



**PROVARIS ENERGY**

Connecting the world to a clean energy future with  
**Compressed Hydrogen**

Retail Investor Presentation | April 2023



**Australia**

**Norway**

[www.provaris.energy](http://www.provaris.energy)

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**This presentation was authorised by the CEO for release on 5 April 2023**  
*\$ refers to Australian Dollars unless otherwise indicated.*

# Experienced Board & Management



Global experience in energy infrastructure, utilities, ship newbuilds, operations, and capital markets



**Martin Carolan**

Managing Director  
& CEO

Commercial  
& Capital Markets

**SYDNEY**



**Garry Triglavcanin**

Executive Director & Chief  
Development Officer

Engineer, LNG, Project Development

**PERTH**



**Greg Martin**

Chairman

Business Leader, Energy,  
Infrastructure, Governance

**SYDNEY**



**Andrew Pickering**

Non-executive  
Director

Shipping, Newbuilds,  
Tankers, LNG

**SYDNEY**



**David Palmer**

Non-executive  
Director

Shipping, Commercial, Financing

**LONDON**



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Manager

Legal, Commercial,  
Project Finance

**PERTH**



**Per Roed**

Chief Technical  
Officer

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Operations

**OSLO**



**Herman Hildan**

Strategic Advisor  
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Energy Transition

**OSLO**



**Mats Fagerberg**

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Commercial, LNG, Infrastructure,  
Shipbroking

**LISBON**



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GH2 Carrier  
Development

Class Approvals,  
Commercial

**CALGARY**



**John Fitzpatrick**

Naval Architect  
& Inventor

Ship Design,  
Class Approvals

**CALGARY**



**Emma Connor**

Chief Financial  
Officer

Accounting,  
Finance

**PERTH**

# Positioned to benefit from early-mover advantage with increasing demand for green hydrogen to meet net zero targets



## +25 countries

Committed to hydrogen roadmaps to support net zero targets

## USD Trillions

Global investments under development for H2 Supply Chains

## Policy Support

From governments globally to incentivise sustainable projects

## REPowerEU

10Mtpa demand for hydrogen imports in Europe by 2030

## Unique IP

Enables low-cost solution and provides a first-mover advantage

## Key locations

In regional markets to supply increasing demand in EU & Asia

## Strong Pipeline

Of development and collaboration projects exceeding 8GW

## Design Approval

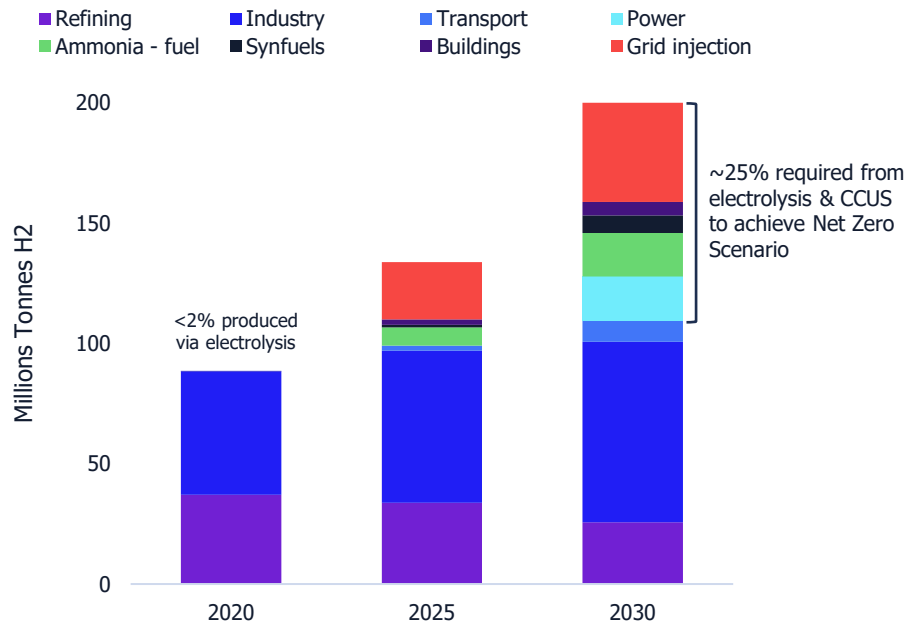
From ABS for bulk hydrogen carriers with proprietary IP

Providing investors with exposure to industrial scale hydrogen supply chains.

# Well positioned to capitalize on the growing demand for green hydrogen to reach net zero emissions targets



## Global hydrogen demand by sector in the Net Zero Scenario, 2020-2030<sup>1</sup>



- > +25 countries committed to hydrogen roadmaps
- > Trillions (USD) investment under development for H2 Supply Chains
- > Significant funding commitment & policy support being legislated: IRA Act. (US) & Green Deal Industrial plan (EU)
- > Efficient and low-capex solutions for storage and transport required for global scale
- > Focus is hard-to-abate industries (heat for steel), heavy transport and decarbonization goals for power generation
- > REPowerEU 10Mtpa import market by 2030 (Decarbonisation + Energy Security)
- > **EU: Renewable Energy Directive and associated Delegated Acts (June 2023) the catalyst for binding offtake and project FIDs**

### Sources

1. IEA, Global hydrogen demand by sector in the Net Zero Scenario, 2019-2030, IEA, Paris <https://www.iea.org/data-and-statistics/charts/global-hydrogen-demand-by-sector-in-the-net-zero-scenario-2019-2030>, IEA. Licence: CC BY 4.0

# Provaris is a leading developer of supply chains for green hydrogen, leveraging its innovative compressed shipping IP

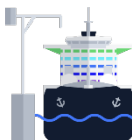


Accelerating innovation in the hydrogen industry to bridge the gap with safe, efficient and economic solutions



## Production of Hydrogen

- > Developer full value-chain for export of hydrogen molecules
- > Development projects announced with 3 GW of capacity
- > First export in 2027
- > Two strategic locations to service the Asian and European regional markets
  - Tiwi H2, Australia > SE Asia
  - Norway > EU



## Hydrogen Shipping and Storage

- > Infrastructure for storage and shipping of hydrogen in compressed gaseous form
- > Terminals, storage and shipping
- > Collaboration with energy majors for long-term contract
- > Development pipeline includes energy majors, energy utilities, renewable hydrogen developers
- > Funding off-balance enables asset-light model



## Leveraging unique IP

- > Proprietary development of bulk-scale marine carriers and storage for hydrogen
- > US Patent & world-first design approval for compressed hydrogen carrier
- > Floating (barge) storage solution under development
- > In-house expertise delivering Engineering, Class Approvals, Newbuilds, and Patents

Potential for multiple revenue streams creating long-term shareholder returns

Long-term take-or-pay offtake for hydrogen



Long-term contract for shipping fleet or barge storage

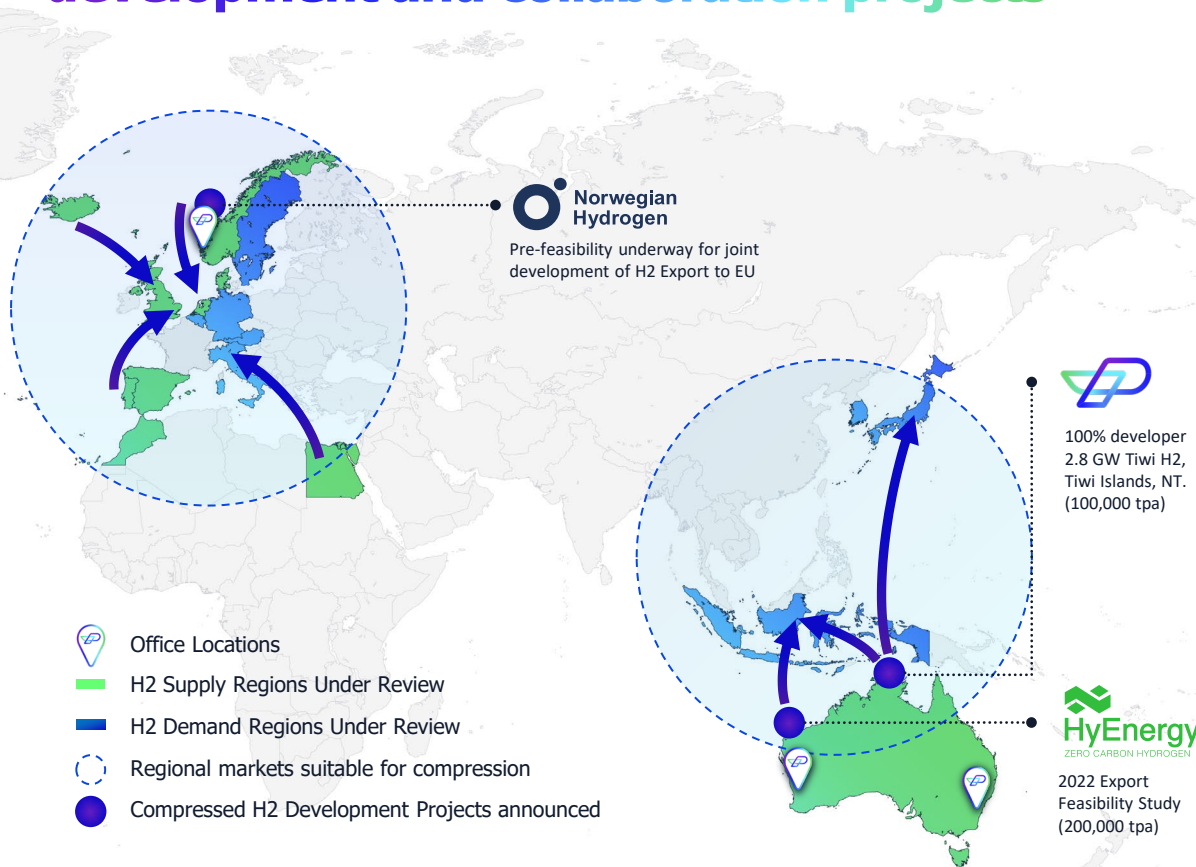


Project Development and License Fees



Attractive cashflows for Infrastructure & Impact Investors

# Strategically positioned to accelerate growth in EU and Asia via development and collaboration projects



✓ Two key regional markets strategically positioned based on carriers shipping range (2,000 to 3,000 Nm)

✓ Office established in Norway in 2022 to capitalise on the fast-growing European opportunities

✓ REPowerEU 10Mtpa import market by 2030 (Decarbonisation + Energy Security)

✓ Ongoing technical and commercial analysis with broad range of industrial users and energy majors

✓ Development pipeline of projects as developer or collaboration exceeds 8 GW (~600ktpa H2)

# Compression provides a low-cost, simple, energy-efficient supply chain for regional hydrogen markets



'Floating pipeline' to connect regional markets eliminating scale and capex required for alternative carriers



Compression of H<sub>2</sub> established for 50 years (proven)



Eliminate complexity and cost of onshore storage



Flexible solutions for loading and unloading in gaseous form



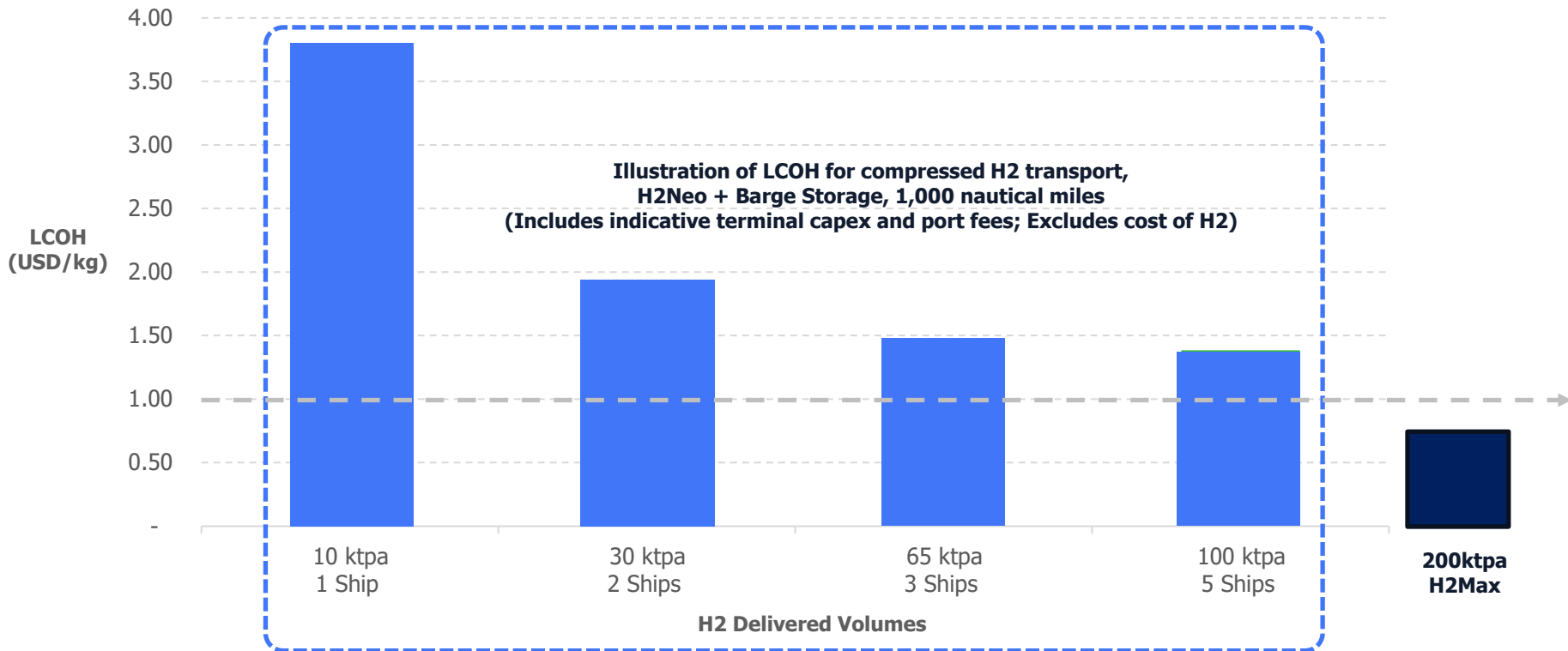
Commercial at low volumes and scales with market supply/demand



# Export volume ambitions rewarded through reduction unit economics for compressed H2 marine transport



Scale benefits on utilization across the compressed H2 supply chain can achieve sub-USD 1.00/kg transport costs



# Eliminating the energy and capital-intensive processes to convert H2 to another state



Minimise (re)conversion losses and capex required for alternative carriers



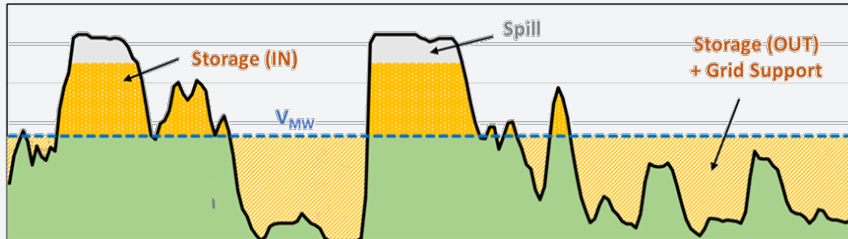
Does not require a base-load renewable energy supply to be efficient



Eliminates Batteries, H2 Storage, and/or 'fossil fuel' grid back-up required by other carriers for stable conversion




100% load-follow the variable renewable generation profile



# Efficiency and levelised cost needs to be evaluated across the full supply chain

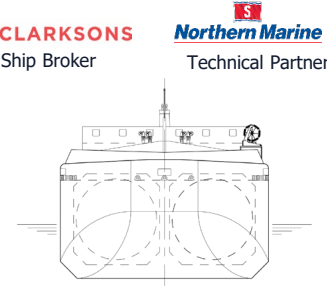
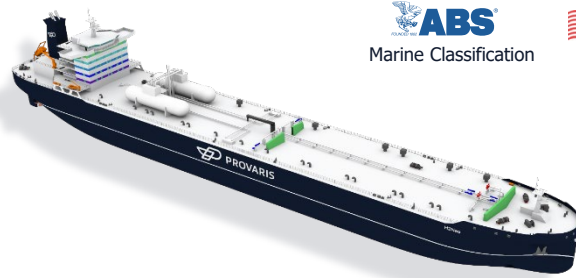
Factors that impact on LCOH of supply chain

	Compression 	Liquefaction (LH2)	Ammonia (NH3)
'Load Follow' Variable Profile	100%	0%	40-100%
Hourly Change in Process	100%	0%	5%
Conversion Efficiency	1 kWh/kg H2	11 kWh/kg H2	9 kWh/kg H2
Boil-off per day	0%	Up to 1%	0%
Reconversion Losses	>0.5% (Scavenging)	5% (Regasification)	30-40% (Cracking)

# World first Design Approval for bulk hydrogen carrier



Low emission shipping through green fuels for power generation, including Fuel Cell and Hybrid integration



- > **Standard MR/LR tanker** with two integrated tanks to store hydrogen at 250 bar pressure
- > Proprietary IP with **US Patent filed** on tank design
- > **Critical safety studies**, process and risk analyses carried out
- > **'Design Approval' from ABS** based on FEED-level package sufficient for shipyards to quote with confidence
- > Integration with flexible jetty solutions accounting for storage, water depths, metocean, and geotechnical conditions



Note: Illustrations are concept designs for unloading at Jurong Island, Singapore

## Two Carriers under development

H2Neo	H2Max
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Cargo carrying capacity: 26,000m <sup>3</sup> (430t)	Cargo carrying capacity: 120,000m <sup>3</sup> (2,000t)
Project export capacity <sup>1</sup> : 200,000 tpa	Project export capacity <sup>1</sup> : 900,000 tpa
Shipping range: Up to 2,000 Nm	Shipping range: Up to 3,000 Nm
<ul style="list-style-type: none"> <li>✓ AiP Received: 2021</li> <li>✓ FEED Approval: 2022</li> <li>• Shipbuilding Contract: 2023</li> <li>• <b>First operations: 2027</b></li> </ul>	<ul style="list-style-type: none"> <li>✓ AiP Received: 2021</li> <li>• Target FEED Approval: Late-2023</li> <li>• Shipbuilding Contract: ~2026</li> <li>• <b>First operations: ~2030</b></li> </ul>

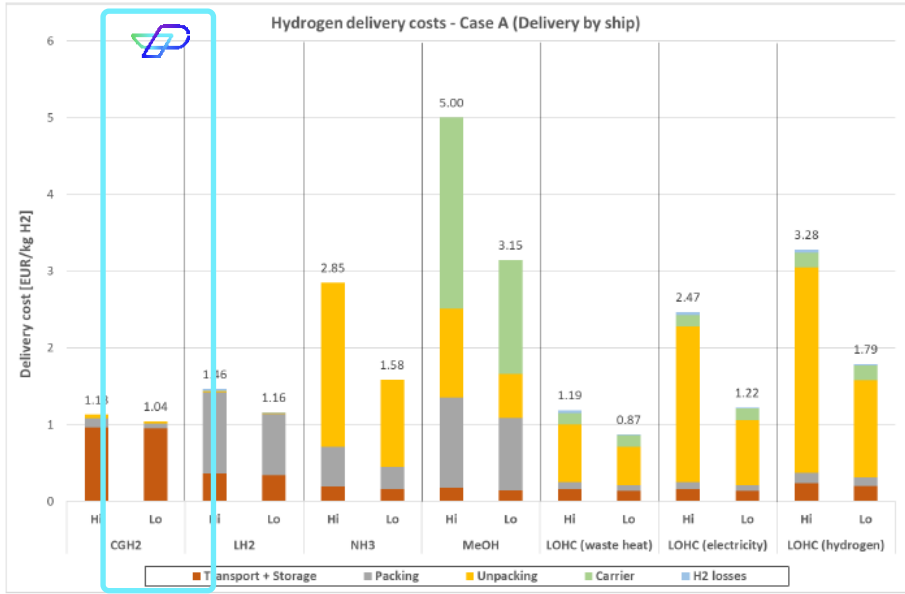
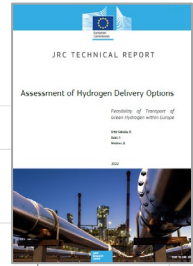
### Assumptions:

- Unloading in 18 hours
- Fleet Ships is based on project production rates and distance to market
- Actual importation volumes can be multiples of the above "fleet" production facility capacities.

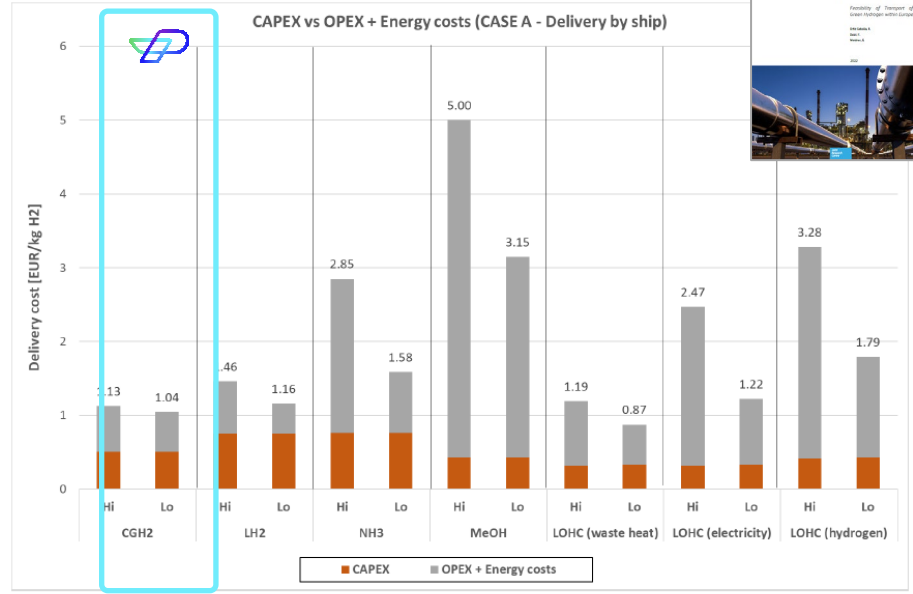
# Independent research in Europe supports the cost advantage and efficiency of Compressed H2 over regional distance



(1Mtpa continuous delivery over a 2,500km distance to market)



Source: JRC analysis



Source: JRC analysis

"In the case of compressed hydrogen delivered by ship, it can be seen that the final cost is dominated by the transport costs. Due to its lower density, transport of compressed hydrogen requires a bigger and more expensive fleet than any other packaging mode. However, the packing and unpacking costs (i.e. compression costs) are low enough to compensate for the higher transport costs. **This makes compressed hydrogen by ship an attractive option, for Case A, with a delivery distance of 2,500 km**" Source: JRC, 2022



# Developing an early-mover export project for Australia



# Tiwi H2 Project demonstrates scale for compressed hydrogen supply chain



Strategic decision to develop both upstream hydrogen molecules and integrate with compressed hydrogen supply chain

**2.8 GW**  
Solar Generation

**2027**  
Target for first export

**~100,000 tpa**  
Green Hydrogen

**500** construction and  
up to **150** operational  
jobs



**Strategic Location to Markets**



**Existing Port Infrastructure**



**Solar Intensity & Water Access**



**Traditional Land Ownership**



**Low Environmental Impact**



**Landowner & Government Support**



**Strong ESG credentials for project financing & government funding**

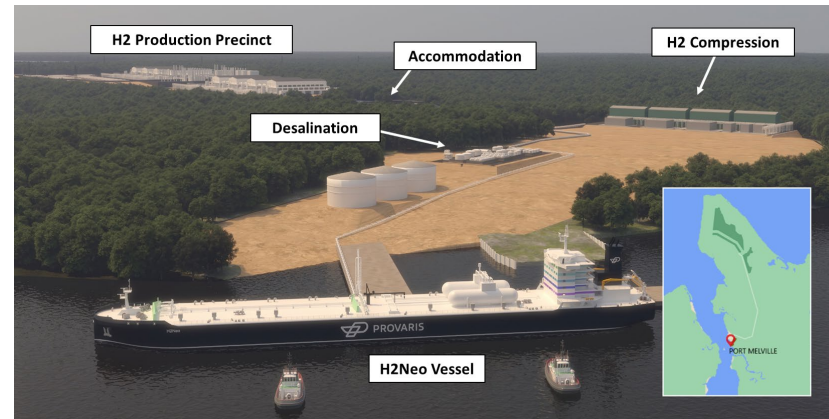
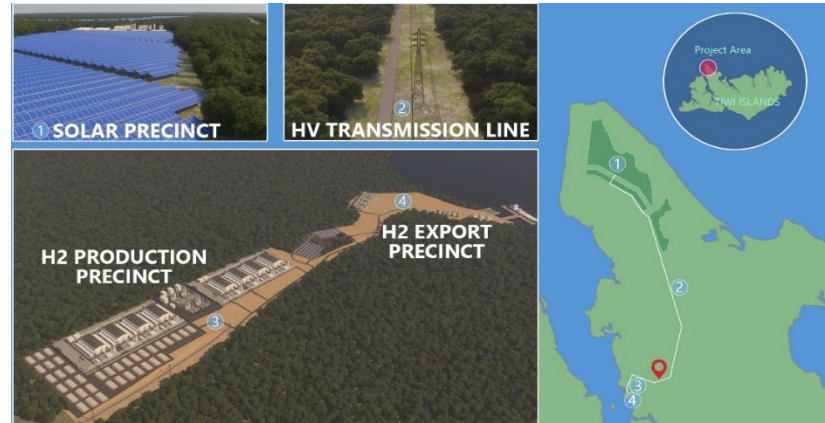


Provaris acknowledges that its proposed Tiwi Islands Green Hydrogen Export Project is located on the traditional lands of the Munupi people. It is a privilege to have the support and such a close working relationship with the Tiwi Land Council and Munupi Landowners.

# Concept Design Study confirms Tiwi H2 can fast-track green hydrogen exports to capitalize on growing demand in Asia



- > **Concept Design Study (August 2022) confirmed feasibility** for compressed hydrogen production for 100,000 tpa export project
- > **Permitting advancing** with Federal and Territory EIS submission scheduled Q4 2023
- > **Early Works Program underway** for Solar Farm pre-FEED and Owners Engineer appointed
- > Introduce JV partners at a time to maximise shareholder value





**Positioned for the  
European opportunity**



# Developing partnership with Norwegian Hydrogen to fast-track supply to EU markets



Provaris identified as “**the missing link**” to enable scale-up of daily production (tpd) and aggregate for coastal transport and potential export volumes to Europe



- > **MOU with Norwegian Hydrogen (January 2023)**
- > Accelerate the development of export scale projects utilizing Provaris’ IP and development expertise
- > **Concept Design Study for preferred site targeted for completion in the March 2023 quarter**
- > **Collaboration will target export of hydrogen by 2027**
- > Multi-project potential for export by compressed hydrogen carriers within 1,000 Nm transport distance
- > Norway’s H2 production costs competitive given reliable grid hydro power and high utilization of electrolysers



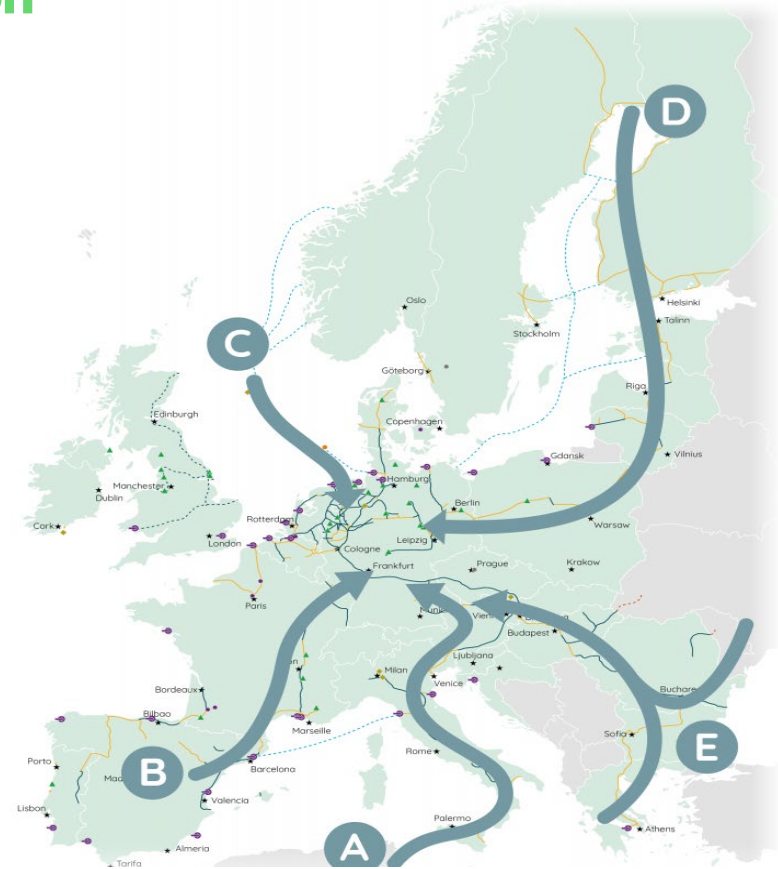
- > **+€100 billion in EU funding allocated** to tackle climate change, build H2 markets and support construction of H2 supply projects and technologies
- > Green Deal Industrial plan suggests a subsidy programme in response to the US IRA Act (\$3/kg subsidy)
- > **Renewable Energy Directive and associated Delegated Acts are the catalyst for binding offtake and project FIDs**
- > Supportive Norwegian government for development of domestic supply and export of H2
- > 1.2 billion NOK in funding to develop maritime hubs based on compression



# Our sights are set on the European Hydrogen Backbone as a crucial downstream focus in the region



- › **Five supply corridors set to unlock abundant and cost-effective hydrogen by 2030**
  - **Phase 1: Completed 2025-2026** to supply large industrial clusters on the coast + the connection to storage
  - **Phase 2-3: Completed 2027-2030**
- › Initial local connections set stage for expansive European hydrogen network and promising export opportunities.
- › Infrastructure confidence accelerates market growth for supply and demand in the H2 sector, consequently bulk volumes are key.
- › **Delegated Act:** Designed and adopted by the European Commission based on articles 290 and 291 of the Treaty on the Functioning of the European Union.
- › **Additionality:** Criteria proving additional production of renewable energies
- › **Art. 25** – Obligation on fuel suppliers to ensure share of renewable generation in transport sector is at least 14% by 2030



**Corridor A:** North Africa & South Europe, **Corridor B:** Southwest Europe & North Africa, **Corridor C:** North Sea, **Corridor D:** Nordic and Baltic regions, **Corridor E:** East and South-East Europe



**Collaborating** with world-scale  
hydrogen developers

# Collaboration partners being established to increase chances of success and achieve global scale



Provaris continues to see an increase in awareness and interaction from hydrogen developers across Europe and Asia seeking to understand the benefits of our Compressed Hydrogen Supply Chain

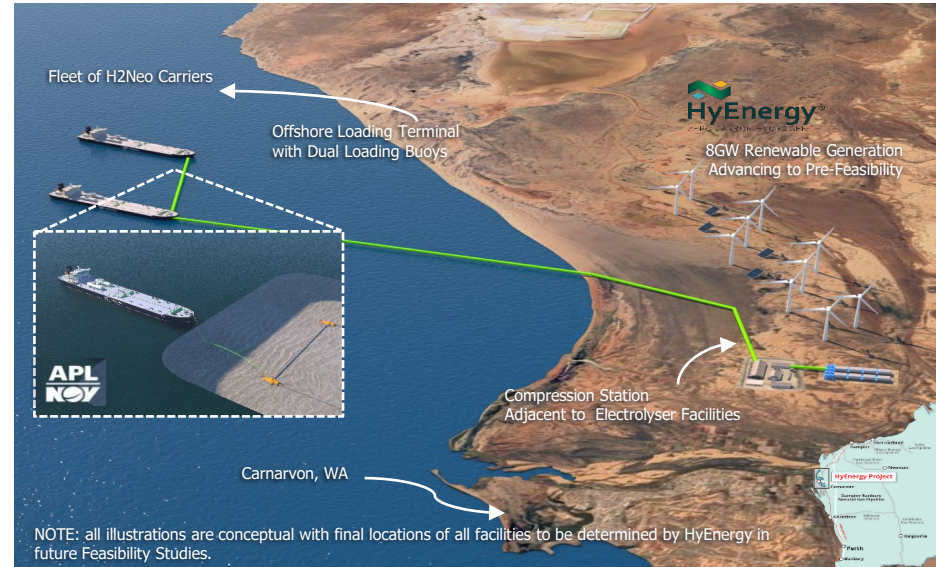
- > Multiple parties continue due diligence and education on how compression can unlock the value of stranded renewable resources, understand how to lower the delivered cost of hydrogen, or find solutions to the inefficiencies and complexity of alternative carriers being assessed

## CASE STUDY – HyEnergy Export Feasibility Study

- > Collaboration with the HyEnergy Project (Province Resources, ASX:PRL) targeting ~600,000 tpa of green hydrogen for export
- > Funding received from the WA Government Renewable Hydrogen Fund
- > **Offshore loading terminal for export of 200,000 tpa** from a Phase 1 development scenario (Compression, shore crossing, subsea pipeline, offshore loading)
- > Demonstrated technical and commercial feasibility of using offshore loading solution for export to Asia-Pacific. Utilised proven offshore Single Anchor Loading (SAL) system from NOV

### Next steps 2023:

- HyEnergy to integrate Compressed H2 export solution into their Pre-feasibility Study due for completion mid-2023



# Provaris is committed to become a leading developer of integrated green hydrogen projects

## KEY TAKEAWAYS

- > REPowerEU has established a 10Mtpa import market & Norway to benefit from 'additionality' rules being introduced
- > Demonstrating the simplicity and efficiency of compression can provide lowest-cost for H2 delivery to EU
- > Multi-project potential in Norway and other regional supply locations to compete with fossil fuel
- > Global opportunity for compression extends beyond Europe
- > Potential to create significant value for shareholders by being a first mover with a cost advantage out of NORWAY

## KEY FOCUS FOR 2023

- > Confirm scope and location of first Norway project
- > Mature a portfolio of export projects from the Nordic region to confirm second project
- > Advance first Norway project to FEED level
- > Validation event targeted with an energy major
- > H2Neo Prototype testing complete and shipyard contract finalised
- > Tiwi H2 EIS Submission, JV Partner, Offtake and RFP for EPC



## Capital Structure

Ordinary Shares on Issue (PV1.ASX) 548 Million

**Market Capitalisation (at 5c) A\$ 27 Million**

Cash (at 31 December 2022) A\$ 8.1 Million

Listed Options on Issue (PV10A.ASX) <sup>1</sup> 96.7 Million

Performance Rights <sup>2</sup> 24.0 Million

Unlisted Options <sup>3</sup> 9.0 Million

## Shareholding (Undiluted)

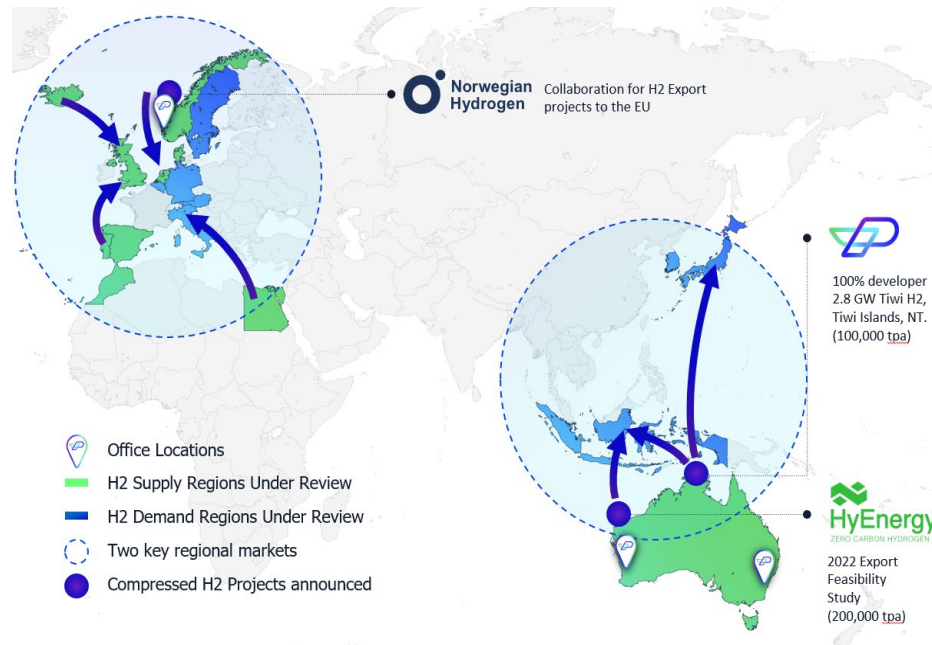
Institutional & HNW 18%

Management 5%

Total top 20 33%

1. Listed Options PV10A, expiry 26 May 2023, exercise \$0.12
2. Performance Rights issued to Management
3. Broker options exercisable at 18.75c, Expiry November 2024

## Regional Office Locations Servicing Europe & Asia



# Progressing our commitment to ESG reporting for a fair and sustainable future, connecting the world to a clean energy future



Provaris has adopted the World Economic Forum (WEF) framework to report material and non-material Environmental, Social and Governance (ESG) matters

**Our purpose is to produce and develop renewable hydrogen supply chains that are simple & efficient providing energy security and enabling net-zero targets to be achieved**



- **ANTI BRIBERY/CORRUPTION**  
We maintain the highest standards of integrity and honesty in our business.
- **MODERN SLAVERY ACT**  
We adhere to legislative obligations relating to modern slavery and human trafficking.
- **DIVERSITY AND INCLUSION**  
We advocate the principles of an inclusive work environment and a diverse workforce.





# Thank you



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