Business Case for the Scaling Green Hydrogen Co-operative Research Centre (SGH CRC) Water Industry Consortium

Background

The development of an Australian green hydrogen economy has become a national priority due to hydrogen's crucial role in the decarbonisation of the economy. The current production costs of green hydrogen are unaffordable and ways to reduce costs will be needed for green hydrogen to play a role in future energy supplies. Also, the production of green hydrogen would need to be environmentally and socially sustainable. A critical aspect of this will be meeting green hydrogen's need for water in a sustainable way, especially important in water stressed areas.

The projected water demand for green hydrogen production is expected to reach 950 GL by 2050 (about 10% of water supply, sewerage and drainage services), which will invariably position the water industry as key players. SGH CRC is a unique opportunity for the water industry to be involved in this rapidly growing economy at an early stage, and shape it through cross-sectoral collaboration, to the benefit of the water industry, its customers and the broader community.

Research Priorities:

SGH CRC recognises the significance of water within a green hydrogen economy and is developing a research program dedicated to water. Water Research Australia has formed a water industry consortium, allowing water utilities to join the SGH CRC at a higher partnership level, which maximises the chance of converting research priorities into research projects. Collaboration between water utilities has identified four priority research areas to be addressed as part of the SGH CRC:

1: Optimising water sources and quality

Water is the indispensable feedstock for green hydrogen and requires meticulous planning to ensure sustainable green hydrogen production in the long term.

The goal is to determine the risks and benefits of various water sources for green hydrogen production, including cost, environmental impact, community support, carbon footprint, locations, quality, and quantity.

This assessment will require the development of detailed water specifications for the multiple processes used in viable green hydrogen production. This knowledge will be used to inform a strategic approach to optimise water demand and treatment requirements, including options to decouple drinking water supplies from hydrogen production. Delivery of a framework suitable for sector-wide adoption will facilitate integrated water planning to account for different scales and locations of hydrogen production,

their influence on logistics (major city vs regional vs rural), and optimal rates of water consumption for green hydrogen, hydrogen derivatives (e.g. green methanol, ammonia, sustainable aviation fuels), and processing waste streams from the hydrogen industry.

2: Creating an enabling regulatory environment

Developing the green hydrogen economy and the potential co-location of green hydrogen production at treatment plants will generate new wastes and products and provide reuse opportunities for various resources.

The goal is to understand and influence the regulatory barriers associated with these new practices to facilitate industry development.

This will include (i) integrating biosolids and/or the use of co-products in hydrogen production systems; (ii) identifying the potential impacts on the regulation of products or production linked to a circular economy; (iii) adapting current EPA regulatory approaches to facilitate treated effluent as the preferred input to hydrogen production, including fit-for-purpose licensing of more highly concentrated treated effluent streams; and (iv) supporting appropriate regulatory and practical systems to ensure worker safety.

3: Closing the loop to ensure green systems

The production of green hydrogen can significantly contribute to the water industry's transition to a circular economy by adopting an integrated water management approach to sourcing water, capturing and reusing co-products from green hydrogen production, and determining the role of treatment plants externalities in the hydrogen economy (e.g. syngas, ammonia, sludge) and the use of hydrogen for energy demand management for water and wastewater treatment.

The goal is to identify circular economy opportunities, demonstrate their technical and economic viability, and unlock their benefits while accounting for new trade waste streams and developing environmentally acceptable management systems.

A circular economy framework incorporating water-services related inputs and outputs from green hydrogen production will be develop, leveraging leading international examples. Key research outcomes will include identifying and refining emerging technologies to enable circular outcomes throughout the water value chain. Economic, social and environmental costs and benefits under different scenarios will be quantified to inform novel business case methods supporting investment in circular outcomes.

4: Establishing and maintaining social licence

Ensuring the long-term sustainability and acceptance of scaling green hydrogen requires establishing and maintaining a social licence. A successful hydrogen economy can bring numerous advantages, including reduced carbon emissions, energy diversification, and economic growth to regional and remote communities. Similarly, communities and stakeholder groups are likely to identify disadvantages at a national, regional or local scale. To foster collaboration and support this emerging industry, it is

crucial to distribute the benefits equitably across various stakeholders and address the disbenefits transparently.

The goal is to enable engagement with communities, indigenous groups, environmental organisations and other relevant stakeholders to build trust and foster a sense of shared responsibility.

This will require establishing tools and processes to build effective partnerships, transparent business models, innovative contracts for co-investment, and inclusive decision-making processes. A key outcome would be the development of a best practice social licence framework for sector wide application, integrating learnings from diverse industries and case studies from national and international water utility and hydrogen developer experience. New research will compile perceptions surrounding conflicting uses of water resources between hydrogen and existing users. This will inform the water sector and policy makers such that they can work effectively to facilitate the development of a green hydrogen sector embraced by communities as part of Australia's energy transition.

Why Commit?

Participation via the WaterRA Water Industry Consortium of the SGH CRC will provide:

- The opportunity to participate in Australia's premier research and industry partnership supporting the development of green hydrogen industry.
- Cost-effective knowledge generation through a shared investment model.
- A strong voice for water utilities within the SGH CRC, facilitating cross-sectoral collaboration and co-design of the research program and industry outcomes.
- Practical industry outcomes early from each of the four themes, with ongoing refinement and maturation during the lifecycle of the SGH CRC.
- Increased employee technical and innovation capacity gained through a time-efficient project development, implementation, and knowledge transfer approach.

Stakeholders

WaterRA Water Industry Consortium is open to member organisations wanting to participate in the SGH CRC. Currently, the consortium partners consist of metropolitan and regional water utilities across the country. The Water Industry Consortium will work closely with researchers throughout the projects, from initiation through to delivery, as well as other SGH CRC partners identified as beneficial by the consortium partners.

Indicative Funding Required:

Partner Level	Funding Required	Benefits
Core Partner (Tier 1)	Combined yearly cash contributions of $250,000 and above • Metropolitan utilities ($35k+/y) • Regional utilities ($15k+/y)	• Membership of CRC Company • Voting rights at Board meetings • Nominating Board members • First rights to Project IP at no cost, with 6 months to take up • All Key Partner benefits listed below
Key Partner (Tier 2)	Combine yearly cash contributions of $100,000 and above • Metropolitan utilities ($20k+/y) • Regional utilities ($10k+/y)	• Nominating Board Members • Access to Project IP at discounted rate, with 6 months to take up • Ability to host potential pilot/ demonstration sites • Preference to have one nominated priority project funded during the life of the CRC • Access to industry-embedded PhD program • Recommending projects for investment • Other benefits including participation in CRC conferences, seminars, and networking events

Duration / Start

The Cooperative Research Centre will deliver research projects over 10 years. The start date is expected to be July 2024.

Request Statement

The water sector would get most benefits from joining the CRC as a Core Partner. To achieve this level of partnership, we are suggesting a commitment of $35,000+ per year and $15,000+ per year from metropolitan and regional water utilities, respectively.