ammonia plant for existing industrial supply, scale up of green fertiliser, green mining explosives and target initial export contracts

## Phase 4: Newcastle becomes hub for large scale green exports

- Low carbon mining
- Low carbon agri.
- Green steel
- Green aluminium
- Green H<sub>2</sub> / ammonia

# Leveraging the domestic platform to provide a credible pathway to export



The H2Newcastle project is the first step in building out a hydrogen export supply chain, harnessing Australia's energy resources to meet global hydrogen demand

## Australia is a world leading energy exporter...

### Use Newcastle and Australia's prestige within the global energy market to replicate the success of the coal and LNG industries

- Port of Newcastle is the world's largest coal export port with an export value of ~A\$20bn. Over half of which flows to Japan (41.5%) and Korea (13.3%)
- Combined West and East Coast LNG projects make Australia the largest exporter of LNG, a trade worth over A\$50bn

### Export projects require more than just competitive pricing

- Building a scalable export supply chain requires Government and Industry to collaborate to build out the domestic, seaborne transport and foreign infrastructure required for energy to flow from Australia
- Securing offtakes, government partnerships, and building expertise now creates the knowledge and capability that provides a global advantage for the future export opportunities

### Tangible projects are the best route to offtake agreements

- A clear pathway to an export project at Newcastle builds out the security of supply needed for Government to enter into agreements with other key export partners.

## ... who can help countries meet their hydrogen goals



**Japan** targets a hydrogen cost of US\$3/kg by 2030

Strategy emphasises the need for foreign partnerships on large scale hydrogen supply chains



**South Korea** Plans to rollout 8GW fuel cell power generation and 2.9 million fuel cell electric vehicles requiring 1.9mtpa of hydrogen by 2030 and over 5mtpa by 2040



**Singapore** Plans to halve its peak emissions by 2050. Limited land means decarbonisation plans have strong emphasis hydrogen.



**Germany** €1bn of funding available to support the import of green hydrogen by bridging the gap between importers capacity to pay and exporters cost of production



The Project Sponsors have partnered with Idemitsu as our Export and Bunkering Partner to assess export market potential and viability of co-locating large-scale export facilities at Port of Newcastle site

# The Port of Newcastle the natural partner to facilitate an open platform for hydrogen export.



Leveraging H2Newcastle's domestic platform, Port of Newcastle's existing berthing capacity, trading partner relationships and independent role as facilitator of Hunter and NSW trade flows makes it the optimal partner to facilitate access to shared export infrastructure facilities for hydrogen



## Fostering security of hydrogen supply to progress export arrangements with confidence

- Phase 1 of H2Newcastle is focussed on hydrogen supply for domestic industries which **kick-starts a green hydrogen supply chain domestically**
- This scalable domestic hydrogen platform from an existing world class export location:
  - **Provides security and delivery certainty** for government stakeholders to negotiate export arrangements with key trading partners; and
  - **Establishes a global cost advantage for export opportunities.**



## A long history as a facilitator of trade flows promoting shared infrastructure at the Port

- PON has been a **key facilitator of trade and logistics solutions for 220+ years with A\$25 billion in trade flows**
- Long history as an **enabler of transparent and open access to common use infrastructure for land and port side services** including vessels, stevedores and property
- With this experience, we understand **that common users, shared infrastructure and long term partnerships are the critical elements required to create a fully functioning export industry**
- Over time **large scale hydrogen and ammonia storage** will likely be required where **cost can be minimised by aggregating demand**



## Creating an open platform to export markets

- Critically important to creating an open platform for export markets is PON's i) **ownership** of existing export facilities, ii) **energy supply relationships** with Japan, South Korea, China and India; and iii) **independence as the key gateway for all Hunter industry**
- This makes PON **natural owner and facilitator that can as part of H2Newcastle enable access to common use hydrogen infrastructure** with:
  - Partners able to 'plug-in' and build-out their own export infrastructure and secure capacity from PON for berthing
  - Maximum flexibility in mind given PON's existing export infrastructure can accommodate any type of energy vector/carrier (e.g. green ammonia, hydrogen, liquid organic hydrogen carriers)
  - Enabling access to hydrogen-specific common use infrastructure including storage, interconnected pipelines and/or refuelling infrastructure



# Project Sponsors

The Project Sponsors combine the site and strategic relationships of Port of Newcastle with Macquarie's infrastructure, renewables and energy development and financing capabilities



## Project Sponsor

Lessor, Co-developer, Investor, Off-taker

- ✓ **Land access in a strategic precinct with scope for expansion**
- ✓ **Potential land access for associated industries** (e.g. bus depot)
- ✓ **Customer relationships to assist scaling:** Existing relationships with import and export-focussed customers to facilitate scaling up the facility size
- ✓ **Strong connectivity to traditional export industries**
- ✓ **Government and Hunter region relationships**
- ✓ **Funding project development**

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## Project Sponsor

Co-Developer, Investor, Financial Adviser

- ✓ **Renewables developer:** 450+ green energy and investment specialists; 22GW+ generation assets operational or under development/construction
- ✓ **Energy solution expertise** to optimise electrolyser dispatch; and GIG PPA team to source lowest cost renewable power
- ✓ **Financial adviser:** A\$9bn invested in or arranged for green projects in 2020; No. 1 ranked global renewables and infrastructure financial adviser
- ✓ **Leading hydrogen expertise:** projects under development in Australia, Americas and Europe across range of demand cases
- ✓ **Funding project development**