

# LESSONS LEARNT REPORT

## VOLUME 1, JUNE 2022

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### SunHQ Hydrogen Hub

Submission to the Australian Renewable Energy Agency

Knowledge Sharing Exercise

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### Project Details:

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<b>Project Name</b>	Phase 1: Renewable Hydrogen Demonstration for Heavy Transport
<b>Project Code</b>	2021/ARP013
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*The views expressed herein are not necessarily the views of the Australian Government, and the Australian Government does not accept responsibility for any information or advice contained herein.*

# 1 EXECUTIVE SUMMARY

The SunHQ Hydrogen Hub (SunHQ) is a 1 MW PEM electrolyser project, with on-site compression, storage and dispensing facilities. The facility is to be owned and operated by Ark Energy Corporation. The project will be co-located within the Sun Metals zinc refinery precinct in a Behind-The-Meter (BTM) configuration with the 121 MW<sub>AC</sub> Sun Metals Solar Farm. The use-case for the green hydrogen is five 140-tonne rated hydrogen Fuel Cell Electric Trucks (FCETs), which will displace approximately 1,275 tonnes of CO<sub>2</sub> per annum.

## 1.1 Project Overview

Ark Energy Corporation Pty Ltd (**Ark Energy**) was established by Korea Zinc Company Ltd (**Korea Zinc**) in January 2021 with a mandate to decarbonise the Korea Zinc Group, beginning with our sister company Sun Metals Corporation Pty Ltd (**Sun Metals**). The green hydrogen from SunHQ will be used to fuel five 140-tonne rated hydrogen FCETs. Plug Power Inc. (**Plug Power**) has been engaged as the supplier of the PEM electrolyser and compression, storage and dispenser (CSD) packages, and Hyzon Motors Inc. (**Hyzon**) has been selected as the supplier of the hydrogen FCETs. The Hyzon FCETs will displace five ultra-heavy diesel trucks in Townsville Logistics' fleet and transport zinc concentrate from the Port of Townsville to the Sun Metals zinc refinery precinct on a 28km round-trip. Figure 1 details the route that the Hyzon trucks will travel between the Port and Sun Metals.



Figure 1 - Overview of SunHQ trucking route

The distinguishing attributes of SunHQ can be summarised as follows:

- Green hydrogen electrolyser that will be integrated within a major industrial precinct and co-located with a 121MW<sub>AC</sub> solar farm;
- Deployment of hydrogen fuel cell heavy vehicles, bringing forward the decarbonisation of heavy transport in Australia by several years;
- Deployment of a hydrogen refuelling station that can be used by, and enable, other businesses in North Queensland to transition to hydrogen vehicles in their fleet;
- Demonstration of the demand-response performance of a PEM electrolyser in response to SCADA data from the SMC solar farm and NEM wholesale electricity prices; and
- Developed by a company that will be a significant future hydrogen producer and consumer.

## 1.2 Report Overview

The hydrogen industry will be critical to the success of the energy transition. However, the infrastructure and technical expertise required to produce, store and use green hydrogen at scale is not proven or cost competitive with incumbent fuel sources. Knowledge sharing is critical to the acceleration of the adoption of green hydrogen and the reduction in costs associated with deployment.

Ark Energy has learnt a number of lessons to-date in the process of delivering SunHQ. The lessons learnt discussed within this report primarily pertain to the design and development phase of the project.

## 2 LESSONS LEARNT

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**Lesson Learnt No.1:** Foreign equipment vendors aren't familiar with Australian standards

**Category:** Regulatory

**Objective:** Addressing barriers to hydrogen production and use in FCEV heavy haulage transport applications by demonstrating the business case, regulatory pathway and operational performance.

**Learning:**

Australia's standards are unique and can be challenging to meet for international vendors with little to no prior knowledge of the regulator's expectations. This is particularly the case with AS3000, Australia's electrical standard for design, installation, safety and testing.

Ark Energy, in partnership with our Owner's Engineer, have made a concerted effort to inform international vendors of these standards and how to best address them. However, overcoming these unique requirements has proven more challenging and time consuming than initially anticipated. Achieving compliance has required more design revision than expected.

It is recommended that future projects allow for additional and longer review cycles for engineering documentation due to the likelihood of overseas vendors not being familiar with the requirements of Australian standards.

A thorough clarification and alignment session is recommended as a forum during the tender review process, during which the vendor can demonstrate how they will comply with Australian standards and regulations. By addressing this at the tender review stage, parties can reduce the risk that overseas vendors will not have a genuine understanding of Australian standards.

The lessons being learnt by our vendors through the design and development of SunHQ will improve their visibility of Australia's unique regulatory requirements. In turn, these learnings will play a critical role in de-risking future hydrogen projects and increase the efficiency of project development and certainty in design works.

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**Lesson Learnt No.2:** Project challenges presented by the lack of depth and experience in local supply chain

**Category:** Commercial

**Objective:** Increased Australian skills, capacity and knowledge of hydrogen production and FCEV prime mover assembly and operation.

**Learning:**

Ark Energy has found the local hydrogen supply market to be immature. The need to look abroad for vendors to supply hydrogen equipment introduces multiple risks that would otherwise be mitigated. Such risks include foreign exchange, supply chain, communication and integration risks.

Hyzon Motors took the initiative of establishing a domestic presence in Australia in 2021, which has resulted in a positive interface between the Hyzon team and Ark Energy. Similarly, Plug Power is in the process of developing a domestic presence in Australia to assist with the delivery of SunHQ.

Ark Energy believe there is value in a supplier having a presence in Australia. From a planning and design perspective, having an Australian presence will give parties greater visibility of the

challenges associated with developing projects in Australia. Having a manufacturing presence in Australia would also be beneficial to mitigate supply chain risk.

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**Lesson Learnt No.3:** **Engineering design that is completed outside of Queensland for a project located in Queensland requires *Registered Professional Engineer of Queensland (RPEQ)* sign-off**

**Category:** Technical

**Objective:** Addressing barriers to hydrogen production and use in FCEV heavy haulage transport applications by demonstrating the business case, regulatory pathway and operational performance.

**Learning:**

All engineering design works completed for projects located in Queensland must receive RPEQ sign off. The selection of overseas vendors that do not have an engineering presence in Queensland, Australia, resulted in challenges as the vendors had to source additional human resources with the right expertise and RPEQ accreditation. RPEQ personnel must be involved in the design review process and be able to influence the design.

It was found that international chartered engineers, in compliance with certain accords, can obtain RPEQ status following an online application and review process. Certification can be awarded within 4 to 6 weeks.

It is important for developers to ensure that vendor lead or supervising engineers have RPEQ status or can obtain such status early in the design process to prevent schedule creep or design delays. In SunHQ's instance, the initial lack of RPEQ accreditation has not caused schedule delay as it has not impacted current critical path items.

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**Lesson Learnt No.4:** **The early engagement of a capable Owner's Engineer that has experience in the hydrogen industry is critical**

**Category:** Commercial

**Objective:** Increased Australian skills, capacity and knowledge of hydrogen production and FCET prime mover assembly and operation.

**Learning:**

Ark Energy has realised the benefits of engaging an Owner's Engineer for the delivery of SunHQ. Noting the small number of proponents in Australia that have in-depth technical and practical knowledge of the emerging hydrogen industry, Ark Energy approached GPA Engineering (GPA) to be our Owner's Engineer for SunHQ. GPA had previously supported the delivery of Australian hydrogen projects.

GPA has supported across design optimisation and in identifying non-compliance at the vendor package design review stage, prior to procurement of equipment. This has reduced Ark Energy's risk of accepting non-compliant equipment and the consequential remediation costs and delays to commissioning.