

Renewable Methane Demonstration Project – Progress and Status

Background

APA is a leading Australian Securities Exchange (ASX) listed energy infrastructure business. We own and/or manage and operate a diverse \$22 billion portfolio of gas, electricity, solar and wind assets. Consistent with our purpose to strengthen communities through responsible energy, we deliver approximately half of the nation's gas usage and connect Victoria with South Australia, New South Wales with Queensland, and Tasmania with Victoria through our investments in electricity transmission assets. We are also one of the largest owners and operators of renewable power generation assets in Australia, with wind and solar projects across the country.

In May 2020, APA announced that its Renewable Methane Demonstration Project (the Project) was the successful recipient of funding from ARENA, as part of its Advancing Renewables Program. APA contracted Southern Green Gas to design, build and test the Project.

The objective of the Project was to provide a proof of concept that hydrogen can be produced from solar energy and water, then converted to methane using CO₂ extracted from the air.

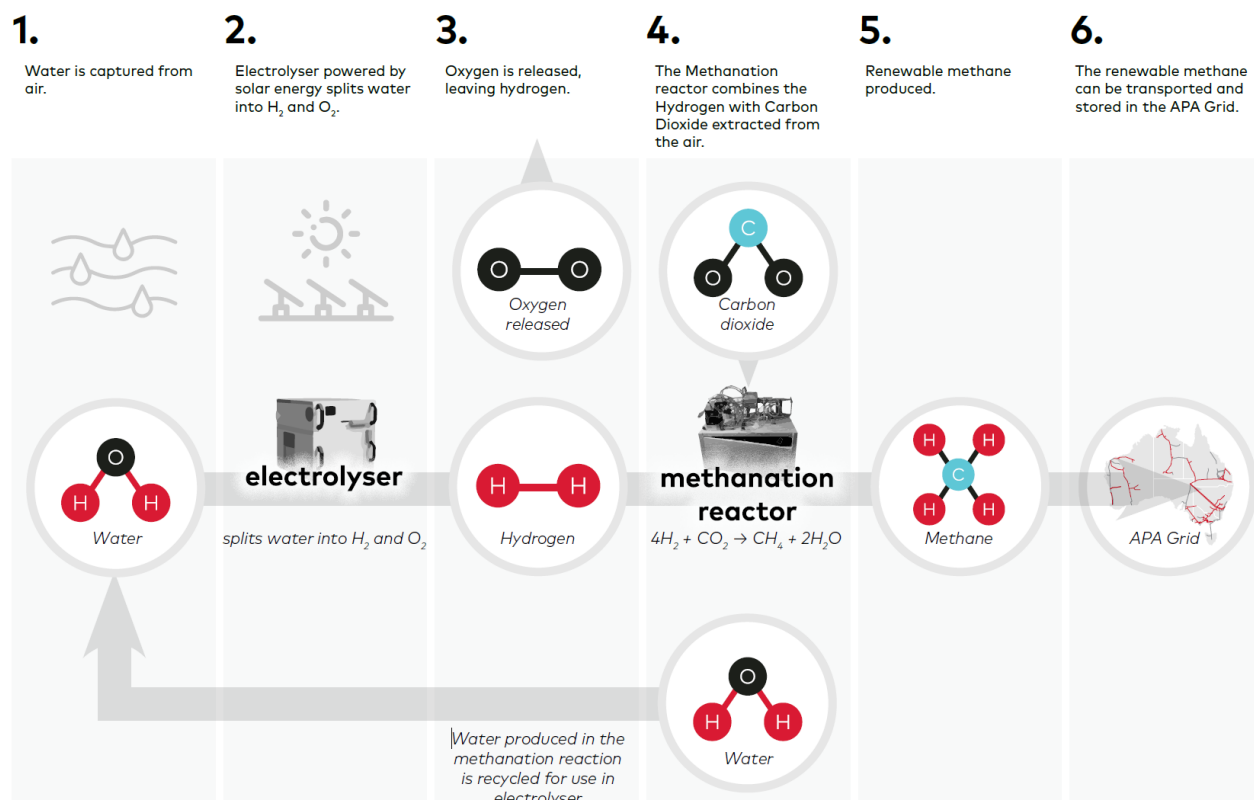


Figure 1: Renewable Methane Demonstration Project Process Overview

Project Development

Since its inception, the project has achieved several successes including: advancing the industry's knowledge of Direct Air Capture technology and establishing a domestic supply chain that has attracted funding from Elon Musk¹. However, the Project has also faced several challenges:

- COVID-19 pandemic:
 - The Project commenced in the same month as the COVID-19 pandemic (March 2020). As with many projects conducted over the past three years, COVID had a significant impact on staff availability, global supply chains, and travel restrictions. The Project experienced numerous and varied delays as a result. To mitigate some of the delays, the Project pivoted to work with an Australian-based manufacturer for the Direct Air Capture unit production instead of the US-based manufacturer as originally planned.
- Technology development:
 - Methanation (Sabatier) reactor – the methanation reaction requires tight temperature control to achieve the desired gas quality. The Project managed to achieve this through trial and error including pre-heating the process when starting from a cold start, introduction of a cooling jacket to manage the reaction temperature once the exothermic reaction started, and ultimately increasing the hydrogen to CO₂ ratio. The final solution simplifies post-reaction gas conditioning requirements and the overall process design of the system.
 - Direct Air Capture (DAC) – the initial DAC unit was designed and tested by an overseas US-based manufacturer, achieving preliminary performance requirements in early 2021. Due to the supply chain challenges caused by the COVID-19 pandemic, the Project agreed in mid-2021 to transition to an Australian-based development team. The DAC module has since cycled through various iterations of design due to technology challenges during development. These challenges have included mechanical failure of the substrate; uneven heating of the substrate; and heat loss through the container shell.

As a result of the delays associated with the above challenges, APA has agreed with ARENA to mutually end the Project and the associated Funding Agreement. Consequently, APA has also ended its agreements with Southern Green Gas.

APA remains committed to the development of renewable gases and continues to explore opportunities to invest in research, pilots, and projects that will demonstrate the technical and commercial viability of clean fuels.

Looking forward, APA's efforts will focus on a number of APA's Pathfinder projects, which are working in partnership with customers, universities, governments and key industry participants.

Further information on APA's clean energy projects can be found at www.apa.com.au

¹ News article: [USD\\$250,000 from Elon Musk to Sydney students, for carbon removal - The University of Sydney](#)