Renewable Hydrogen Production and Refuelling Project

ARENA Project 2018/ARP178

LESSONS LEARNT REPORT

Project Details

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EXECUTIVE SUMMARY

BOC produces hydrogen at its Altona facility in Melbourne, Victoria via steam methane reformation of natural gas. Since the closure of the BP refinery at Bulwer Island in Brisbane, Queensland, BOC has transported hydrogen from Altona to Bulwer Island in high pressure tube trailers to service its industrial gas customers. The transport of hydrogen from Victoria to Bulwer Island results in 90,000kg of greenhouse gas emissions per year.

As a leading provider of hydrogen refuelling infrastructure through its parent company, Linde, BOC saw an opportunity to demonstrate ultra-high pressure refuelling of hydrogen fuel cell electric vehicles, using renewable hydrogen produced at Bulwer Island. This led to the project starting, with ARENA funding support, in May 2019.

The project is nearing commissioning after negotiating a number of challenges and delays. This process has led to some significant learnings that have relevance for similar projects. The key learnings from this project so far are:

1. electrolysers and refuellers require localisation to meet to Australian standards – this applies to equipment approved for sale in the EU, US and

other regions regardless of local approvals;

2. local hydrogen skills are key to the Australian market developing, especially during a pandemic; and

3. approvals processes for new sites can extend project timelines based on limited hydrogen specific regulations.

KEY LEARNINGS

Lesson learnt No.1: Localisation of Hydrogen Equipment

Category: Technical / Commercial

Objective: Demonstration of refuelling and electrolyser equipment in Australia

Detail:

This project found a number of key areas where localisation of equipment from Europe requires additional engineering as well as costs to meet Australian standards. This is based on a number of differences between relevant hydrogen equipment standards in Australia and the European Union and United States where much of the hydrogen equipment is being developed and manufactured. Harmonisation of Australia's standards with those in major hydrogen markets is important if Australia is to accelerate local production and compete in global hydrogen markets in the future.

The main areas of this project where additional work and cost was required to comply with Australia's specific standards are outlined below:

a) **Pressure Vessels**

Design registration and verification of pressure vessels is mandatory in all Australian states and territories. This is done to increase safety, but the specific requirements go above and beyond global requirements which only apply for large pressure vessels above a minimum size.

This adds an additional step and cost in installing internationally approved refuellers and electrolysers which often contain a number of small internal pressure vessels. This is further complicated by Victoria and Western Australia having slightly different rules to the rest of the country.

b) **Flammable Zoning**

As with the design registration of pressure vessels, Australia has flammable zoning rules that differ from Europe and the US. This has led to the requirement for additional risk modelling as well as re-wiring of equipment that is currently operating safely in the EU. Again there are some differences between states which complicates this issue – a key issue key managing hydrogen safely.

Lesson learnt No.2: Local skills required

Category: Technical / Commercial

Objective: Demonstration of refuelling and electrolyser equipment in Australia

Detail:

BOC Limited has been working with Hydrogen applications in Australia for decades allowing the group to have a number of skilled personnel in the areas of safety, controls and customer uses.

Despite this, many international equipment manufacturers will insist on sending their own staff from Europe or the United States to commission their electrolysers and refuelling systems in Australia. The Covid-19 pandemic complicated this process as well as adding delays and costs to projects in terms of hotel quarantine.

Key learnings are outlined below:

a) Technology and flexibility are key. BOC Limited worked with Linde counterparts to remotely commission the Toyota EcoPark refueller in Altona (also funded by ARENA). This was achieved by utilising video conferencing, well designed commissioning manuals as well as BOC personnel skilled in hydrogen.

   This approach will be followed for the Bulwer Island BOC refueller as BOC Limited build the skills of their local resources. As uncertainty over COVID-19 border restrictions continue, BOC would recommend parties use equipment from known professional vendors as well as investing in specialist hydrogen training for local staff. The availability of local teams with specialist hydrogen skills will be an ongoing requirement for the maintenance and support of these projects. The importance of these local skills and training should not be underestimated by new participants to the refuelling market.

b) Similar learnings may be applied to electrolysers although in many cases the manufacturer has looked to commission these units themselves based on proprietary technology in the electrolyser “stack”. These skills need to be localised through long term partnerships as they will also be needed for ongoing maintenance.

Lesson learnt No. 3: Developing Social Licence

Category: Technical / Commercial

Objective: Demonstration of refuelling and electrolyser equipment in Australia

Detail:

BOC Limited produces Hydrogen as well as supporting Hydrogen infrastructure for customers across Australia. This includes managing local approvals on typically industrial sites.

The challenge with new applications such as mobility and refuelling will be seeing hydrogen applications on more public facilities such as commercial petrol stations.

The refuelling infrastructure was originally planned to be sited on the Queensland University of Technology (QUT) campus but this plan was changed in response to concerns about the potential risk perceptions related to a sensitive local population. This process highlighted the difficulty of communicating complex industrial risk assessment outcomes to stakeholders that are not trained in this area, but understandably sensitive to the notion of explosive risk.

An alternative site on Bulwer Island was identified as suitable, and in fact offers additional benefits in terms of demonstrating the co-location of hydrogen and traditional liquid fuels in a high-profile public facility. The Development Application process for the alternative site is ongoing and will be a key test for councils approving hydrogen facilities at non-industrial sites. The learnings from this process should be used as a framework for councils to help build their knowledge of relevant hydrogen projects.

The specific issues of community acceptance and council development approval is likely to remain a challenge to the sector as it develops and deserves careful attention by project developers. A co-ordinated and thorough industry-wide approach would be more efficient and avoid the risk of long-term damage to community acceptance of hydrogen projects in the event that an individual developer does not handle it well.