P2_037 – Transporting Hydrogen by Rail

Proponent: Queensland Transport and Logistics Council (QTLC)
Current Gate: Gate 2 – Pre-Feasibility Study
Acknowledgements: Project funded by the Australian Government's Inland Rail Interface Improvement Program

Proposal overview: The Proposal is a conceptual study which focuses on understanding the potential to transport gaseous hydrogen by rail. It is aiming to understand tipping points of the commercial viability of transporting gaseous hydrogen by rail. It is also seeking to understand the safety and regulatory requirements of transporting hydrogen by rail in this form.

Main product:
Hydrogen (noting this a concept study so there are no existing electrolysers for the Proposal that will produce the hydrogen for transport)

Key opportunities identified:

1. Hydrogen production, transport and use have the opportunity to spread regionally in Australia providing employment in regional areas.
2. Government and private businesses are showing substantial interest in hydrogen as part of reducing emissions leading to substantial growth in the industry.
3. Hydrogen is a green fuel with a wide range of potential applications, however potential impediments to transporting it are not fully understood.

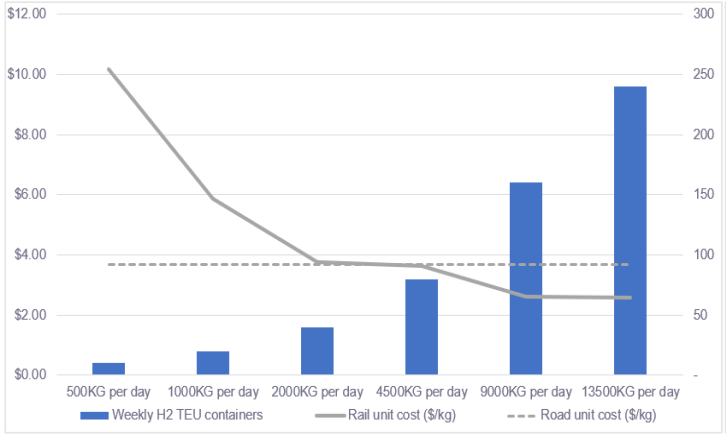
Freight task:
The Proposal assessed two options. All assumptions between the two options were the same, except for the mode of transport. This allowed rail and road to be comparatively assessed to understand commercial viability tipping points for various volumes of hydrogen and distances travelled. The options are summarised below.

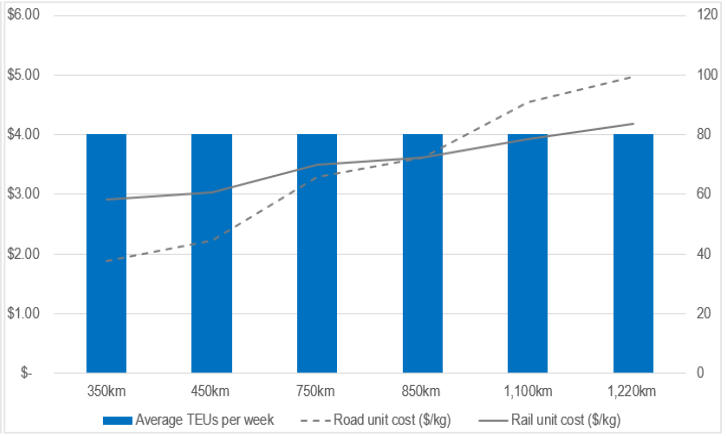
Road Case	Rail Case
Transportation via road in tanktainers	Transportation via rail in tanktainers
Toowoomba to Parkes	Toowoomba to Parkes
4,500 kg of H_2 per day	4,500 kg of H_2 per day
Compressed gaseous H_2	Compressed gaseous H_2
Unloaded for final destination	Unloaded for final destination

It has been assumed that the Infrastructure will be co-located with other facilities (for example an intermodal, road logistics facility, the production facility, or others). Therefore the infrastructure included within the analysis only considers the tanktainer storage requirements.

Option	Infrastructure Requirements	Cost
Road Case	The following at both Toowoomba and Parkes - Hardstand (4,480m2), Security Fencing, fire hydrant system, Gatehouse.	Capital costs: $7.72m Ongoing costs: $5.81m
Rail Case	The following at both Toowoomba and Parkes - Hardstand (8,960m2), Security Fencing, fire hydrant system, Gatehouse.	Capital costs: $12.13m Ongoing costs: $9.75m

Costs presented above are in nominal terms, inclusive of contingency.





The volume tipping point in terms of transport costs whereby rail becomes more cost effective than road 4,500 kgs per day

The distance tipping point in terms of transport costs whereby rail becomes more cost effective than road is 850km

Direct benefits are estimated at $13.3m

Indirect benefits are estimated at $7.7m

Stakeholder Findings

- Stakeholders view the project to be useful for the future hydrogen industry in furthering understanding of the commercial viability of transporting it by rail and the associated regulatory and safety requirements
- Rail is considered a safer option in comparison to road transportation. Rail also has the potential to reduce emissions and reduce the number of trucks on road
- Safety aspects need to be better understood, especially in the safe handling, refuelling and maintenance of hydrogen systems
- There are limited standards for the transportation of hydrogen, but safety and regulatory bodies are considering these issues
- There are many potential end-uses for hydrogen to further de-carbonisation in Australia. However, there will need to be extensive engagement with the community to ensure it can be used safely and effectively.