Hydrogen
Transporting the Future of Energy
Hydrogen is now a global mega-trend
Set to become the pillar for decarbonising the world’s heavy CO₂ emitters

› Hydrogen has zero carbon emissions.
› COVID has delivered significant scale in global stimulus to implement ‘zero carbon’ road maps removing dependencies on fossil fuels.
› Governments, corporations and investors committed to ‘net-zero targets’ and mobilising investment.
› Falling costs of renewables and hydrogen technologies opening up new hydrogen industries.
› Hydrogen industry embracing new storage and transport solutions to facilitate export markets.
› Significant sustainable investment now focussing on early adopters of hydrogen solutions.
Why Hydrogen?

A clean burning fuel that can be produced, stored and utilised in multiple ways

- Most common substance in the universe
- Produced from many energy sources
- No greenhouse gas emissions in use
- Can be made cleanly using water
- Higher energy density than batteries when compressed

- Can be stored as a liquid or gas
- Can be stored, transported & exported
- No more or less safe than petrol or diesel fuels
- Can provide energy to all parts of the economy

Source: Australian Hydrogen Council
Why Compression?

A simple, low cost & low internal fuel use solution that is ideally suited for regional transportation.

* H₂ liquefaction point is 93 °C colder than natural gas (-160 °C)
GEV’s first mover hydrogen advantage

World first development utilising compression for marine storage and transport of hydrogen

➢ Leverage in-house technical expertise in the design and approval of marine pressure vessels to accelerate development program.

➢ Advance engineering and design in accordance with American Bureau of Shipping rules and guidelines to target ‘Approval in Principal’ in early 2021.

➢ Continue to evaluate funding for R&D program and feasibility studies for export projects.

Benefits of compression over liquefaction or chemical carriers for regional transport

✔ Simplicity of the overall supply chain

✔ Established technology

✔ Low energy intensity

✔ Low cost of compression & decompression

Storage capacity of up to 2,000 tonnes of compressed H2

Smaller capacity ships will be assessed for demonstration project requirements

With the rapid advancement fuel cell technology for vessels, GEV intends to include engines that burn pure hydrogen, providing a ‘zero-carbon’ shipping solution
Why Australia?

Australia leads the world with a national hydrogen strategy focussed on building hydrogen supply chains and large-scale export industry infrastructure

- National Hydrogen Strategy (2019, supported by $500M funding).
- Track record for developing major energy infrastructure projects.
- Abundance of cheap renewable energy.
- Resources and skills in place to build an economically sustainable domestic and export industry.
- Technology road map aimed at creating an industry to ship hydrogen to Asia Pacific customers who are already building a new hydrogen industry to replace natural gas.
- 2020: Long-term funding and policy commitment in place with recently announced $1.9 billion expenditure for renewable R&D over 10 years

- Focus on next-generation energy efficient and carbon reducing technologies such as hydrogen, soil-carbon sequestration, carbon capture and storage, green-steel production (based on domestic hydrogen supply) and the energy reduction of industrial processes.
"The shipping industry needs to develop new technologies, fuels and infrastructure for net zero emissions at a pace never previously seen." Shell, Global Head of Shipping & Maritime, 2020.
Why Hydrogen for GEV?

First mover advantage in the future of transporting zero-carbon energy

- CNG already supports the energy transition
- Hydrogen extends proprietary marine compression IP
- Leverage growth in global energy infrastructure
- Provides zero-carbon transport solution
- Focus on Australian export projects
- Major funding options for R&D
- Costs to reduce with scale from development of export markets
- Profitable & sustainable business model
GEV is a developer of marine solutions for transporting energy to regional markets

Advancing the development of CNG marine transportation across multiple projects

**Brazilian Pre-Salt:** Working on multiple development projects, backed by global oil majors, seeking a commercialisation strategy for associated gas.

**CNG to Power:** Joint venture with local partners to provide CNG for local power production in Brazil. New Brazilian legislation to open natural gas market to greater competition.

**US Gulf of Mexico:** Offshore site secured, adjoining existing infrastructure to export of US Henry Hub gas to the Mexico and the Caribbean. Discussions on market off-take underway.

**Hydrogen Export:** Development of a new ship and patent to cover compressed hydrogen transportation and supply chain.
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