TASMANIAN RENEWABLE HYDROGEN

OVERVIEW OF INDUSTRY ACTIVATION STUDY AND NEXT STEPS

Renewables Tasmania
Department of State Growth

Tasmanian Government

CONTENTS

Background

Renewable or "green" hydrogen has the potential to play a significant role in the decarbonisation of the global energy system. The Tasmanian Government has set out a vision in the Tasmanian Renewable Hydrogen Action Plan (TRHAP) for the State to become a leader in large-scale renewable hydrogen production, and a significant global supplier of renewable hydrogen from 2030.

The Tasmanian Government has committed funding support to help deliver the TRHAP through the $50 million Tasmanian Renewable Hydrogen Industry Development Fund (TRHIDF).

An initial TRHIDF funding round was carried out in 2020, calling for expressions of interest for renewable hydrogen feasibility studies and projects. Funding of $2.6 million was allocated through the funding round to support three feasibility studies (Origin Energy, ABEL Energy and Grange Resources) investigating larger-scale projects.

An Industry Activation Study (the Study) was carried out to identify near-term local projects that could activate a renewable hydrogen industry in Tasmania. The primary focus was to outline options to achieve the short-term goals stated in the TRHAP, which includes local production and consumption of renewable hydrogen in Tasmania by 2022 to 2024. The Study also considered the identification of niche applications where Tasmania is likely to have a competitive advantage but that may take longer than 12 to 18 months to develop.

Linking together supply and demand is a significant challenge in a new and developing market. While the production of renewable hydrogen is relatively straightforward, developing the demand side of the market, and linking this with supply, is more challenging. Investigation of these aspects was a key focus of the Study.

The Study involved collaboration with potential market participants, industry and other government entities. This document represents a summarised version of the Study findings and the next steps to activating Tasmania's renewable hydrogen industry.

The Government has approved up to $12.3 million from the TRHIDF to undertake the key recommendations arising from this Study. These are outlined in the 'Next Steps' section.

Phased hydrogen industry activation

Activation of the renewable hydrogen industry in Tasmania can be considered in phases, with the initial phase (near-term) focussed on establishing promising demonstration projects and facilitating benefits such as increasing social awareness and 'learning by doing'.

Subsequent phases (from 2023) can build on the demonstration projects and feasibility studies completed in the initial phase. This can focus on identified areas of comparative advantage for renewable hydrogen in Tasmania and scaling projects that provide economic and emissions reduction benefits.

Near-term project options (12 to 18 months)

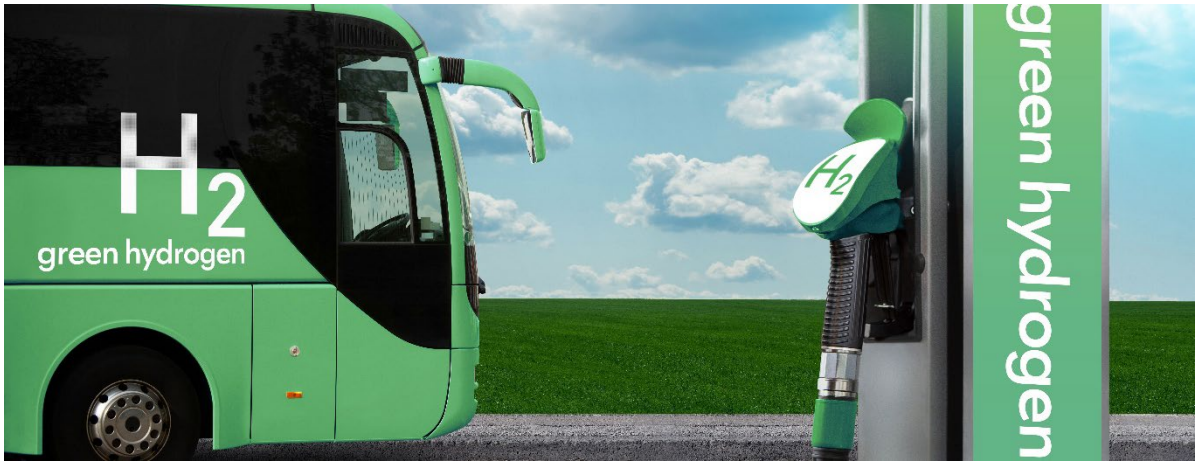
The transport sector is seen as the most promising area for the consumption of renewable hydrogen in the near-term, particularly in the heavy vehicle segment which includes buses and trucks.

This reflects that hydrogen is closest to cost parity with conventional transport fuels such as diesel, the availability of these technologies, and, in regard to heavy vehicles, the potential weight saving and rapid refuelling benefits in comparison to battery electric alternatives.

In assessing transport opportunities, higher daily distances are desirable as this increases the amount of hydrogen consumption for a given vehicle investment. While this is a significant characteristic for a commercial project, it becomes less critical for small demonstration scale projects where other factors may take priority such as increasing public awareness and building industry capability and knowledge. Vehicle age is also of interest, as integrating fuel cell electric vehicles into the natural replacement cycle is more desirable and efficient than displacing relatively new vehicles.

Hydrogen buses are available from a number of manufacturers, and there is potential to build buses here in Tasmania. It is expected that a small bus trial could be established within 12-18 months. On the right routes, buses could be a great way for the community to see and experience a hydrogen vehicle.

Metro Tasmania is the largest bus operator in the State and is a key candidate for demonstrating hydrogen buses, although its buses have a relatively low average mileage. A number of other general access bus opportunities have also been identified around the state including, for example; Merseylink, Tiger Bus, Redline, and Tassielink.



The Government announced in the 2020-21 Budget that Metro Tasmania would be tasked with undertaking a zero-emissions bus trial in both the north and south of the State, with either electric or hydrogen technology to be utilised. While battery electric buses are currently lower cost than hydrogen fuel cell buses, given the uncertainties regarding the relative merits and cost effectiveness of these technologies over the longer term, a prudent approach may be to trial both technologies concurrently.

Medium Term (2 to 5 years)

Hydrogen trucks are considered one of the most promising areas for renewable hydrogen vehicles compared to battery electric alternatives because it is a sector with weight sensitivity and the need for rapid refuelling on longer haul routes. Through discussions with the Tasmanian Transport Association (TTA), it has been identified there will likely need to be an education and support program, and a clear transitional pathway, to encourage operators to adopt fuel cell truck technologies. It has also been identified that the fuel cell trucks from the majority of manufacturers may not be commercially available until roughly 2024.

Development of maritime opportunities is seen as an important focus for Tasmania. The State is home to the Australian Maritime College and the Blue Economy CRC, has significant national and international shipbuilding capability, and has a large aquaculture industry. Some of these opportunities may take longer than 12 to 18 months to implement, but early investigation of feasibility could help accelerate this sector.

Export, large-scale industrial and Antarctic opportunities are also seen as an important focus for Tasmania and these sectors are likely to develop significantly over the coming 12 months.

While the transport sector has been the focus, other end-use cases such as replacement of natural gas for heating, and utilisation of hydrogen for electricity generation have also been considered. A high-level summary of opportunities for each market segment is provided in Table 1.

Table 1 – Summary of hydrogen demand opportunities

Application	Findings	Opportunities
Transport	Recommended early focus	Primary focus: • Buses/coaches, with funding reserved for trucks when they become more readily available Secondary focus: • Passenger cars a consideration through demonstrating in government/private fleets • Forklifts a consideration as an addition to a logistics project (truck demonstration) • Shipping Potential future applications: • Rail (investigate opportunities through TasRail) Other: • Progress feasibility studies into local shipbuilding opportunities (e.g. hydrogen ferry) • Develop a more detailed roadmap and costings for a hydrogen refuelling station network roll out
Heating / Gas Blending	Commercially challenging to match the current natural gas price (i.e. < $2/kg$H_2$)	• Grange Resources feasibility study • Potentially progress a feasibility study into hydrogen blending and injection into the natural gas distribution network (dependant on Gas Strategy outcomes).
Industrial / Chemical	Generally larger scale. Outside the scope of this report.	• Origin Energy and Abel Energy feasibility studies (monitor/support the proposed Fortescue Future Industries ammonia project) • Potentially support feasibility studies (e.g. local urea production)
Electricity generation	Not competitive with alternatives (eg diesel). However, would require lower CAPEX and be faster to implement than most transport trials.	• Blue Economy CRC: marine-based power generation Potential applications: • Bass Strait Islands (Hydro Tasmania) • grid-connected diesel gensets (TasNetworks) • alternative power for Antarctic/Sub-Antarctic bases or individual huts (Australian Antarctic Division) • provision of FCAS/firming capability in future
By-products[1]	Secondary consideration.	Potential applications: • Oxygen for water/wastewater treatment (TasWater) • Oxygen for aquaculture industry
Export	Very large scale. Outside the scope of this report.	• Export-based feasibility studies and proposed projects as per our Tasmanian funded feasibility studies. Refer to www.renewablestasmania.tas.gov.au/hydrogen for more details.

[1] Of hydrogen production from electrolysis of water

In Tasmania there are several entities progressing early-stage development activities for potential hydrogen production projects. This ranges from the Blue Economy CRC which has ordered a 700 kW electrolyser and hydrogen powered generator, through to companies such as Fortescue Future Industries (FFI), Woodside Energy, Origin Energy and ABEL Energy that are progressing early stage development work for potential large-scale projects at Bell Bay. Process industries continue to work with Renewables Tasmania to investigate hydrogen production as a production process by-product. Investment decisions by these parties could influence the overall hydrogen industry development pathway.

Consideration of supporting infrastructure and services, that link supply and demand, are critical in the delivery of a successful project. Hydrogen distribution infrastructure can increase flexibility in where hydrogen is used, although at an incremental cost. Hydrogen refuelling stations are available in two standard pressures: 350 bar typically for heavy vehicles and 700 bar typically for passenger cars where minimising storage volume is desirable. Costs increase with pressure, speed of refuelling and capacity. Single containerised units can offer the benefits of portability and demonstration in multiple locations. Ideally refuelling infrastructure would be open access to reduce costs/barriers to entry for parties looking to use hydrogen end-use technologies.

While there are forecasts that the hydrogen industry will progress rapidly over the next five to ten years, it is difficult to predict which particular hydrogen technologies and suppliers will be successful, the timing of technology availability, and future pricing.

These uncertainties coupled with the current high cost of establishing a hydrogen supply chain, suggest highly visible, small-scale hydrogen projects over the near term are the best pathway to activate the industry. These early projects can generate public interest while helping ensure the community is comfortable with safety aspects of hydrogen technology, test the regulatory arrangements are fit for purpose, and help develop local Tasmanian knowledge and skills in hydrogen technologies. This approach would also reserve TRHIDF funding to be utilised for future small-scale projects as new opportunities arise.

Benefits for Tasmania

Installing and operating hydrogen equipment and heavy vehicles within the next 12 to 18 months will provide many key benefits, including:

- Developing local skills in hydrogen production, distribution, refuelling, local manufacturing (if equipment/vehicles built in Tasmania), safety, and vehicle operations and maintenance.
- Testing the regulatory framework and facilitating identification of where changes are necessary.
- Building understanding of operational issues related to hydrogen equipment and vehicles.
- Increasing public awareness and education related to hydrogen. This may help drive local demand for hydrogen and related equipment and vehicles.
- Building social value and community acceptance in renewable hydrogen production and end-use.
- Providing a pathway to commercialisation for future hydrogen technology and zero net emissions transport options.
- Enabling faster delivery of future projects (development approval pathways, knowledge sharing).
- Demonstrating Tasmania's renewable hydrogen industry capabilities to potential future international export markets.

Development of a renewable hydrogen industry will enhance Tasmania's credibility in advanced manufacturing and build on the State's international reputation as a provider of niche, high quality, and clean products. It will also demonstrate that renewable hydrogen and related renewable energy projects can provide a career pathway for Tasmanians.

Risks and challenges

Hydrogen infrastructure and vehicle costs are currently high in comparison to petrol/diesel options, reflecting the nascent state of the market. In the near-term, hydrogen projects are likely to need significant government support to be financially viable.

Other key considerations include:

- Ensuring a coordinated approach across the supply chain to ensure the timing, capacity and compatibility of supply and demand side components, including refuelling infrastructure, are matched.
- Hydrogen supply chain reliability is important and will require inclusion of redundancy which will add cost.
- Future vehicle availability and refuelling requirements are uncertain, which may lead to sunk assets.
- 'Pure' hydrogen has potential competition from alternative renewable fuels also currently being developed, including; biofuels and green hydrogen derivatives and from alternative technologies such as battery electric vehicles.
- Access to hydrogen specific local skills in manufacturing, project delivery, and operation and maintenance.
- Electricity price significantly influences the cost of hydrogen production from electrolysis and will be a significant factor in renewable hydrogen industry development.

Next steps

1. Conduct a near-term trial of two to three hydrogen buses by Metro Tasmania for a period of up to five years, with 'in-principle' support for this to be delivered through an arrangement with the Blue Economy CRC for hydrogen supply (subject to agreement on a finalised project plan).
2. Develop a hydrogen truck demonstration strategy, in collaboration with the Tasmanian Transport Association.
3. Conduct a feasibility study investigating the potential for hydrogen marine vessels in Tasmania.
4. Conduct demonstrations of hydrogen trucks and hydrogen marine vessels, subject to feasibility study and strategy development findings, and available funding support.
5. Develop a hydrogen refuelling network strategy that covers Tasmania's main population centres and freight hubs, informed by the hydrogen truck strategy, hydrogen bus trial and marine feasibility study.
6. Evaluate the potential for future use of hydrogen for heating applications through gas networks, subject to the findings of the Tasmanian Future Gas Strategy.
7. Continue working with proponents who are investigating Tasmanian hydrogen projects.

Indicative timeframes | Tasmanian hydrogen industry activation – key local demand side activities