



**Dr Josh Whitcombe COO Gold Hydrogen Ltd**  
**PESA Symposium - Brisbane 11th September 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 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.



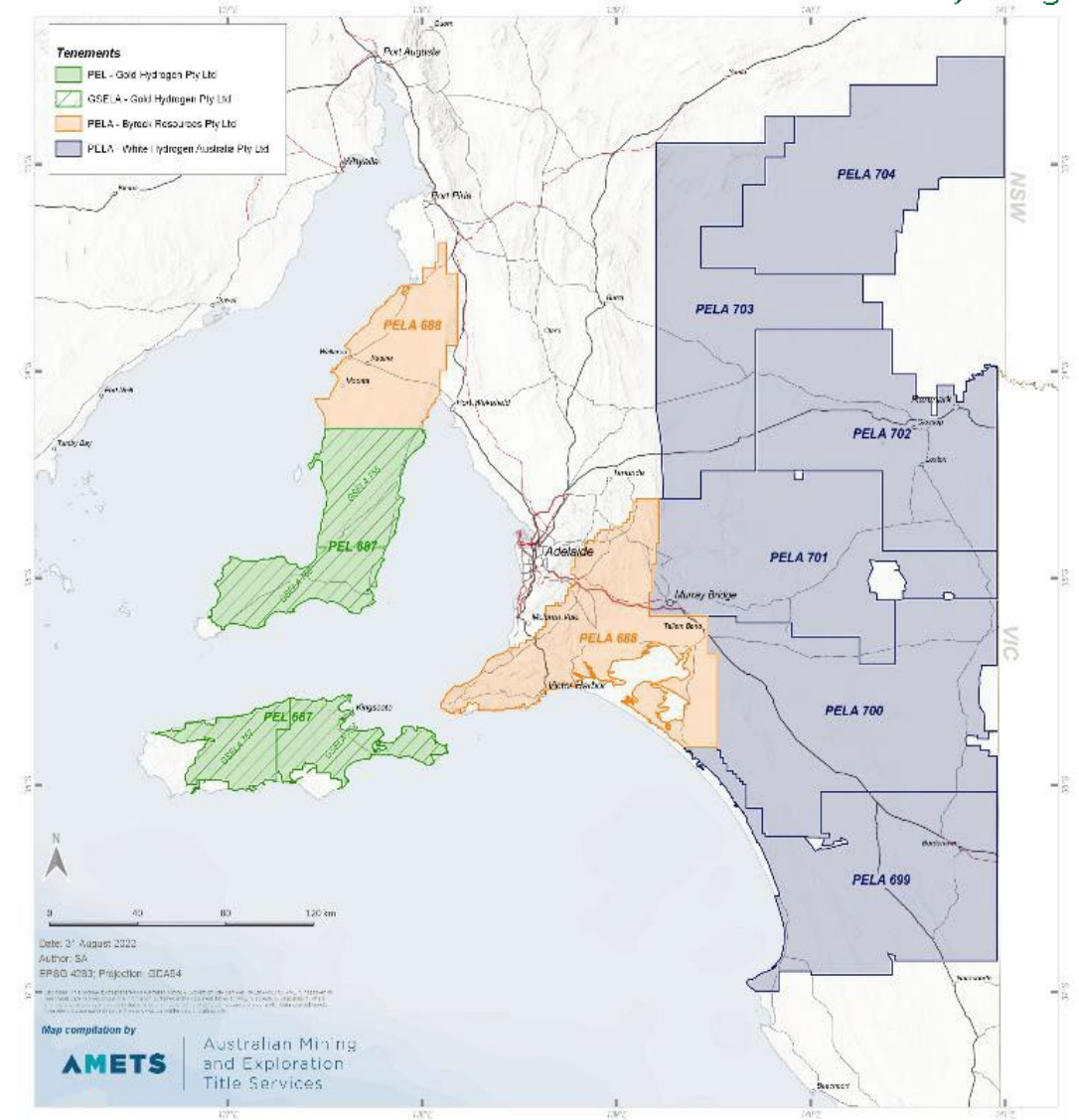
# Who Are We?

## Corporate:

- “GHY” listed on ASX on 13 January 2023.
- \$20 million raised, sufficient for first 2 years work program.
- Dedicated natural hydrogen exploration company

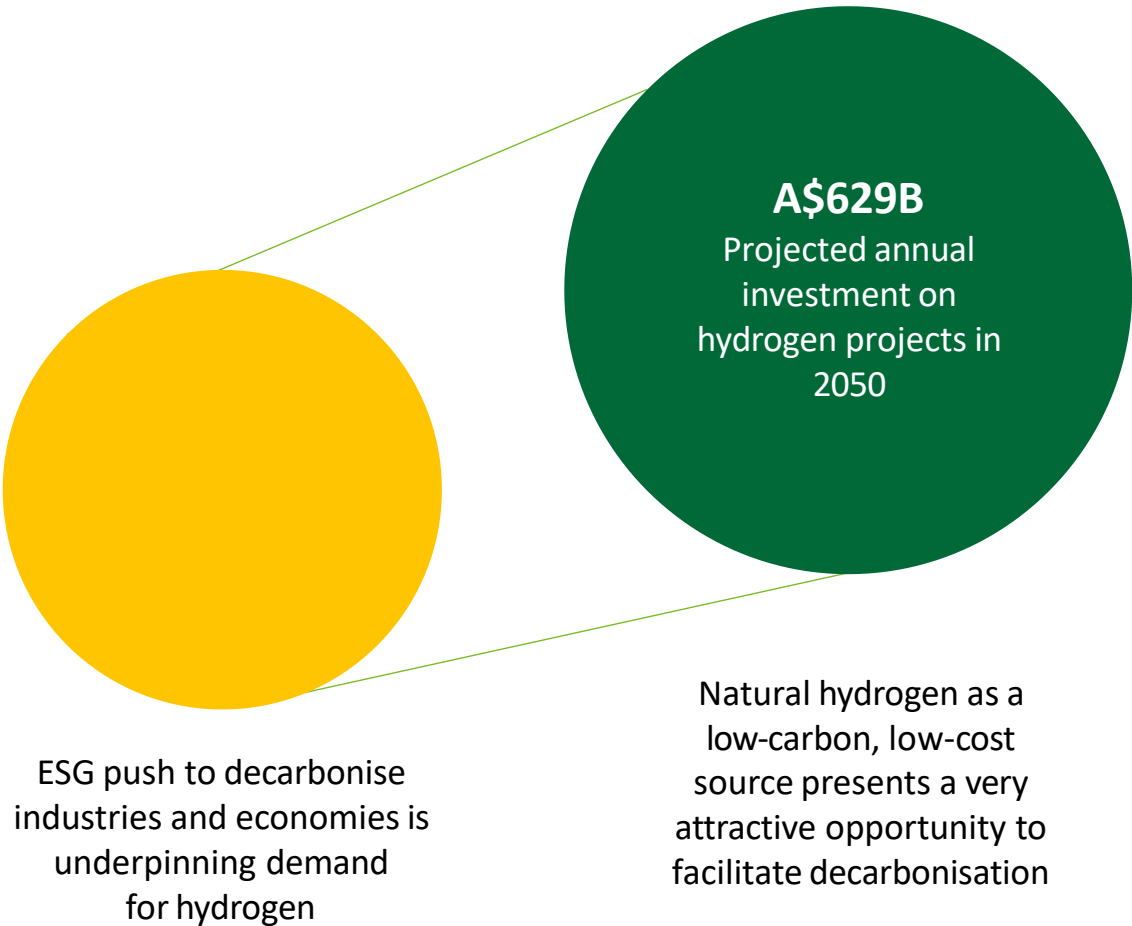
## Project:

- Large acreage position in South Australia, includes historic wells that encountered hydrogen.
- Plan to drill the Ramsay 1 and 2 hydrogen exploration wells in October and November 2023.
- Ramsay 1 will twin the original Ramsay Oil Bore 1 that encountered hydrogen.
- Plan to progress Prospective Resources into Contingent Resource for natural (white or gold) hydrogen.

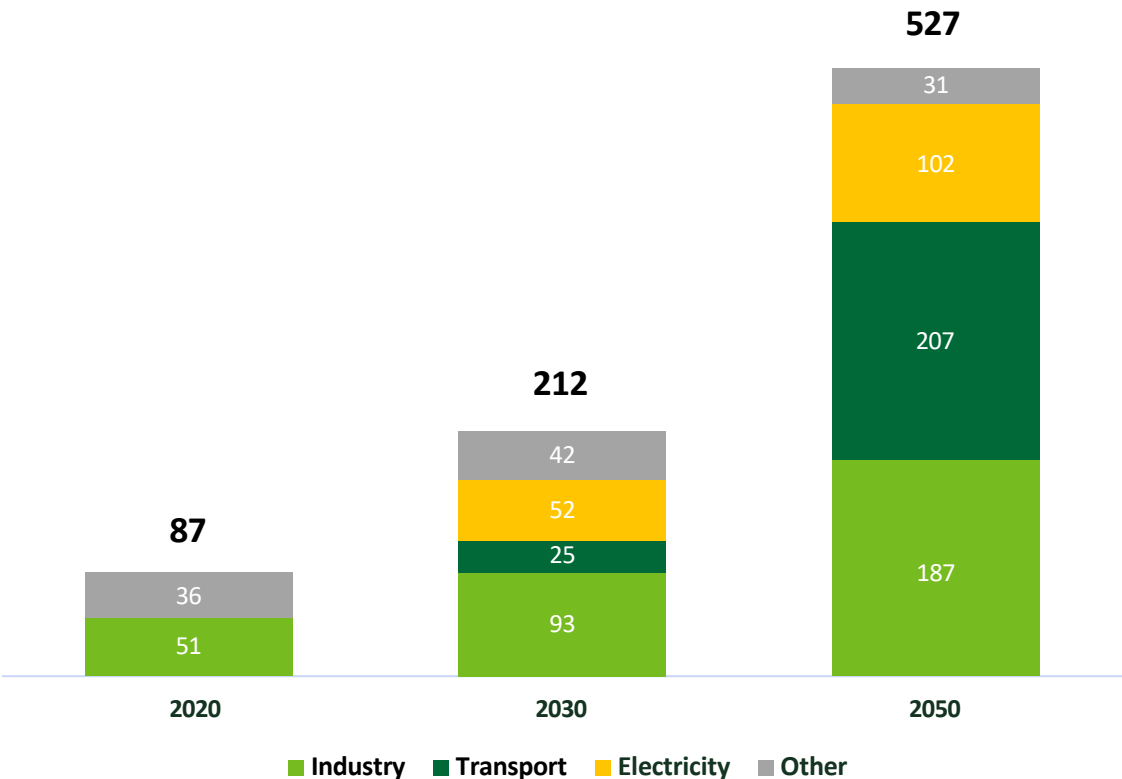


# Global Hydrogen Forecast

Substantial investment laying the foundation for hydrogen use



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



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

# Types of Hydrogen Production

Naturally occurring hydrogen offers a significant cost and carbon neutral advantage relative to other hydrogen production (manufacturing) processes.

	Natural	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) <sup>1,2</sup>	\$1.00	\$5.60	\$6.20-\$6.40	\$10.20-\$10.30	P: \$6.40-\$25.50 A: \$4.70-\$23.20
Cost comparable to existing power generation <sup>3</sup>	✓	✗	✗	✗	✗

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

Source: Frost and Sullivan, Sep-2022

1. P = Polymer electrolyte membrane electrolysis. A = Alkaline Electrolysis.

2. For industrial buyers, a hydrogen offtake price of €3 (\$4.50) per kg would be required to incentivise hydrogen production over power generation

3. Source: Christophe Rigollet<sup>1</sup>, Alain Prinzhofer<sup>2,3</sup>, 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.”

# What is “Natural Hydrogen”

- It is naturally occurring hydrogen, believed to be generated from the interaction of water with the granite basement.
- CSIRO have shown a theoretical mass balance that allows the liberation of hydrogen through the interaction of our basement material and water.
- Unlike petroleum generated from a carbon-based source, hydrogen can be generated continuously over a longer timeframe and a wider temperature range, which means that hydrogen systems can renew and may possibly be renewable. Research on this matter is ongoing.
- Historical wells in the area have found high concentrations of hydrogen (up to 90%) while drilling. It is believed the hydrogen migrates / percolates through the limestone via the small porosity / permeability rather than accumulating in sandstone traps.
- Currently a working natural hydrogen field is in production in Mali, Africa.

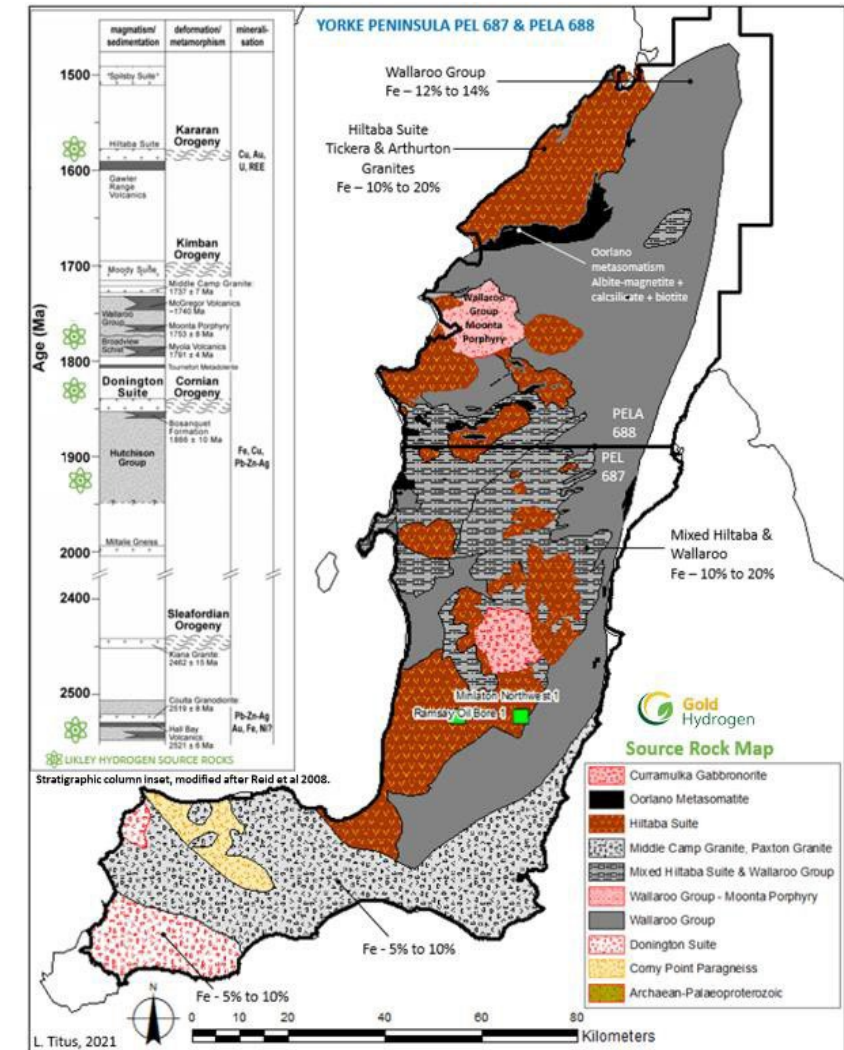


Figure: Ramsay Project source rocks at Yorke Peninsula

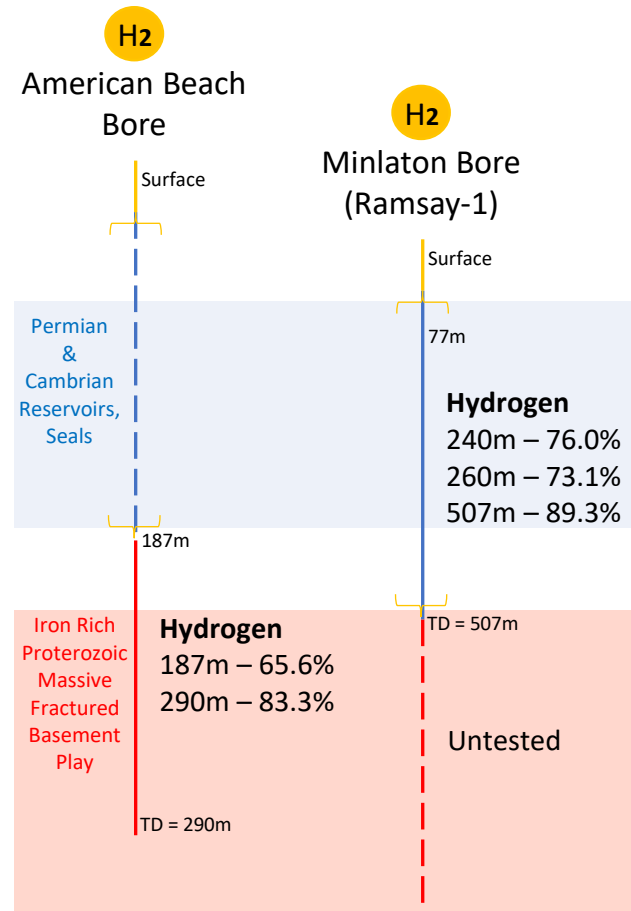


# Yorke Peninsula – a History of Natural Hydrogen

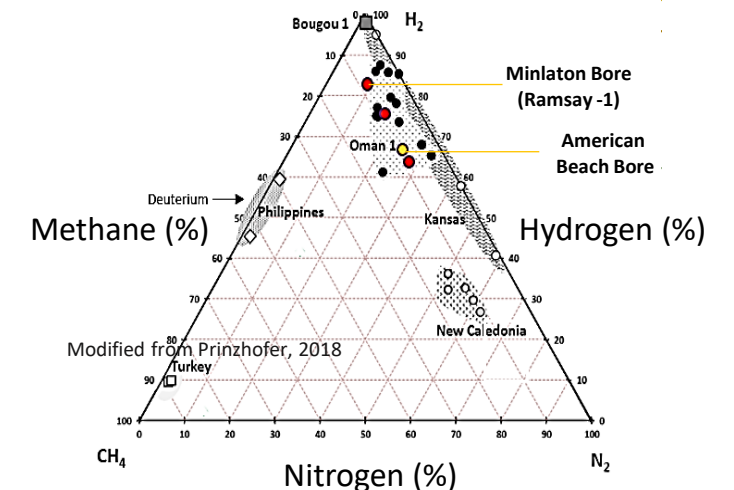
Ternary diagram of relative proportions of hydrogen, methane and nitrogen in PEL 687 compared to other natural hydrogen accumulations



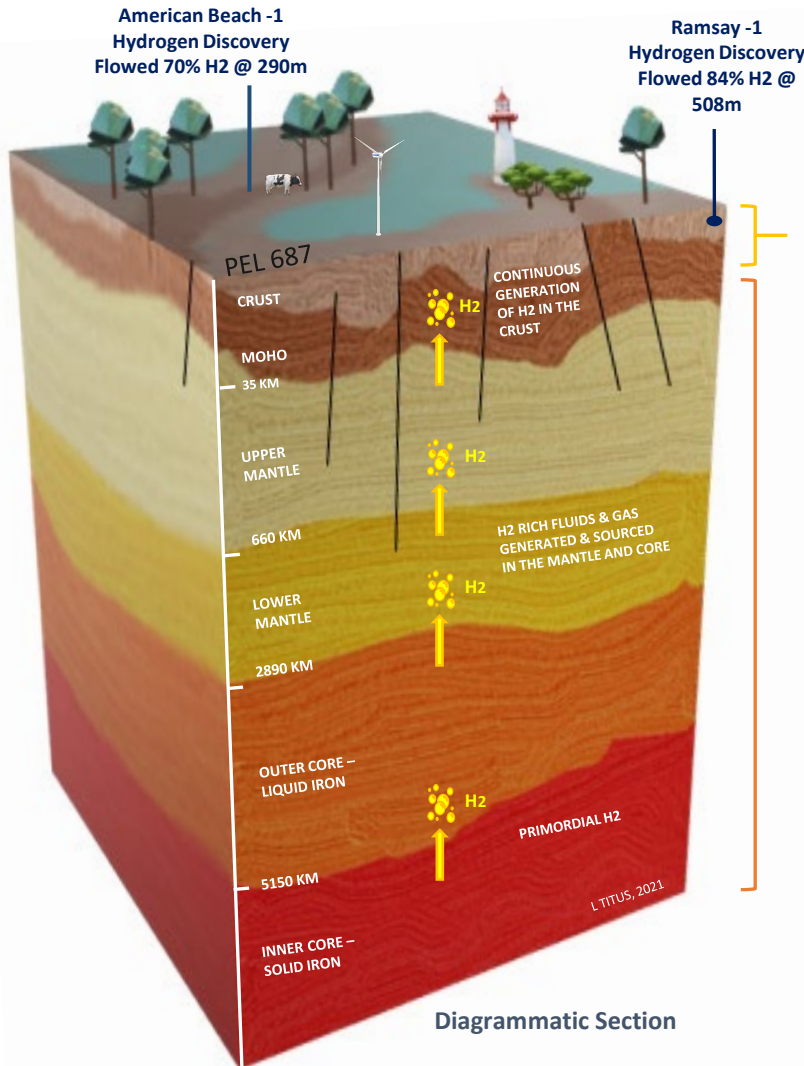
Gas sampling whilst drilling – Ramsay Oil Bore




Location	American Beach Borehole		Ramsay Borehole		
Depth (m)	187.4	289.5	240.8	262.1	507.8
Sample Composition					
CO <sub>2</sub> (%)	5.3	0.5	0.2	0.8	0
O <sub>2</sub> (%)	4.3	3.6	0	2.4	1.2
C <sub>2</sub> (%)	0.5	0.0	0	0	0
CO (%)	0	0.0	0	0	0
<b>H<sub>2</sub> (%)</b>	<b>51.3</b>	<b>68.6</b>	<b>76</b>	<b>64.4</b>	<b>84</b>
CH <sub>4</sub> (%)	2.6	4.7	7.5	7	0
N <sub>2</sub> (%) by difference	36	22.6	16.3	25.4	14.8
Air Corrected Values					
CO <sub>2</sub> (%)	6.8	0.6	0.2	0.9	0
<b>H<sub>2</sub> (%)</b>	<b>65.6</b>	<b>83.3</b>	<b>76</b>	<b>73.1</b>	<b>89.3</b>
CH <sub>4</sub> (%)	3.3	5.7	7.5	7.9	0
N <sub>2</sub> (%)	24.3	10.4	16.3	18.1	10.7



# Gold Hydrogen Prospective Resources



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

 <b>Unrisked Prospective Hydrogen Resources, PEL 687</b>			
SPE-PRMS Sub-Class Category	Low Estimate (kTonnes)	Best Estimate (kTonnes)	High Estimate (kTonnes)
Prospect	165	1135	8050
Lead	42	178	770
<b>Total</b>	<b>207</b>	<b>1313</b>	<b>8820</b>

**Calculated Volume not Determined**

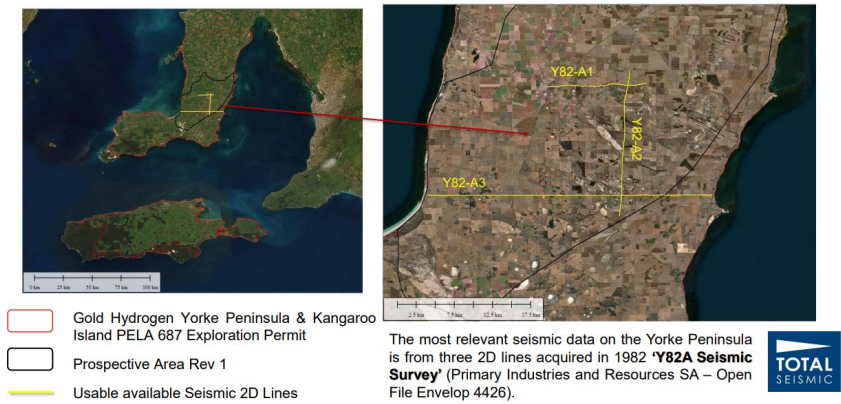
**NOTE** - All estimates are unrisked and aggregated arithmetically by category, hence caution that the aggregate low estimate maybe a conservative estimate and the aggregate high estimate maybe very optimistic estimate due to the portfolio effects of arithmetic summation. The estimated quantities of 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.

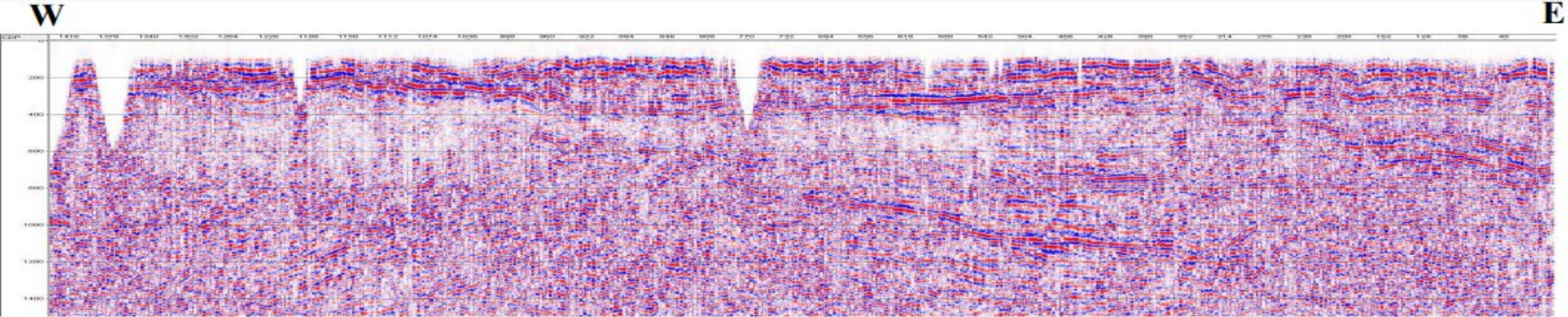


# Geology of the Yorke Peninsula- Structure

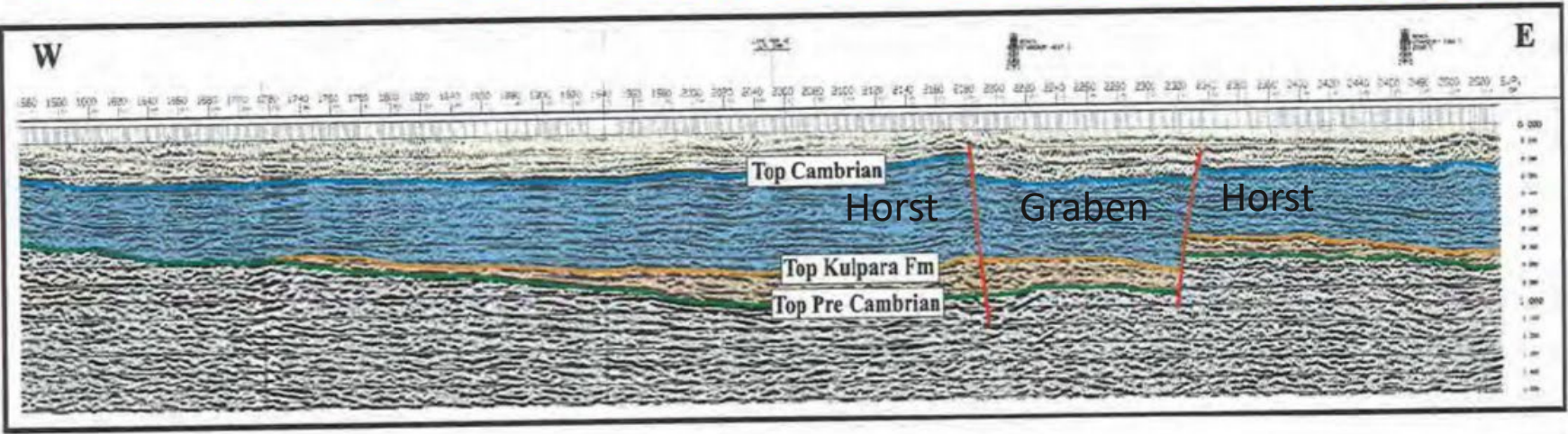
Horst and graben 'extensional' structural setting will significantly enhance fracture basement play



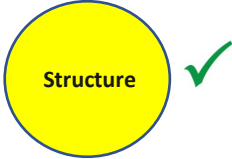
Y82-A3 Seismic Line



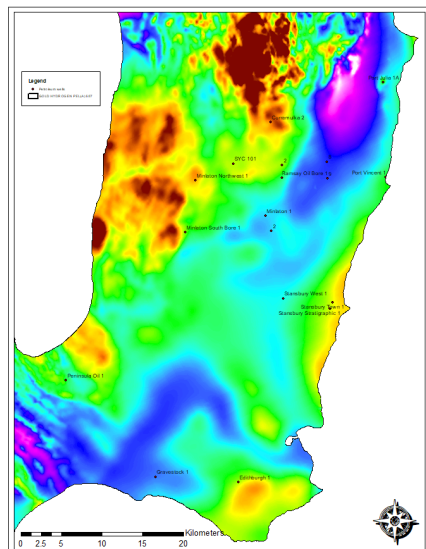
Available migrated stack in SEG-Y format



Interpreted (0-1500 msec TWT) stack after Benjamin Royal, 2003

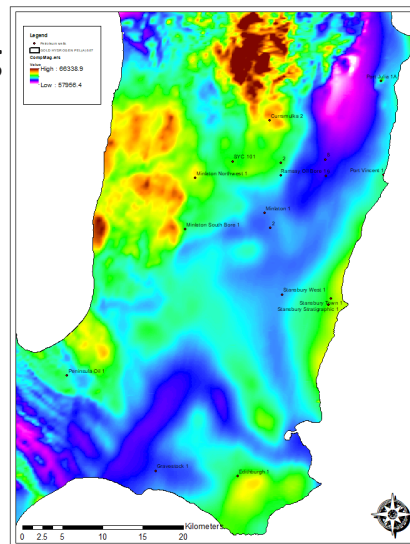


# Recently Acquired Airborne Gravity Magnetic Survey



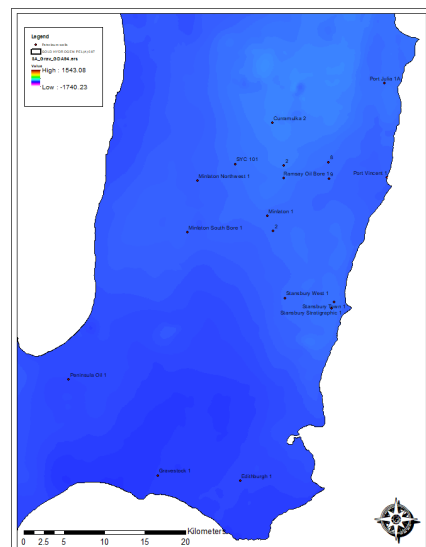
Magnetic Survey Imaging

Old Data → New Data



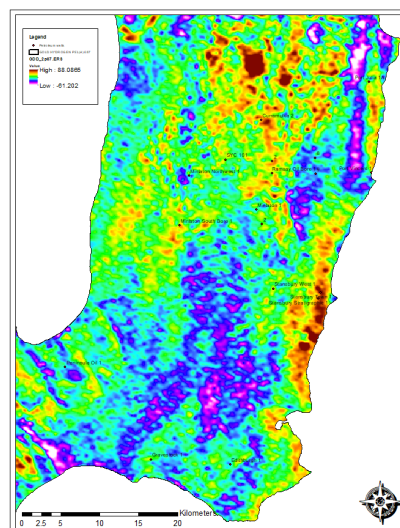
## New Magnetic Survey – Preliminary Imaging

- Sharper contrast in formations under the Cambrian.



Gravity Survey Imaging

Old Data → New Data

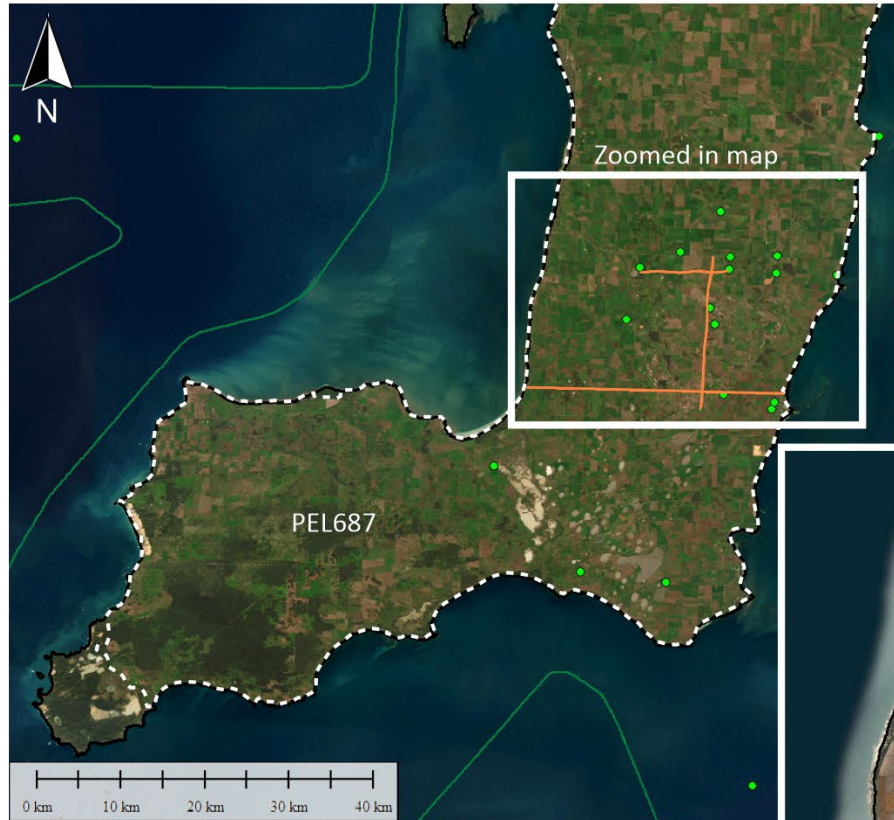


## New Gravity Survey – Preliminary Imaging

- Substantial improvement in data quality



# The Ramsay Project



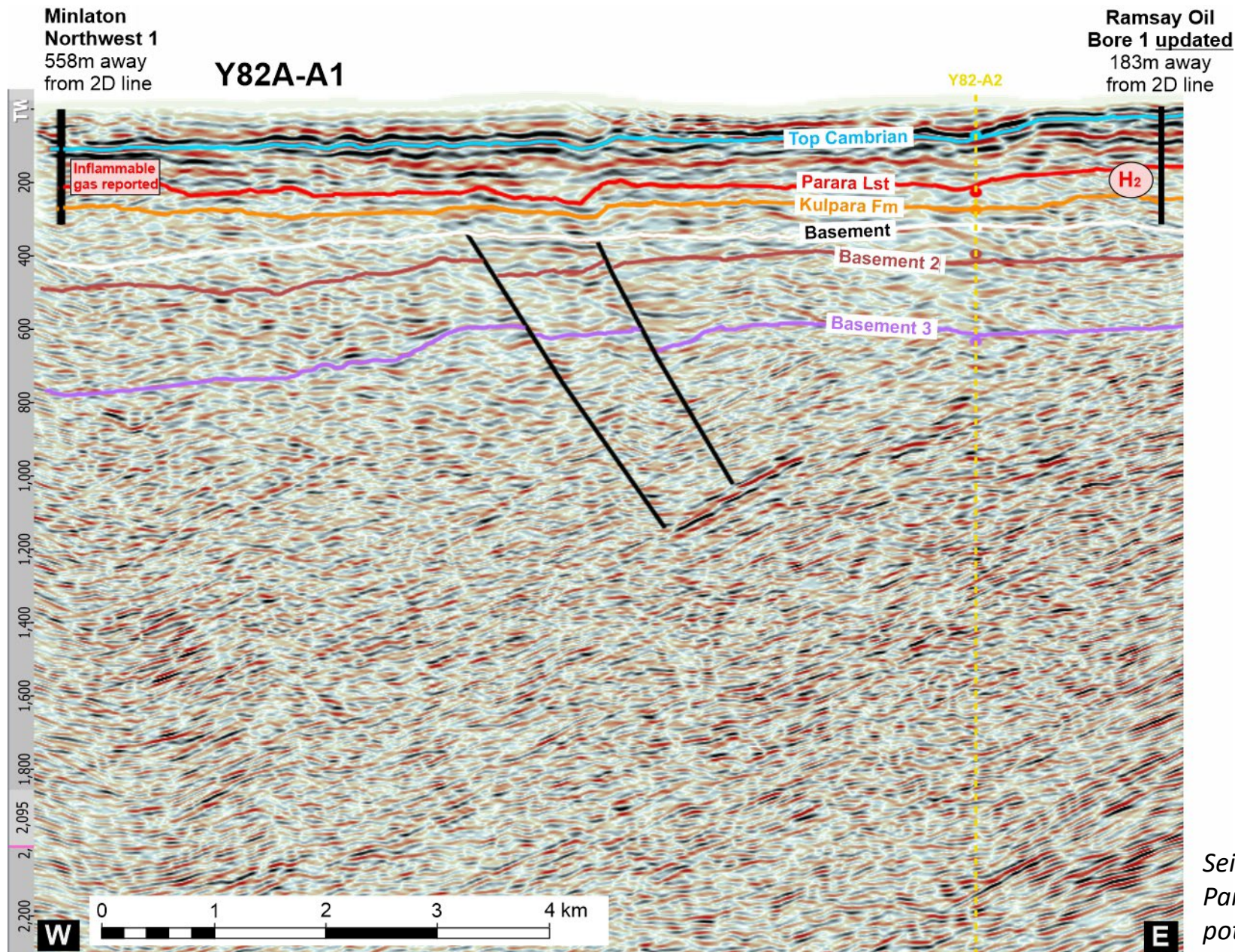
## LEGEND:

- Petroleum wells
- Ramsay Oil Bore 1 (updated location)
- Relevant onshore 2D seismic lines
- Relevant offshore 2D seismic lines
- PEL687 permit outline



- Gold Hydrogen is planning to drill a dedicated hydrogen exploration well in October 2023.
- First well will twin the historical Ramsay Oil Bore 1.
- Ramsay 1 will test for hydrogen in the Cambrian (limestone) above the granite basement.
- Planning underway for Ramsay 2, approx. 500m to the west of Ramsay 1.
- Different drilling challenges compared with traditional oil and gas.





## Ramsay 1

- First well will twin the historic Ramsay Oil Bore 1 that recorded hydrogen in the Limestone (Parara and Kulpara Formations).
- Well is planned to tag the granite basement, which is believed to be the source of the hydrogen.
- Full geological logs and samples will be taken.
- Second well planned for ~500m west of the first well.
- Multiple picks for the basement, with top basement expected between pick 1 and 2.

*Seismic interpretation showing hydrogen occurrences in Parara and Kulpara Formations at Ramsay Oil Bore 1, and potential basement tops*





**Gold Hydrogen Ltd (ASX: GHY)**  
Level 14, 110 Eagle Street, Brisbane  
+61 7 3521 8038

Website: [goldhydrogen.com.au](https://goldhydrogen.com.au)  
Twitter: [@GHY\\_ASX](https://twitter.com/GHY_ASX)

**Dr Josh Whitcombe**  
**Chief Operating Officer**  
[jwhitcombe@goldhydrogen.com.au](mailto:jwhitcombe@goldhydrogen.com.au)