“We’re as Strong as the Weakest Link: Building Scale through Value Chain Collaboration”

Immediate Roadblocks for the Growing Industry
Ammonia Energy Conference
24 August 2022

Paul Hodgson
Interim Chief Executive Officer

SCALING GREEN HYDROGEN CRC

Immediate Roadblocks

- Existing ammonia production
  - 150 MT of ammonia already produced worldwide that needs to be decarbonised, before considering ammonia for energy
- Competition for green electrons
  - electricity system struggling with its own transition without demand from further electrification (eg. EVs) and electricity derived fuels and chemicals
- Competition for energy carriers
  - batteries and cables, biofuels, ammonia, hydrogen, methanol, MCH, etc
- Lack of coordination, certainty and coordination across the value chain
  - suppliers, partners, enablers, customers

Rationale for Scaling Green Hydrogen CRC

- Certain sectors are unsuitable for mass electrification, requiring green hydrogen and derivatives as chemical carriers of green electrons:
  - Chemicals
  - Long-distance heavy transport
  - Steel manufacturing
  - Energy exports
- Limited capacity of existing electricity and water systems to support growth
- Increased demand for renewable electricity for green hydrogen production
- Limited existing sovereign manufacturing and service capability
- No clear pathway for scaling from 0+ TW to 1 TW of installed electrolyser capacity

Scope of Scaling Green Hydrogen CRC

- 5 key national research themes in green hydrogen production and utilisation
- Intersecting with regional green hydrogen hubs (e.g. Gladstone, Newcastle, Geelong, Pilbara, Adelaide and Upper Spencer Gulf), creating living labs for engagement and dissemination with hydrogen clusters
- Developing a skilled and ready workforce to support the green hydrogen sector's scale-up
- Building Australia's hydrogen-related manufacturing and services supply chain, including a global HETS sector
- Facilitating growth in capability and capacity of Australia's SMEs and emerging entrepreneurs.
- Complementing and collaborating with existing CRCs:
  - Future Fuels CRC
  - Future Energy Exports CRC
  - RACE for 2030 CRC
  - iMOVE CRC
  - Future Battery Industries CRC
  - Blue Economy CRC
  - Heavy Industry Low-carbon Transition (HILT) CRC
  - Sovereign Manufacturing for Automated Composites (SoMAC) CRC

CRC Research Themes

1. Production & Storage

2. Water

3. Chemicals

4. Mobility

5. Enabling

1. Production & Storage

Focus on integration of green hydrogen with the electricity sector, covering scalable energy technologies, electrolysis, models for distributed vs centralised production, and storage options.

Example research initiatives:

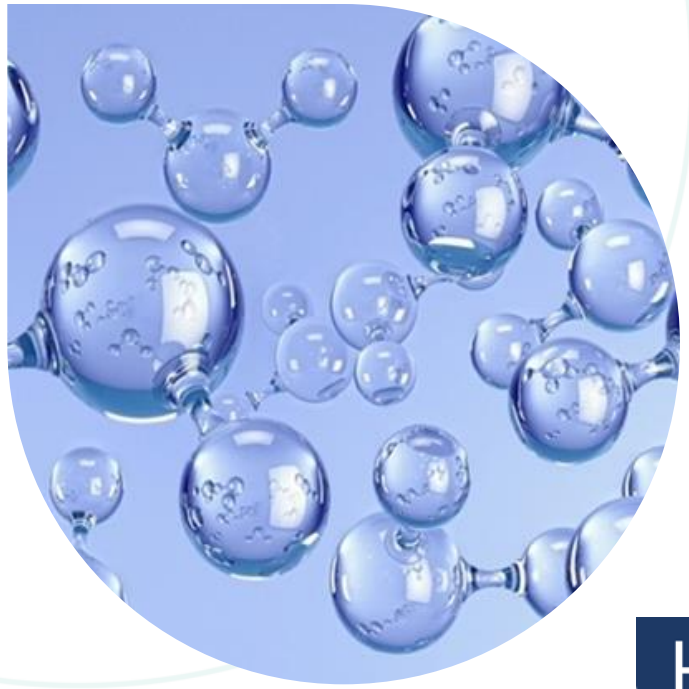
- Renewable energy-based production technologies
- Distributed vs centralised models
- Shared infrastructure
- Electrolyser CAPEX and OPEX reductions
- Balance of plant development
- Business case for local manufacturing
- Storage technologies and options
- Emerging production technologies

2. Water

Focus on decoupling fresh water resources from hydrogen production through electrolysis via desalination, recycled water networks, waste water, sea water, air capture or other methods.

Example research initiatives:

- Technologies for alternative water sourcing
- Shared infrastructure and models
- Beneficial co-products and co-location
- Integrated planning



3. Chemicals

Focus on new and efficient processes for hydrogen derived commodity chemicals and fuels.

Example research initiatives:

- Green hydrogen derived or refined fuels (such as sustainable aviation fuel)
- Green hydrogen derived chemicals (such as methanol)
- Green ammonia and fertilisers
- Technologies and models for distributed production

4. Mobility

Focus on achieving zero emission shipping, aviation, rail, buses and trucks in Australia and internationally.

Example research initiatives:

- Refuelling systems for shipping, aviation, rail, buses and trucks
- Multi-user and shared infrastructure
- Fuel cell technologies

5. Enabling

Focus on best practice processes and systems to support the growing sector and deliver shared value.

Example research initiatives:

- Safety, regulations, and standards
- Sustainable financial and techno-economic models
- Beyond social licence - mutually valuable partnerships with First Nations and other communities
- A talented and skilled workforce
- A sovereign and innovative supply chain
- Addressing United Nations' Sustainable Development Goals

Early Non-Research Partners

AMOG

ARUP

AUSTRAL FISHERIES
SUSTAINABLE SEAFOOD

bp

Clayton H2

evolve HYDROGEN

GloBird energy

GRAPHENEX

HAMR ENERGY

HUNTERNET
The power of many

MARITIME INDUSTRY AUSTRALIA LIMITED

City of Perth

PIPING SOLUTIONS
www.pipingsolutions.com.au

SA H2H
Hydrogen Technology Cluster

STANDARDS Australia 100

Water Research AUSTRALIA

Early Research Partners

THE UNIVERSITY OF SYDNEY

Australian National University

University of South Australia

THE UNIVERSITY OF QUEENSLAND
AUSTRALIA

MACQUARIE University

MONASH University

UNSW SYDNEY

Flinders UNIVERSITY

Please Join Us!

Thanks

Mr Paul Hodgson
Interim Chief Executive Officer
Scaling Green Hydrogen CRC
paulhodgson@consultingis.com.au
+61 431 882 911
www.hydrogencrc.com.au