Gold Hydrogen

# Aiming to Discover and Develop Naturally Occurring Australian Hydrogen

## AGM Presentation 3 October 2023

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Statements in this presentation as to gas and mineral resources has been compiled from data provided by Gold Hydrogen’s Chief Engineer, Mr. Billy Hadi Subrata. Mr. Hadi Subrata’s qualifications include a Bachelor and Master of Engineering Science from University of New South Wales, Sydney, Australia, and he is an active member of Engineers Australia and SPE. Mr. Hadi Subrata's has 18 years of relevant exploration, development and production experience in petroleum, conventional and unconventional hydrocarbons, and hydrogen. Mr. Hadi Subrata has sufficient experience that is relevant to Gold Hydrogen’s resources to qualify as a Reserves and Resources Evaluator as defined in the ASX Listing Rules 5.11. Mr. Hadi Subrata consented to the inclusion in this report of the matters based on his information in the form and context in which it appears.

# Gold Hydrogen – Low Cost, Natural Hydrogen

| | |
|---|---|
| **Title over reported natural hydrogen prospective resource occurrences** | Historic wells flowed hydrogen in gas samples. Independent expert unrisked Best Estimate Prospective Resource of 1.3 billion kilograms of hydrogen (**Refer Slide 10 for details**). |
| **Flagship project, exploration permit granted and application** | Ramsay Project 7,820 km$^2$ (green on map) is 100% owned by Gold Hydrogen. Other locations under application, also 100% Gold Hydrogen, represent a further 67,512 km$^2$ |
| **Near term value inflection point** | Stage One exploration drilling and testing programme is scheduled to commence in October 2023 on the Yorke Peninsula. |
| **Enabling arrangements with leading global hydrogen experts** | Strategic supplier arrangements with Savanna Energy, SLB (Schlumberger), Total Seismic, Xcalibur Multiphysics and CSIRO. |
| **Significant commercial and environmental competitive advantage** | As a replacement for carbon-based fuels, naturally occurring hydrogen offers significant cost and emissions advantages relative to other sources of hydrogen production. |

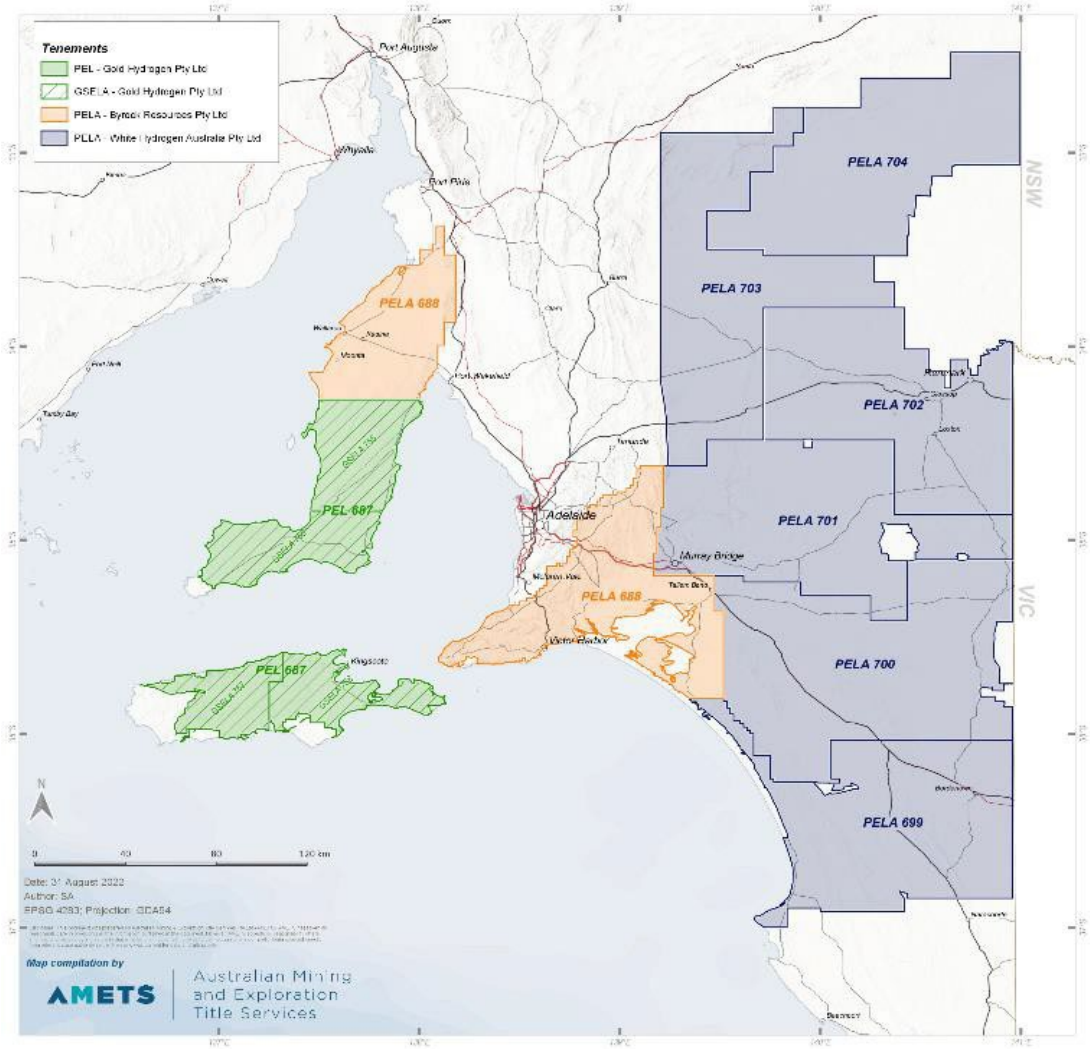


*Figure: Overview of Gold Hydrogen tenements*

# Industry Overview

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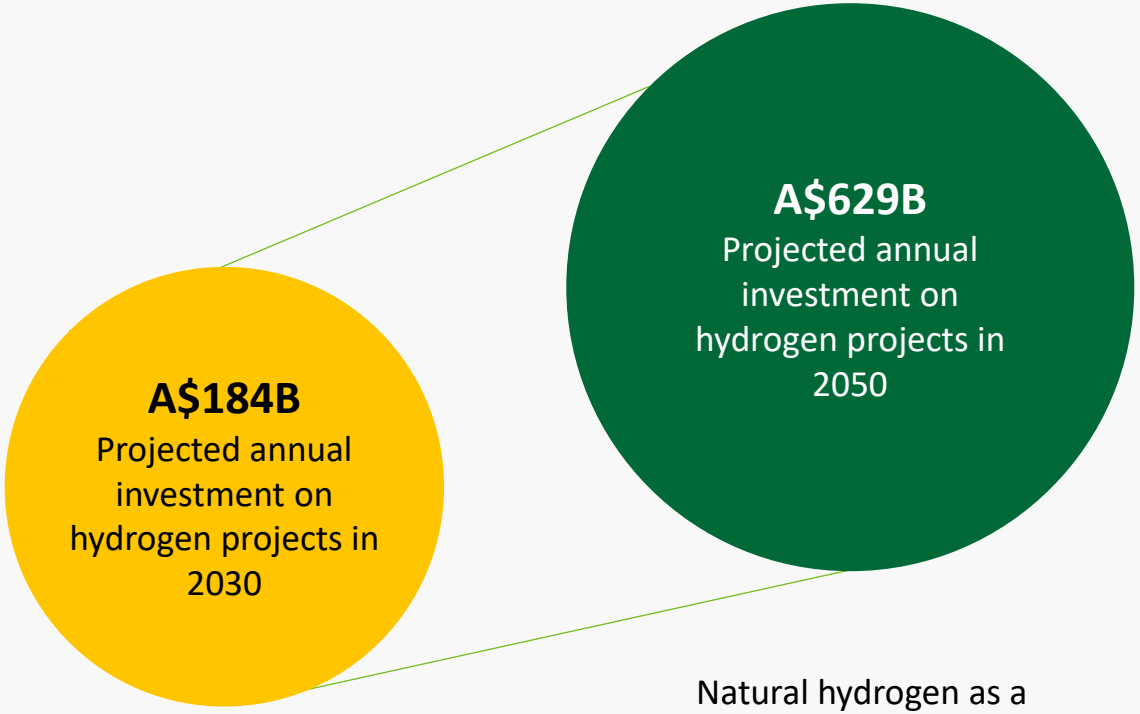
# Global Hydrogen Forecast

## Substantial investment laying the foundation for hydrogen use

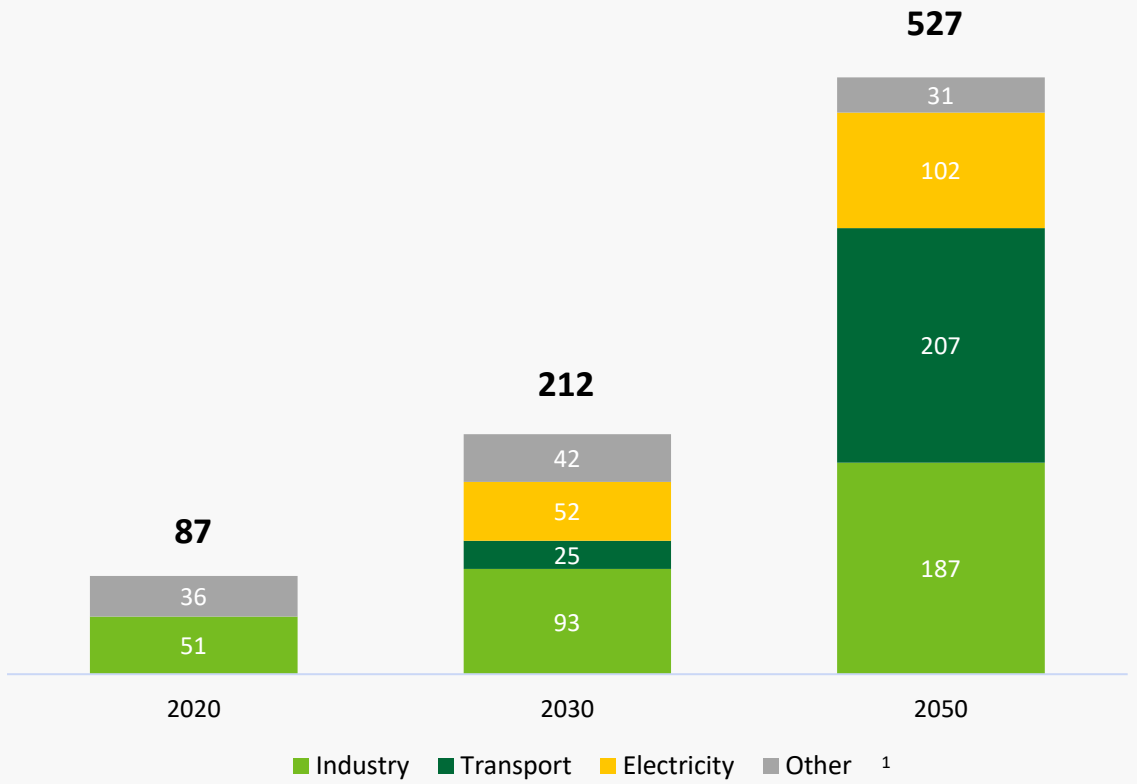



ESG push to decarbonise industries and economies is underpinning demand for hydrogen

Natural hydrogen as a carbon-neutral, low-cost source presents a very attractive opportunity to facilitate decarbonisation

*Source: Frost & Sullivan Report - Page 29 of Gold Hydrogen Prospectus*

### Global Hydrogen Demand by Sector, Net Zero Emissions Target Scenario (Mt)




*Source: International Energy Agency, Oct-2021*
*1. Other includes buildings, agriculture and refineries*

# Key Trends Driving Hydrogen Adoption

**Most hydrogen used today is in the production of ammonia and steel, or by oil refineries**

**Future growth projections are based on a number of key trends that are driving adoption**

**ESG investment and country policies** push to decarbonise


**Technological advances** across the hydrogen value chain


**Hydrogen enhances flexibility** of grids and industrial applications


**Use of hydrogen as transport fuel** or heat source alternative

# Types of Hydrogen Production

## Naturally occurring hydrogen offer a significant cost and carbon emission advantage relative to other hydrogen production (manufacturing) processes

| | Gold Hydrogen | Grey | Black/Brown | Blue | Green |
|---|---|---|---|---|---|
| **Energy source** | **Natural hydrogen** | Natural gas | Coal | Natural gas / coal | Renewables / biomass |
| **Environmental impact** | **Carbon-neutral** | High | Very High | Low | Carbon-neutral |
| **No thermal process** | ✓ | ✗ | ✗ | ✗ | ✗ |
| **Production cost (A$/kg)[1,2]** | **$1.00** | $5.60 | $6.20-$6.40 | $10.20-$10.30 | P: $6.40-$25.50<br>A: $4.70-$23.20 |
| **Cost comparable to existing power generation[3]** | ✓ | ✗ | ✗ | ✗ | ✗ |

*Today, ~95% of all hydrogen produced is from natural gas*

*Source: Frost and Sullivan, Sep-2022*

1. *Source: Christophe Rigollet[1], Alain Prinzhofer[2,3], Natural Hydrogen: A New Source of Carbon-Free and Renewable Energy That Can Compete With Hydrocarbons, First Break, Volume 40, Issue 10, Oct 2022, p. 78 – 84 DOI: https://doi.org/10.3997/1365-2397.fb2022087; "The Bourakébougou field, in Mali, represents the first natural hydrogen deposit studied both scientifically and industrially. It gives us information on its renewability, on the natural flows involved and therefore on its sustainable exploitation. It is possible to estimate that the cost of operating hydrogen would be less than $1/kg, which is significantly cheaper than any manufactured hydrogen, whether green, grey, or blue. Equivalent work is in progress in other continents, in order to be able to compare our knowledge of this Malian field with other fields in the world, which will make it possible to better ensure the industrial and societal interest of R&D for this new field."*
2. *P = Polymer electrolyte membrane electrolysis. A = Alkaline Electrolysis. Gold Hydrogen cost is an estimate*
3. *For industrial buyers, a hydrogen offtake price of €3 ($4.50) per kg would be required to incentivise hydrogen production over power generation*

# Gold Hydrogen's Ramsay Project

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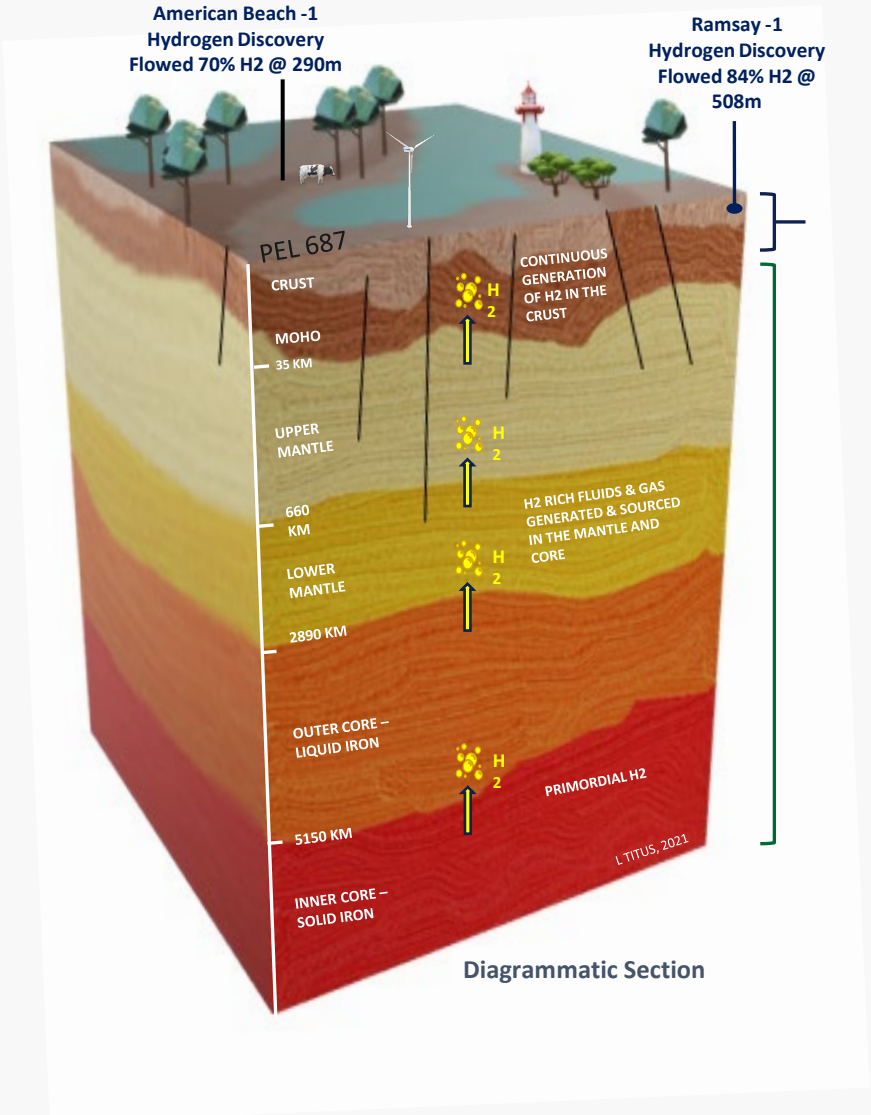
# Historical Drilling at Ramsay Encounters Hydrogen

- In the 1920s and 1930s, Natural Hydrogen occurrences in PEL 687 were reported during unsuccessful ventures looking to discover oil.
- Gases were sampled by the State of South Australia at the rig site and after lab analysis was to have a very high Natural Hydrogen content between 66% and 89% (air corrected).
- Natural Hydrogen content increased significant as depth increased, and Gold Hydrogen believes potential for deeper Natural Hydrogen sources and Reservoirs exist at untested depths.

***Historical drilling***

| | American Beach discovery well | | Ramsay discovery well | | |
|---|---|---|---|---|---|
| Depth (m) | 187.4 | **289.5** | 240.8 | 262.1 | **507.8** |
| H2 (%) – sample composition | 51.3 | **68.6** | 76.0 | 64.4 | **84.0** |
| H2 (%) – air corrected values | 65.6 | **83.3** | 76.0 | 73.1 | **89.3** |

# Gold Hydrogen Prospective Resources



Diagrammatic Section

## Certified Prospective Hydrogen Resources, existing discoveries and drill ready hydrogen prospects

**Unrisked Prospective Hydrogen Resources, PEL 687**

| SPE-PRMS Sub-Class Category | Low Estimate (kTonnes) | Best Estimate (kTonnes) | High Estimate (kTonnes) |
|---|---|---|---|
| Prospect | 165 | 1135 | 8050 |
| Lead | 42 | 178 | 770 |
| **Total** | **207** | **1313** | **8820** |

**Calculated Volume not Determined**

**NOTE** - All estimates are unrisked and aggregated arithmetically by category, hence caution that the aggregate low estimate maybe a conservative estimate and the aggregate high estimate maybe very optimistic estimate due to the portfolio effects of arithmetic summation. The estimated quantities of hydrogen that may potentially be recovered by the application of future development project(s) relate to undiscovered accumulations. These estimates have both an associated risk of discovery, risk of development and risk of commercialization. Further exploration, appraisal and evaluation is required to determine the existence of a significant quantity of potentially recoverable Natural Hydrogen.

See ASX release of 13 January 2023 for full details and notes.

# Key Success Factors

**Ramsay Project ticks the boxes in respect of the key attributes for the formation and accumulation of Natural Hydrogen**

| | Key Success Factor | Ramsay Project | |
|---|---|---|---|
| **Source & Generation** | The optimal geological conditions for the natural formation of hydrogen gas revolve primarily around the hydrolysis and radiolysis reactions in old rocks | Ramsay Project is ideally located at the Gawler craton of South Australia, where radiolysis and hydrolysis reactions of iron-rich rocks are ongoing creating naturally occurring hydrogen | ✓ |
| **Seals & Traps** | The entrapment of the naturally formed hydrogen is essential to find commercially viable accumulations | Ramsay Project contains seals in the Cambrian stratigraphy including tight limestones that overlie the basement source rocks. These seals were penetrated by the historic wells that discovered hydrogen | ✓ |
| **Structure** | Ideally the host rocks for formation of hydrogen gas are located along major structural boundaries in an extensional geological regime where natural fractures exist | Ramsay Project located on major lithospheric boundary and bend in the Tasman line of the Delamerian orogeny. Additionally, it is within the setting of the tectonically active horst-graben Adelaide extensional rift | ✓ |
| **Reservoir** | The commerciality of a resource is a function of its reservoir type, volume (size), depth (accessibility), extraction rate and quality of the natural hydrogen content | Ramsay Project Reservoir may extend to 5km depth (with only 50-150m thickness assumed in the Technical Expert Report) with occurrences of up to 84% Natural Hydrogen (89% Air-corrected) from rocks which overlie the Basement Source rocks | ✓ |

# Operational Update

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# Completed Exploration Activities

## Key contracts awarded for drilling

- Savanna Energy Services to provide drill rig and drilling operations.
- SLB (formerly Schlumberger) assisting with geological, design, testing and other services.

## Geological work completed

- CSIRO experimental soil testing has confirmed that hydrogen is migrating to the surface in moderate levels in key fault zones.
- CSIRO scientific review of historical rock samples prove hydrogen shows and the rocks samples have the right components and made hydrogen in laboratory settings.
- Gravity/ Magnetic survey (10,000 line kms) and interpretation completed showing significant coverage of iron and magnetic rocks across the permit area.
- Geological review of offset wells and seismic lines completed providing clear understanding of the surface.

## On track for October drilling

# Gold Hydrogen – We are doing what we said we would do

| | | Q4 CY22 | Q1 CY23 | Q2 CY23 | Q3 CY23 | Q4 CY23 | Q1 CY24 | Q2 CY24 | Q3 CY24 | Q4 CY24 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Project development** | Continued community & stakeholder engagement | | | ✓ | | | | | | |
| | Environmental approvals and land access | | | ✓ | | | | | | |
| **CSIRO workstreams** | Stage 1 – Gas Soil | | | ✓ | *Field work completed, results announced* | | | | | |
| | Stage 1 – Lab analysis | | | | *On track* | | | | | |
| | Stage 2 – Gas Soil | | | | | | | | | |
| | Natural hydrogen research and studies | | | ✓ | | | | | | |
| | Airborne survey and processing | | | ✓ | *Survey completed, data received and processed* | | | | | |
| **Schlumberger workstreams** | Downstream – production and sales scenarios | | ✓ | | | | | | | |
| | Upstream – 2D Seismic repro and dynamic model | | ✓ | | | | | | | |
| | Well design | | ✓ | | | | | | | |
| **Yorke Peninsula drilling program** | Exploration well 1 - permitting | | | | ✓ | *On track for approval in September* | | | | |
| | Exploration well 1 - drill testing | | | | | ✓ | | | | |
| | **Resource update (results dependent)** | | | | | | | | | |
| | Exploration wells 2 & 3 – permitting | | | | ✓ | *Well 2 ahead of plan* | | | | |
| | Exploration wells 2 & 3 - drill testing | | | | | | ✓ | *Well 2 ahead of plan* | | |

# Low Cost Hydrogen Exploration

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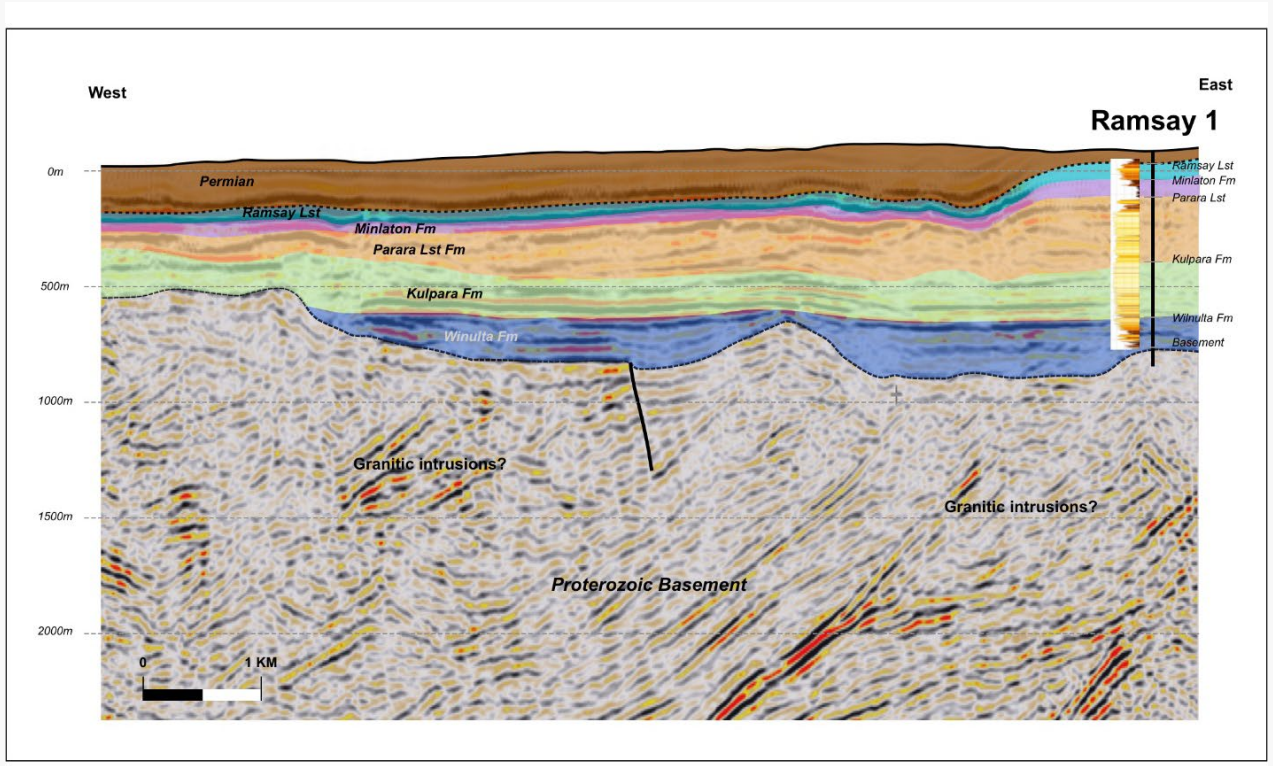
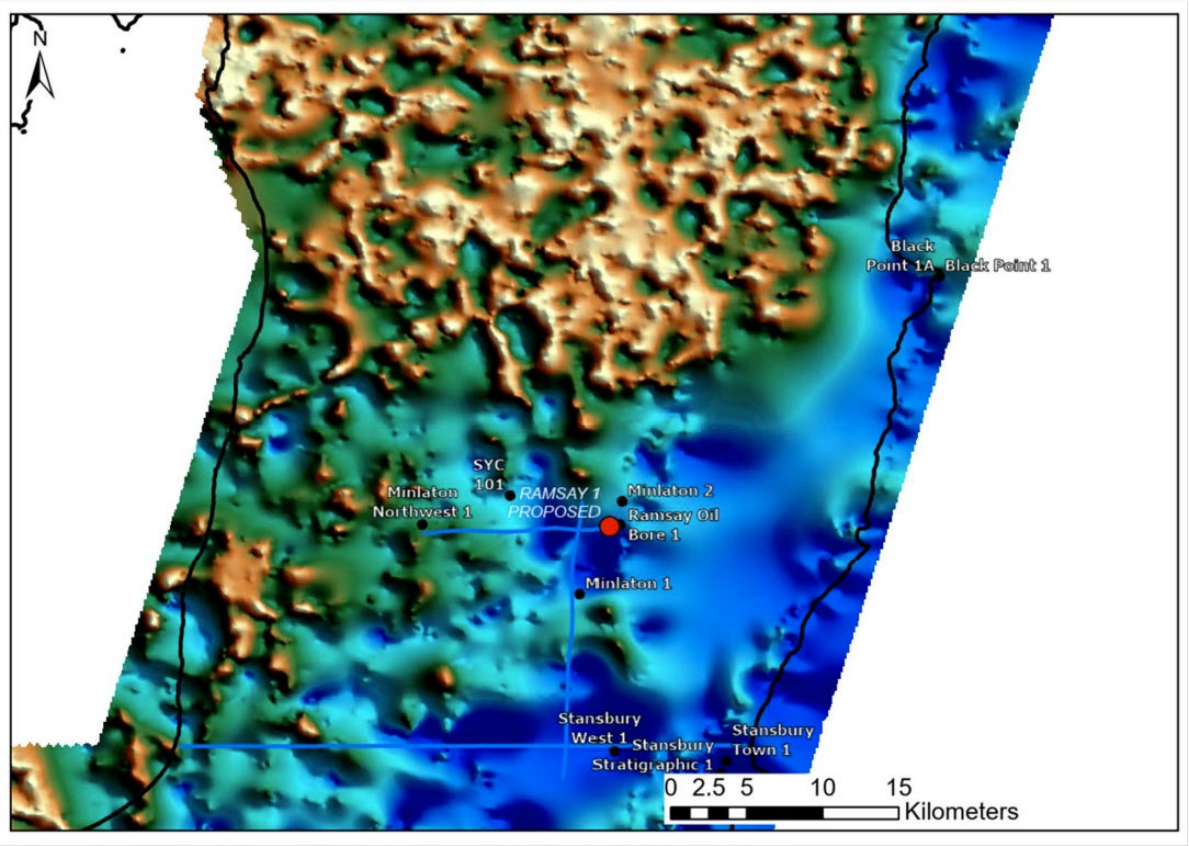
# Geology Update




## Considerable work done to date

- increased understanding of geological setting, including surface sampling, sub-surface modelling, seismic reinterpretation and rock fluid inclusion studies.
- aerial survey, high quality data to help plan future program.

# Rock Characterisation Study

- Test conducted on historical rock samples from PEL 687.
- 31 out of 34 samples contained hydrogen.
- Samples indicated the rock formations have the potential to generate, store and allow the flow of hydrogen.
- Granite mineralisation is potentially able to generate hydrogen.
- The rock samples were shown to have natural porosity and permeability that allowed hydrogen to be stored and extracted.
- Independent mapping of the mineralogy supports the recently interpreted aerial magnetic survey.

**This independent laboratory work supports Gold Hydrogen's theory that Natural Hydrogen is produced in the granite basement, and can then migrate into the limestone formation. This theory is to be tested with the Ramsay 1 well.**


*Figure: Historical samples*

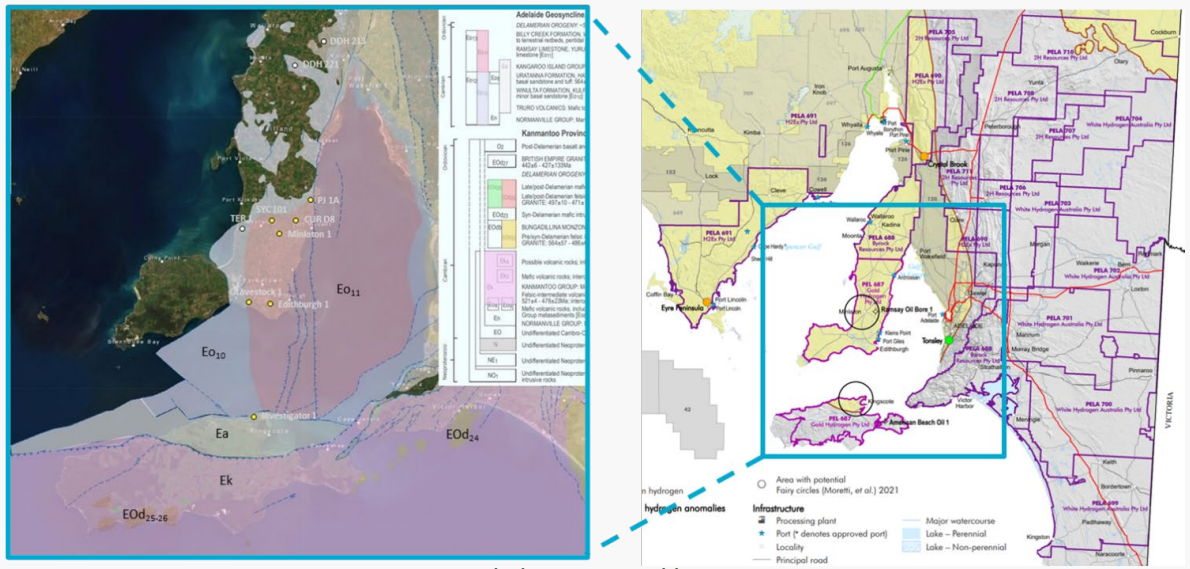



*Figure: Sample location and basement map*

# Drilling Update


Legend

- Historical Ramsay Oil Bore 1
- Ramsay 1
- Ramsay 2
- Roads
- Access
- Ramsay 1 Well Pad
- Ramsay 2 Well Pad

## Ramsay 1 & 2

- Well sites pegged and ready to build.
- Formal project approval gazetted (21st September).
- Activity Notice Submitted (21st September).
- First of staged approvals - site works (28th September).
- Expect drilling approval in early October.
- **Spud of Ramsay 1 scheduled for mid-October, and mid-November for Ramsay 2.**
- Post drilling, Gold Hydrogen to progress Contingent Resource assessment.

# What's Next – Resource Development, Project De-risking and Early Commercialisation

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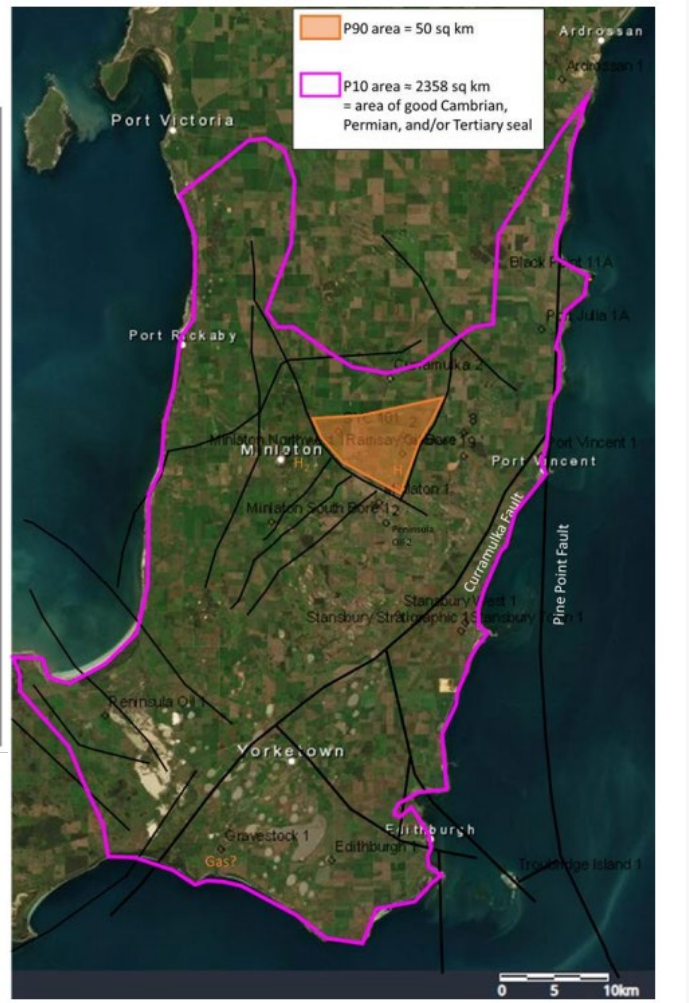
# 2024 - 2025: Resource Development, Proof of Concept and Further Exploration



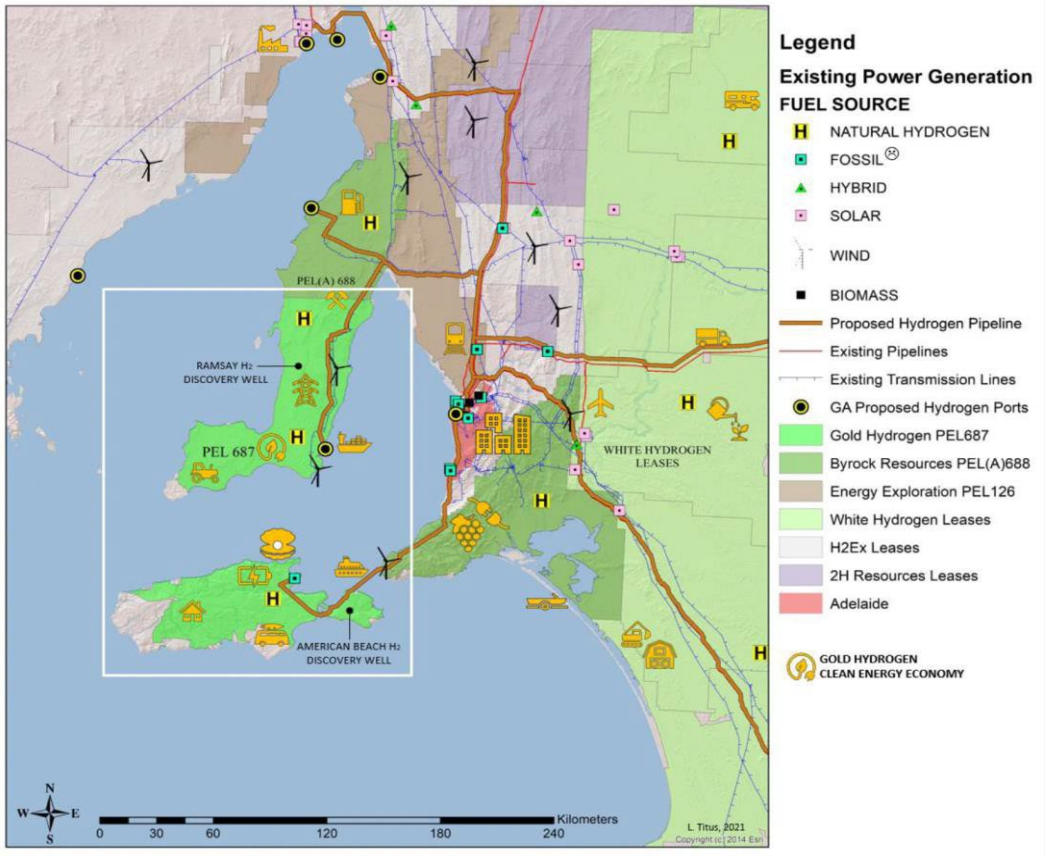

## Ramsay Project

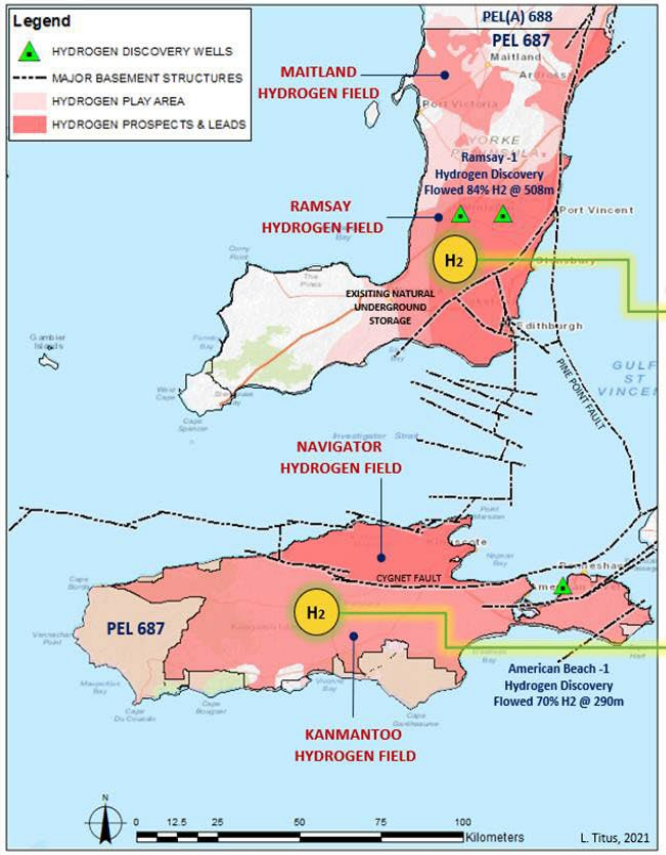
- Progress Prospective Resource to Contingent Resource.
- Obtain additional 2D seismic.
- Planning for additional delineation wells.
- Progress proof of concept pilot (notionally 1,000kgs per day).
- Obtain world's first hydrogen reserve certification.

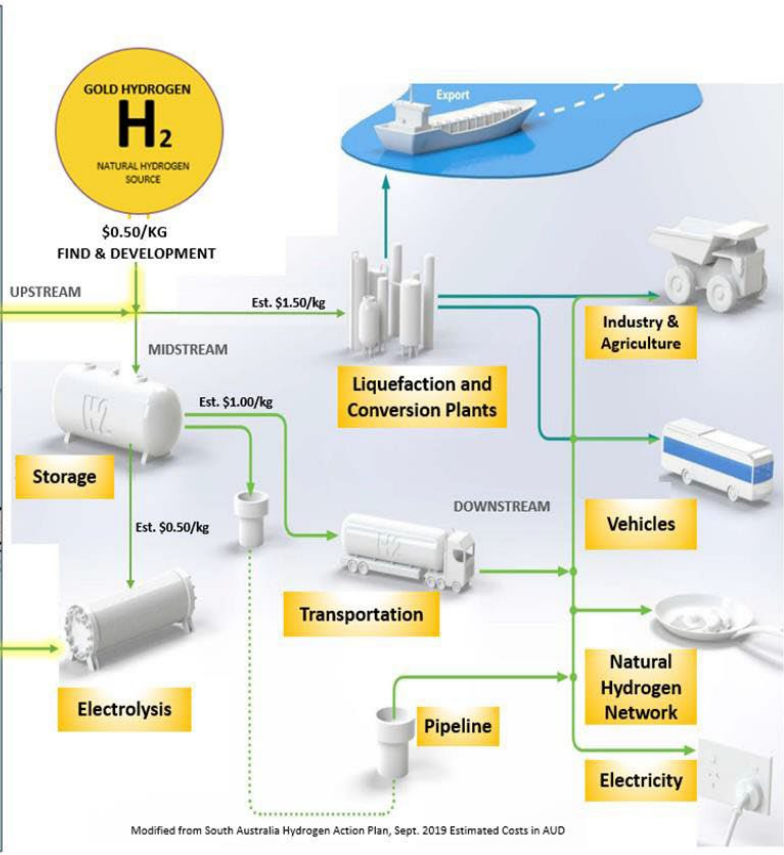
## Expand the base

- Gather 2D seismic in the south and north.
- Additional exploration wells.

# 2025 + Ongoing Planning for Large-scale Commercialisation

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