TITAN HYDROGEN

# TITAN HYDROGEN LTD
# Transforming Diesel Engines to Burn Hydrogen Fuel

## Investor Presentation

July 2021


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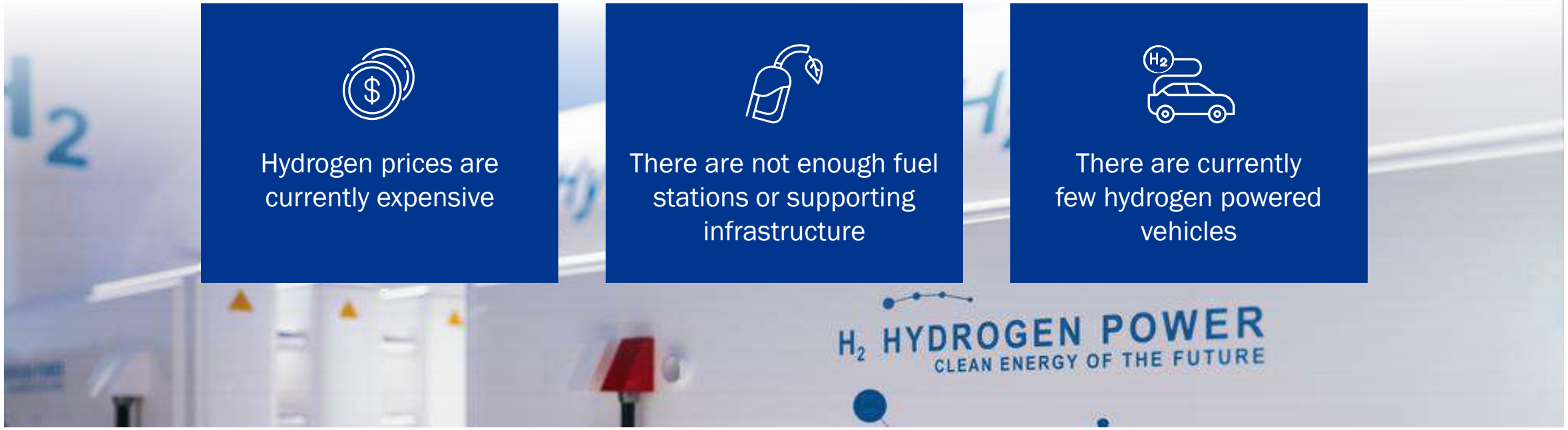
# Introduction to Titan Hydrogen

The market for new trucks, buses & vehicles are moving to electric power to reduce carbon emissions and particulate pollution. These vehicles can be powered by batteries only (BEV) or by batteries in conjunction with fuel cells that use hydrogen (FCEV). Most car manufacturers are already working on production of these technologies. There is also an existing base of billions of Internal Combustion Engine (ICE) powered vehicles which are going to be in use for at least the next two decades.

## The challenges facing hydrogen usage in vehicles are:




- Hydrogen prices are currently expensive
- There are not enough fuel stations or supporting infrastructure
- There are currently few hydrogen powered vehicles


TITAN HYDROGEN

# Our vision is to *"take our technology to the world"*

**Our team is dedicated to:**

- Make fuel cell systems much more efficient which will significantly increase the driving range of hydrogen powered vehicles and make the vehicles much more cost effective to operate
- Develop & deliver hydrogen injection systems that will extend the life of existing Internal Combustion Engine (ICE) vehicles and reduce their emissions by up to 30% and improve fuel consumption by up to 20%

# Investment highlights

## Titan Hydrogen – Integrated Hydrogen Solutions


Unique fuel cell development with Patent pending IP along with a hydrogen hybrid injection system to improve existing combustion engines emissions and fuel consumption


Large and growing market opportunity for both Hydrogen fuel cells and existing ICE vehicles transitioning to a lower emission more efficient future

Industry Experienced Board and Management Team

Pre-money valuation of $20 million ahead of planned IPO in late 2021

# Titan Hydrogen: background

## Enabling the transition to a hydrogen based transport economy

Titan Hydrogen has IP and a provisional patent cover for technology to improve the efficiency of low temperature hydrogen fuel cells. Titan also has the technology to improve the efficiency of existing Internal Combustion Engines (ICE's) by providing a hydrogen hybrid conversion kit.

### Titan Hydrogen has two main business streams:

The development of a high efficiency fuel cell system, which will significantly increase the range of hydrogen fuel cell electric vehicles by employing fuel cells that use a modified type of gas diffusion layer.


Commercialise a hydrogen hybrid injection system that will extend the life of existing Internal Combustion Engine (ICE) vehicles and reduce their emissions by up to 30% and fuel consumption by up to 20%.


Image source: https://hydrogentoday.infor/news/103

# Highly experienced Board and Executive team

## Dedicated team to lead the research and continued growth

### David Vinson
**Chair**

David is a seasoned director and executive in the Australian chemical and new technology industries. He has been instrumental in launching and operating numerous companies in the chemical, marketing services, biofuel, and recycling industries, including managing the construction and operations of one of Australia's first bio-chemical based fuel plants. David has wide experience in the commercialisation, design, construction, and operations of chemical and processing facilities.

### Kim Vaksman
**Director**

Kim has an outstanding technical background working in the Gas and Oil Industry with over 20 years experience in Australia. He holds a Bachelor Degree in Mechanical Engineering and has exceptional Project Management skills, with a proven track record of delivering major projects on time and on budget. Kim is Highly experienced in vendor management and managing teams associated with complex projects.

### Matthew Koadlow
**Director**

Matthew has an honours degree in Aerospace Engineering and is now completing a Masters of Network Engineering at RMIT where he managed a team of engineers who successfully launched a supersonic rocket which collected and displayed live data. He is currently employed at Victrack as a Network Operations Centre Engineer. His previous roles at Victrack have been as Acting Incident Manager and Problem Manager. Matthew is a board member of STA Inc, a charity that provides care to people with disabilities. He has previously been a board observer for Planet Innovation Ltd, the parent company of Lumos Diagnostics Ltd which is currently listing on the ASX with a valuation in excess of $180 million.

### Dr Andrew Dicks
**Chief Technology Officer**

Andrew is the Secretary for the Australian Association for Hydrogen Energy and is also currently the Convener of the Australian Hydrogen Research Network and adjunct Principal Research Fellow/Associate Professor at Griffith University

Andrew is an experienced science & engineering professional, with a background in materials science and catalysis. He is a clear analytic thinker, with an international standing in fuel cell and energy technologies, and a good track record in innovation and project management at a high level.

With a career that has included both industrial and academic positions, his expertise covers: Research Management | Emerging Energy Technologies | Hydrogen Energy | Fuel Cell Systems | Gas Processing | Systems Analysis.

# The hydrogen transport market

The year 2014 was marked by the world's first commercialized fuel cell vehicle by Toyota, representing a culmination of years of R&D efforts. From then on, in the eyes of the public, fuel cell vehicles were no longer experimental, but were recognized as one of the key driving technologies of the future of mobility. Through a combination of government policy, technology advancement and industrial involvement, fuel cell applications are now entering into a golden era of advancement.

The market growth in Asia Pacific, Europe and USA can be attributed to the increasing demand for hydrogen fuel cell based vehicles and hydrogen filling stations

To various extents and for various reasons, governments of China, Australasia, USA, European nations and Japan have promoted the development of the fuel cell industry, investing heavily in the core technology research and establishing subsidy policies and medium/long-term strategic plans.

### USA to 2030*

- 5.3 million buses and commercial vehicles
- 1 million passenger vehicle (California only)
- 300,000 forklifts

### Europe Road Map to 2030*

- A fleet of 3.7 million fuel cell passenger vehicles
- 500,000 fuel cell light commercial vehicles
- 45,000 fuel cell trucks and buses

### China projection to 2030*

- 1 million passenger vehicles
- 11,600 commercial vehicles

### Japan Targets 2030*

- 800,000 passenger vehicles
- 1,200 buses and light commercials

Source: Deloitte China: *Fueling the Future of Mobility: Hydrogen and fuel cell solutions for transportation*

# Titan Hydrogen approach

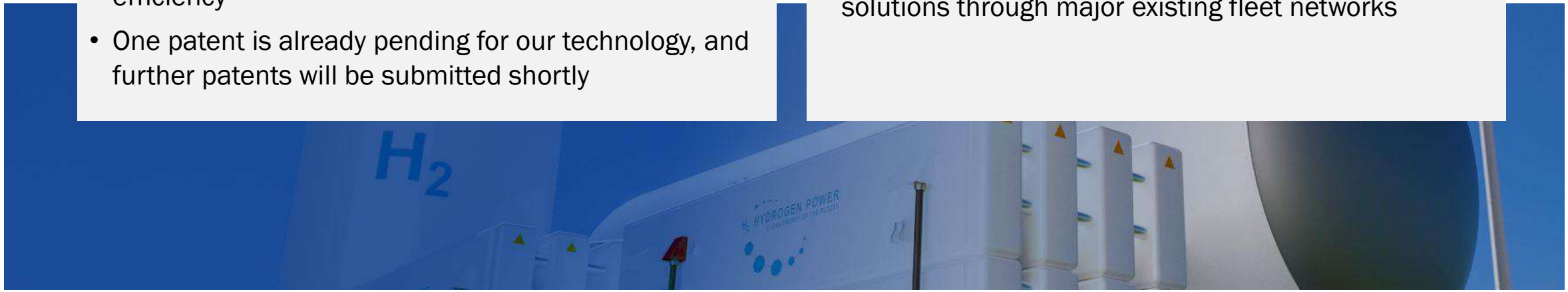
**While most of the hydrogen industry is focussed on reducing the price of hydrogen, our approach is to generate more energy from the same amount of hydrogen. This will lead to a substantial decrease in the cost of travel**

## 1 Improve Fuel Cell Development

- Titan Hydrogen takes a radically different approach to fuel cell development based on more than ten years of engineering and research & development experience
- Our innovative development is based on sound science principles which has shown to lead to substantive impacts of >60% increase in fuel efficiency
- One patent is already pending for our technology, and further patents will be submitted shortly

## 2 Provide Hybrid Hydrogen Systems for Existing ICEs

- Introduce our hybrid hydrogen system to today's truck and bus fleets which will be on the road for up to 20 years from now
- Significant emission reductions achieved of up to 30% along with fuel efficiency gains of more than 20%
- Move to commercialise our proven retrofit technology solutions through major existing fleet networks

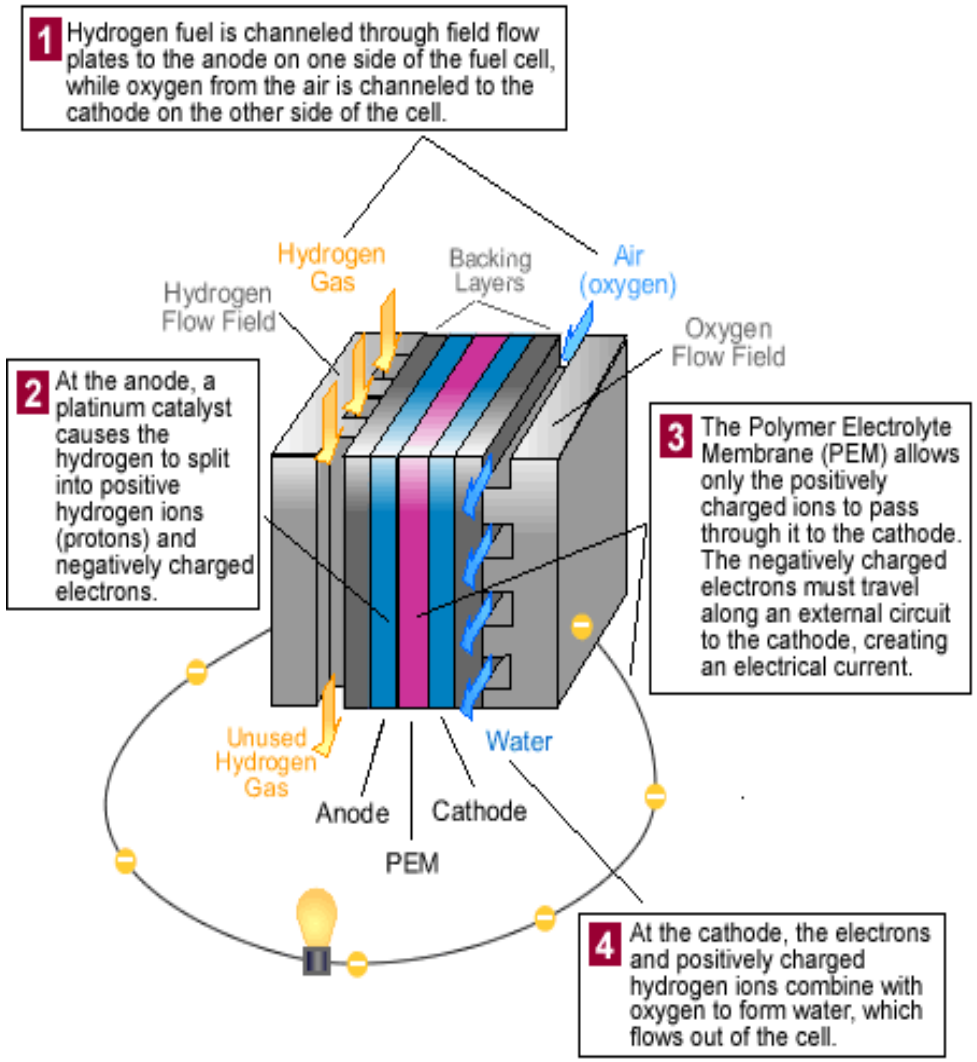


# 1.
# Improve Fuel Cell Development

# Improving fuel cells

## Current challenges

- Efficiency of low temperature Polymer Electrolyte Membrane (PEM) fuel cells is currently low – typically they convert less than 40% of the energy of the supplied hydrogen into electricity.
- Buses and trucks require large quantities of hydrogen to achieve reasonable range, reducing cost effectiveness of Fuel Cell powered Vehicles.
- Low conversion efficiency of fuel cells means that efficiency of using hydrogen to store electricity can be as low as 50% (compare to batteries at >90%).
- The low efficiency give rise to high TCO (Total Cost of Ownership) compared to ICEVs and BEVs.
- PEM and the more recent AEM fuel cells are expensive, contributing to around 73% of fuel cell module costs. It makes the majority costs difference compare to the BEV and ICEV.




Source: www.fueleconomy.gov the official US government source for fuel economy information

# Titan Hydrogen E Fuel Cell development

## Our solution – patent pending technology based on sound scientific principles

- Titan Hydrogen E Fuel Cell – improving current fuel cell efficiency by up to 60%.
- The low efficiency of existing low-temperature (e.g, PEM) fuel cells arises because of low proton conductivity in the membrane, high ohmic resistance in the cell components and activation overpotential of the electrocatalysts, mass transport losses and internal currents/fuel crossover.
- Many fuel cell researchers have focused on improving the catalysts in PEM fuel cells aiming to reduce both the activation overpotential and precious metal content of the catalysts or eliminating it altogether, thereby also reducing cell costs.
- Titan Hydrogen focuses on overpotential resulting from poor mass transport within the gas diffusion layers and catalyst layers of the fuel cell.
- By applying advanced nano-technology, the cell components are re-engineered to improve the access of reactant species to the active triple-phase regions within the fuel cell.

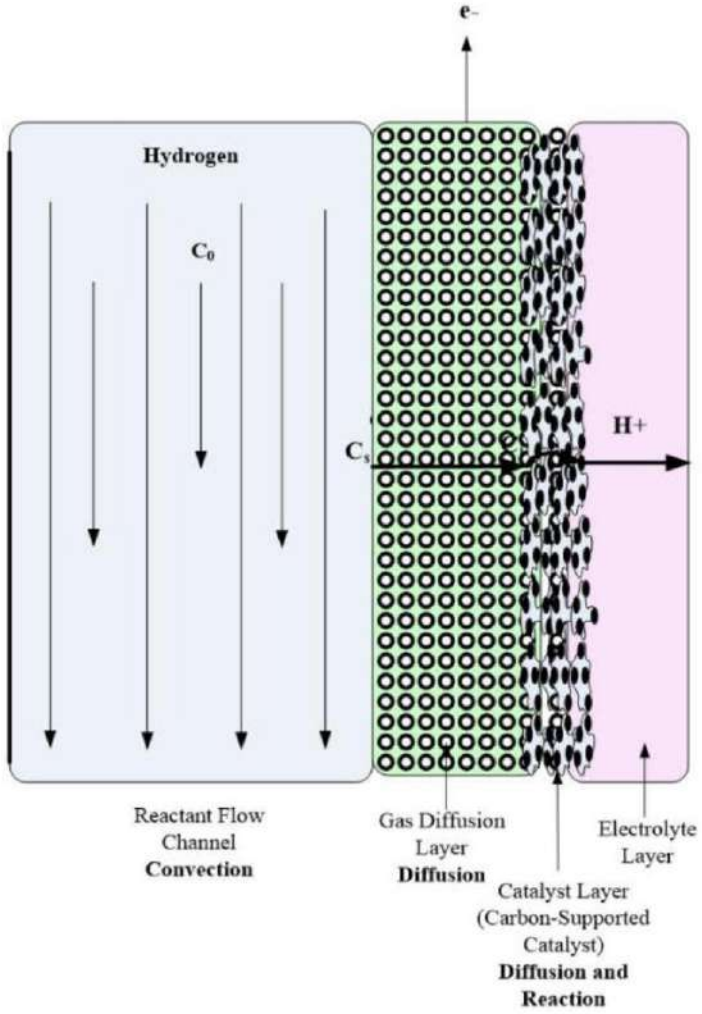
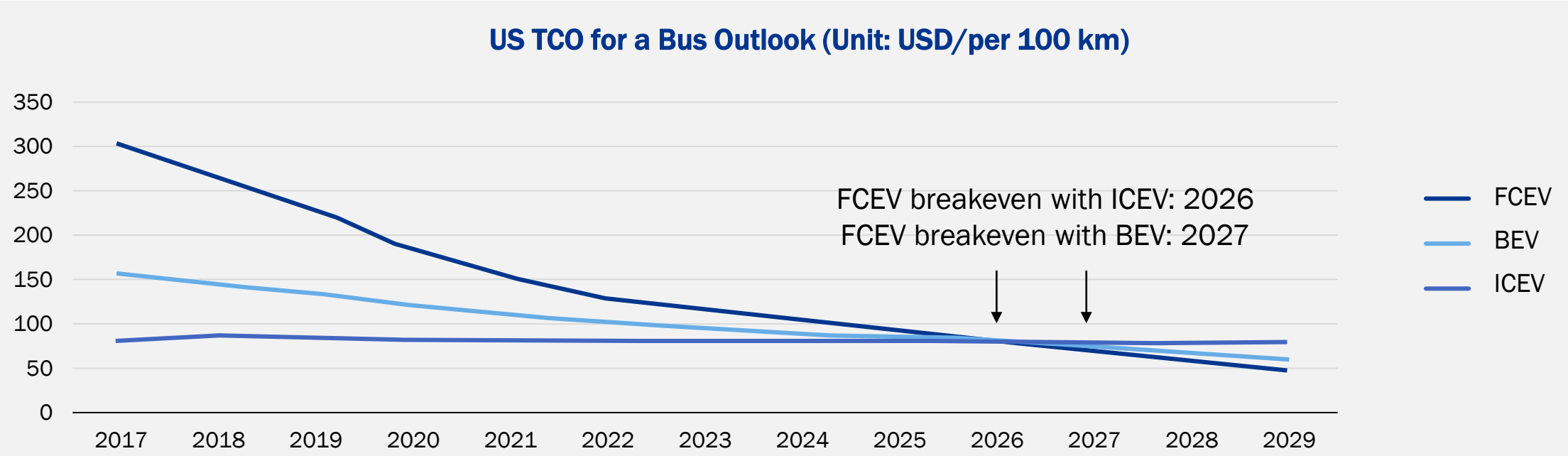



Image source: https://www.fuelcellstore.com/blog-section/*gas-diffusion-layer-characteristics-and-modeling*

# Titan Hydrogen E Fuel Cell will lower total cost of ownership

## Patent pending technology developed over 10 years

Projected total cost of ownership (TCO) by utilising the high efficiency Fuel Cells: FCEV (Fuel Cell Electrical Vehicles) will be more efficient than BEV and ICEV by 2027.




Source: Deloitte China: *Fueling the Future of Mobility: Hydrogen and fuel cell solutions for transportation*

# Titan Hydrogen E Fuel Cell: the fuel cell technology for clean energy and transport

**By applying the Titan Hydrogen approach to fuel cell development, we aim to improve fuel cell efficiency by up to 60%**

This breakthrough performance is obtained by applying our novel (patented) approach resulting in:

- Use of fuel cells to generate power from stored renewable energy, enabling long-term storage to be cost competitive with battery storage
- Significantly less hydrogen required for vehicles for distance travelled
- Dramatic reduction in total costs of ownership for fuel cell vehicles
- Game-changing use of stored hydrogen for power generation

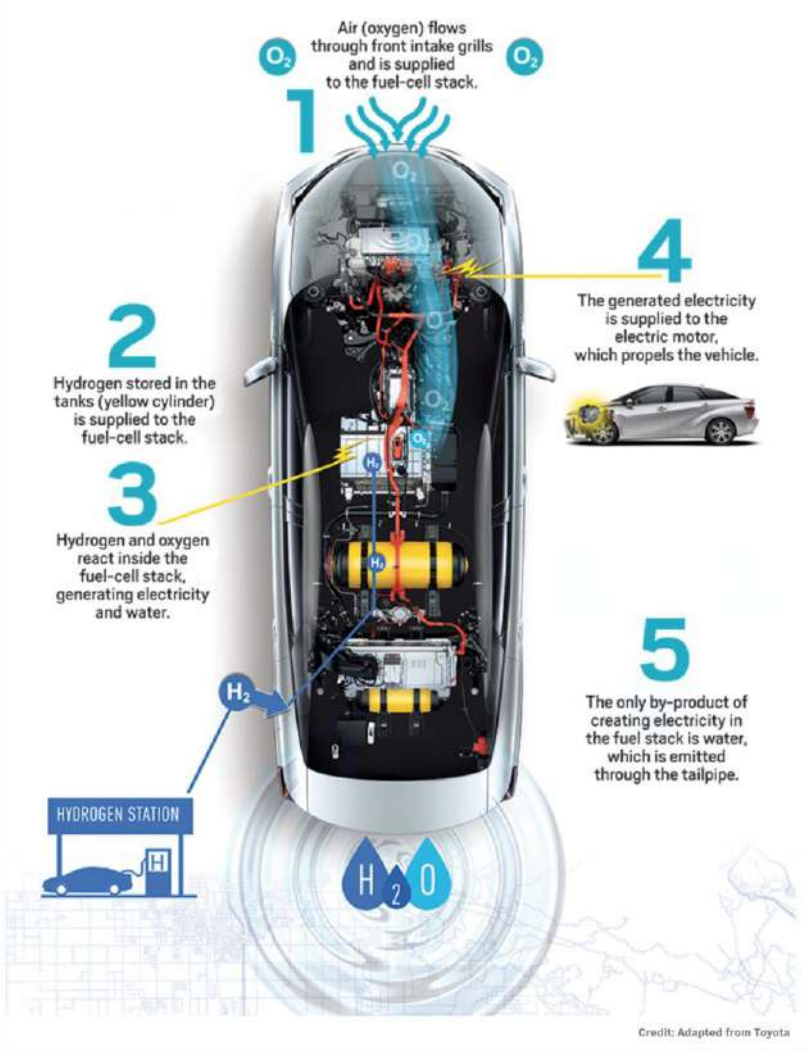
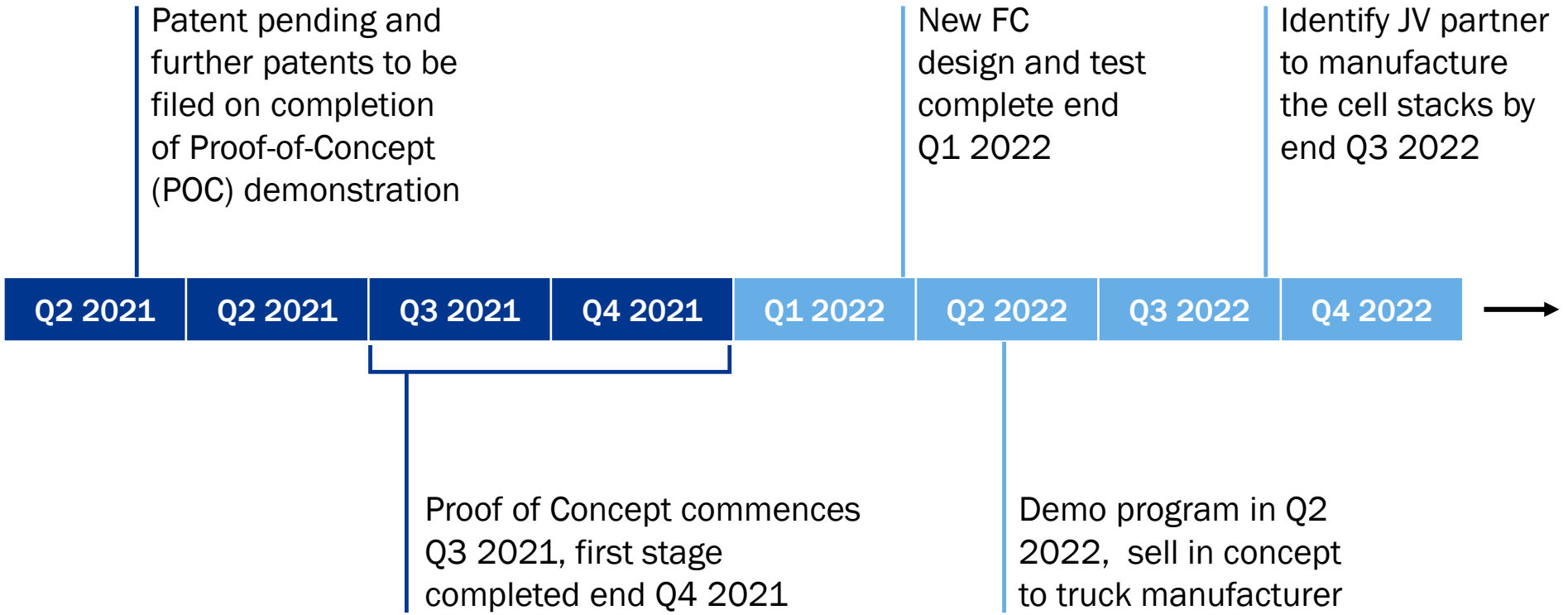



Image source: https://cen.acs.org/articles/95/i38/*Fuel-cell-cars-finally-drive*.html

# Titan Hydrogen E Fuel Cell status and outlook

## Revolutionising fuel cell efficiency

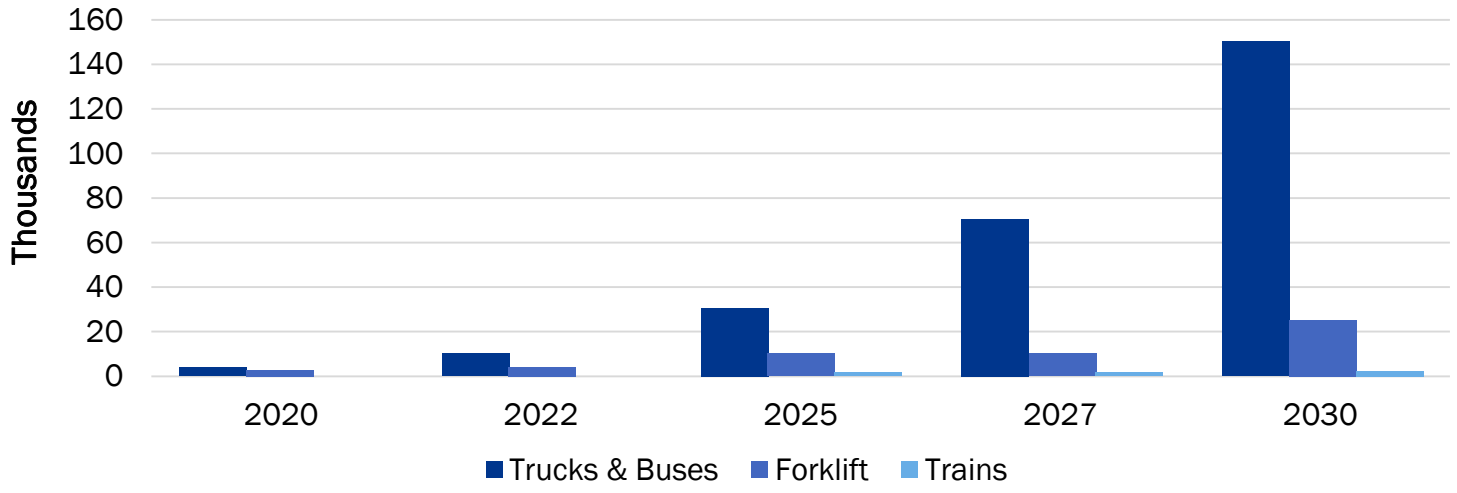



**Commercialise:**

- FC to Truck, Bus, Forklift, Train and Maritime industries
- OEM licensing program 2022 for FCEV market

# Titan Hydrogen E Fuel Cell penetration estimate

## Fuel Cell Market Size to 2030 – Commercial Vehicles



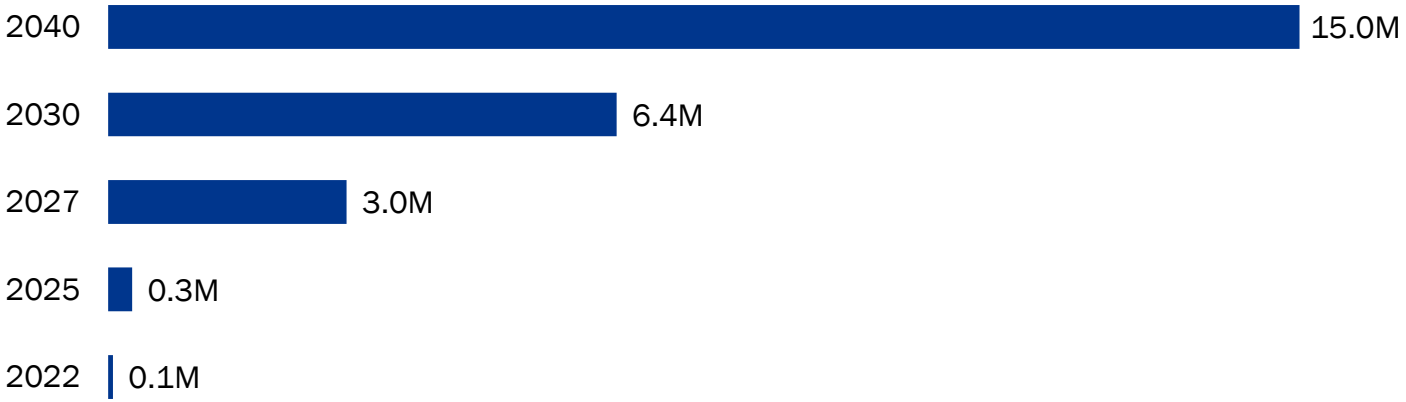

## Market Forecast for Fuel Cell Commercial Vehicles

| Year | | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 |
|---|---|---|---|---|---|---|---|---|
| Production | Units | Development | 80 | 200 | 300 | 500 | 800 | 1200 |
| Revenue | $m | | 4.8 | 12 | 18 | 30 | 48 | 72 |
| **Profit Margin** | **$m** | | **1.44** | **3.6** | **5.4** | **9** | **14.4** | **21.6** |

# Titan Hydrogen E Fuel Cell and penetration estimate (PCV)

## Fuel Cell Market Size to 2030 – Passenger Vehicles (ICCT Report)

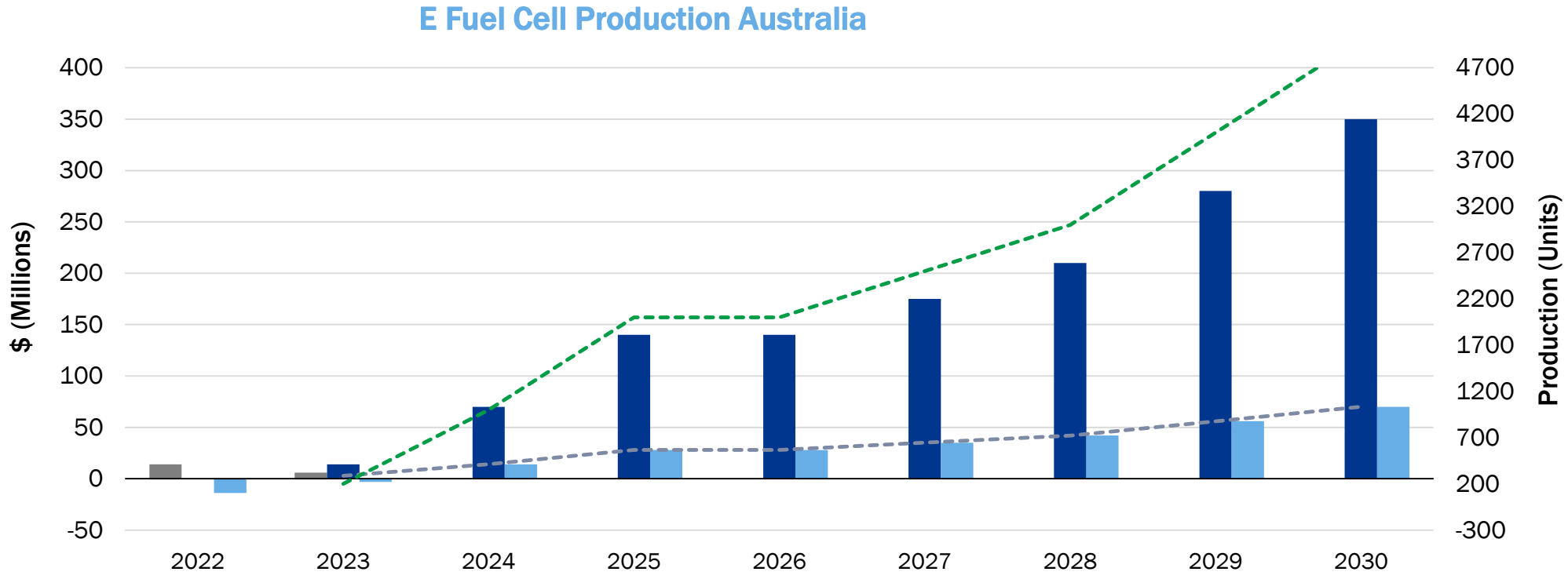
**FCEV Production,** million




## Market Forecast for Fuel Cell Passenger Vehicles – OEM

| Year | | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 |
|---|---|---|---|---|---|---|---|
| OEM Licences | Units | 9000 | 12000 | 15000 | 22000 | 33000 | 45000 |
| Revenue | $m | 18 | 24 | 30 | 44 | 66 | 90 |
| **Profit Margin** | **$m** | **10.8** | **14.4** | **18** | **26.4** | **39.6** | **54** |

# Titan Hydrogen – E Fuel Cell production forecast



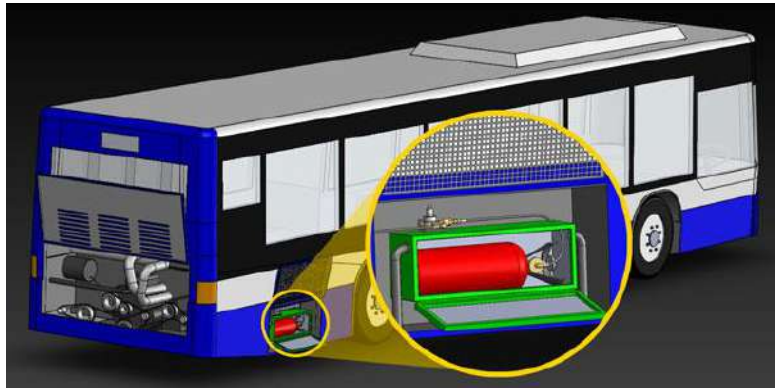

| | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 |
|---|---|---|---|---|---|---|---|---|---|
| Fabrication Facility - Construction | 14 | 6 | | | | | | | |
| Revenue | | 14 | 70 | 140 | 140 | 175 | 210 | 280 | 350 |
| Projected Cash Flow | -14 | -3.2 | 14 | 28 | 28 | 35 | 42 | 56 | 70 |
| Profit | | 2.8 | 14 | 28 | 28 | 35 | 42 | 56 | 70 |
| Production | | 200 | 1000 | 2000 | 2000 | 2500 | 3000 | 4000 | 5000 |

# 2.
# Hybrid Hydrogen Systems for Existing ICEs

# Titan Hydrogen Hybrid

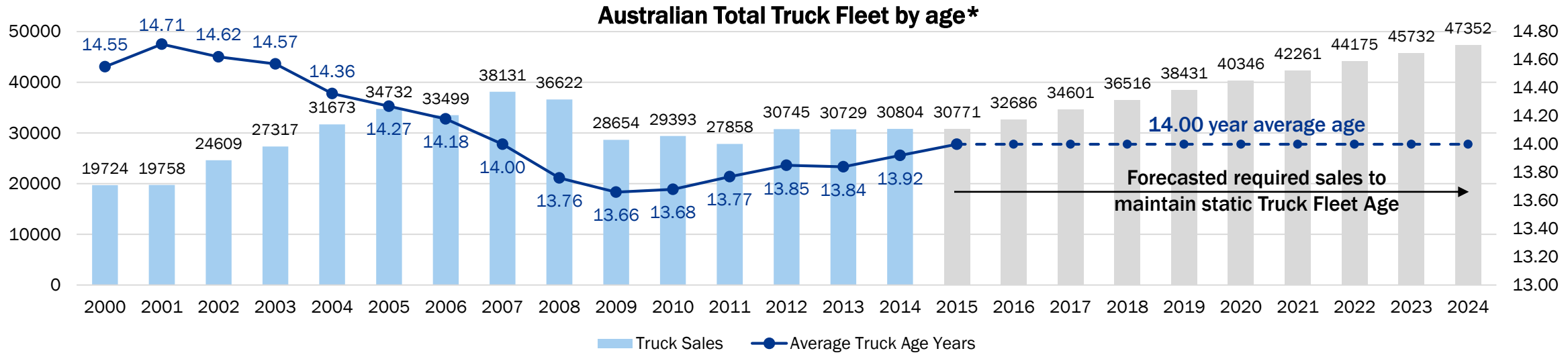
**Enhancing buses, trucks, ships and trains ICEs to include hydrogen injection, will extend engine life and dramatically improve emissions and fuel economy**

- Developing the state-of-the-art Hydrogen Injection system
- Proven retrofit technology - solutions are ready to install
- Introduction of hydrogen to today's truck and bus fleets
- Emission reductions of up to 30%
- Fuel efficiency gains above 20%
- Short term payback for adopters, <18 months



# Hydrogen hybrid market size and opportunity

## Australia Market is Ready for Adoption




## Titan Hydrogen Market Forecast for Hybrid Revenue and Margin

| Year | | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2018 |
|---|---|---|---|---|---|---|---|---|
| Trucks Fitted | Units | 440 | 600 | 1200 | 1200 | 800 | 800 | 800 |
| Revenue | $m | 2.2 | 3 | 6 | 6 | 4 | 4 | 4 |
| **Profit Margin** | **$m** | **0.44** | **1.2** | **2.4** | **2.4** | **1.6** | **1.6** | **1.6** |

460 000 trucks and 146 000 buses

10% penetration in 3 years

Average age of fleet 17.45 years

* Source: sustainablefreight.com.au

# Moving Forward

# Commercialisation process

## Titan Hydrogen E Fuel Cell

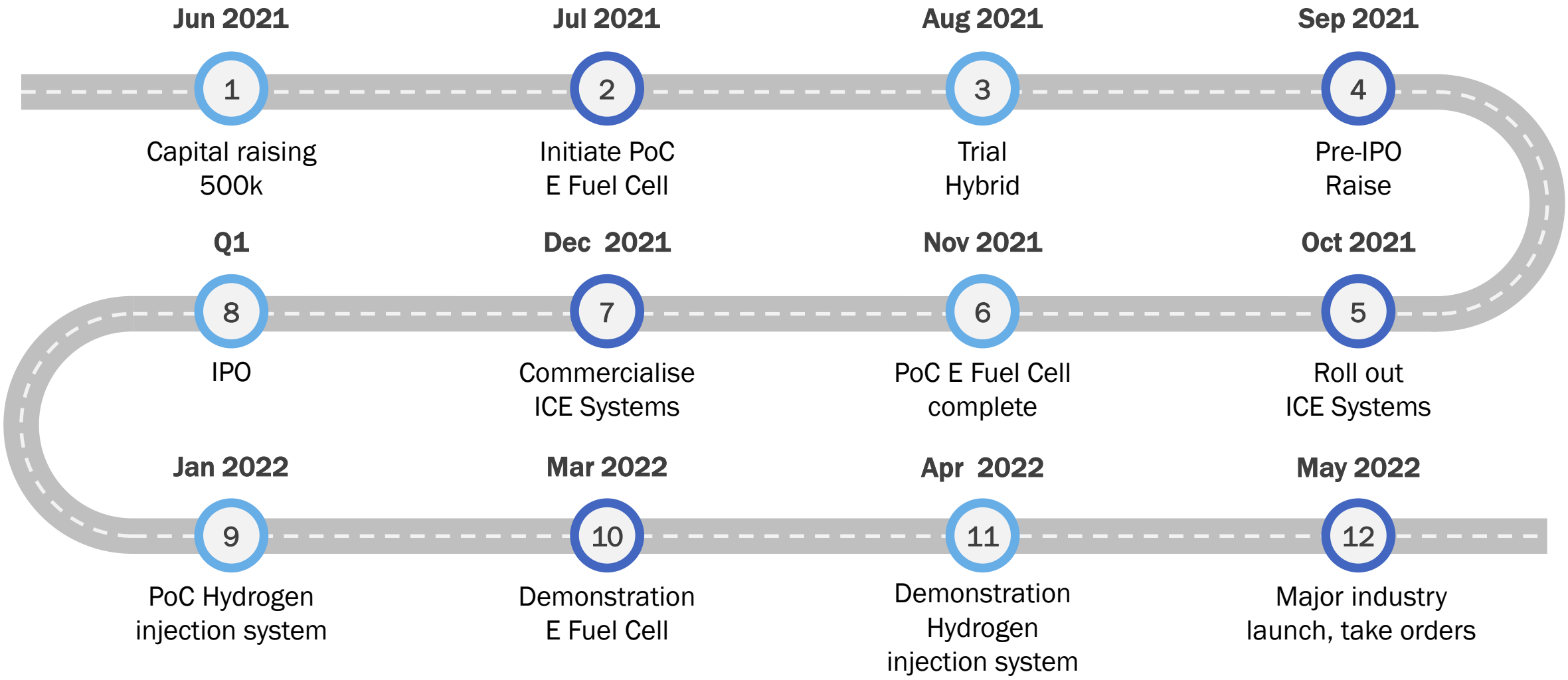
- Establish direct sales in Titan Hydrogen's E Fuel Cell to the commercial vehicle market
- Customer set includes Nikola, Kenworth, Mack, Hyster, Bus manufacturers
- License program to OEMs: Toyota, Hyundai, Mercedes, VW, Ford, GM, Mitsubishi, Nissan, Iveco, Scania

## Hydrogen Hybrid

- Direct sales
- Customer set includes: Toll, Linfox, Ventura, K&S, FMG, Rio, BHP

**In 2022 global offices presence in major growth markets: USA, Europe.**

# The next 12 months roadmap



# Corporate overview – capital structure and offer details

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## Pre-IPO Offer Details:

- Price per share: $0.20
- Pre-money company valuation: $20M
- Raise minimum: $500,000
- Raise maximum: $750,000

## Options on Issue:

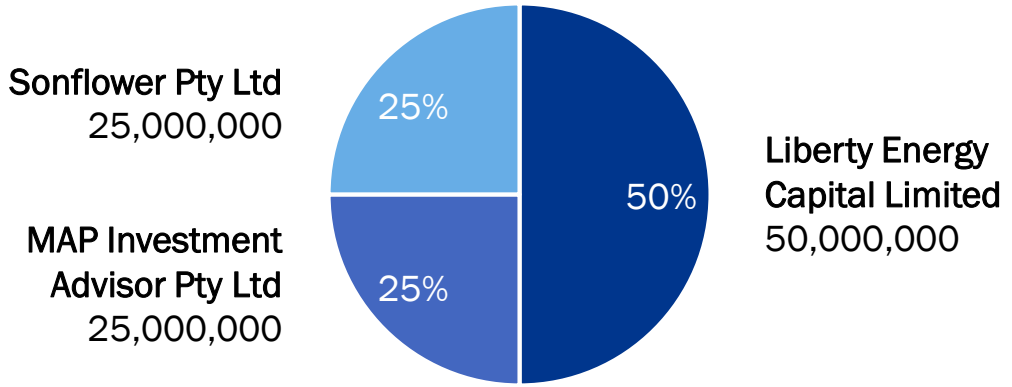
The Company currently maintains 20,000,000 options on issue that may be converted into fully paid ordinary shares in the Company on a 1:1 basis by no later than 31 December 2026, exercising at $0.20 per option.

## Performance Shares on Issue:

The Company maintains 20,000,000 performance shares on issue that shall convert to fully paid ordinary shares once the first heavy vehicle modification for injection of hydrogen is completed and signed off in writing by the Client as a successful modification.

## Current Shareholders

**Total = 100,000,000**




| Company Capital Structure | | |
|---|---|---|
| Current shares on issue | 100,000,000 | 81% |
| Shares to be issued under this offer (max) | 3,750,000 | 3% |
| Performance shares to convert to ordinary shares | 20,000,000 | 16% |
| **Shares on issue prior to IPO** | **123,750,000** | **100%** |

# Project risk analysis

| Risk | Mitigation strategy |
|---|---|
| **Titan Hydrogen – trial fails prior to roll out** | • Technology proven, correct through technical checks, track pilot activity carefully, set realistic KPI's<br>• Proven test data from product developers<br>• three different products exclusively controlled and proven outcomes, can switch if necessary<br>• Relationship is strong, mutual reliance is being created<br>• Exclusive agreements<br>• ASX Client is actively pursuing edis opportunity, ensure successful trial and delivery |
| **E Fuel Cell technology fails** | • Dr Dicks is leading world authority on fuel cells, project is based on his research<br>• Evidence based academic literature supports design<br>• Breaking development into two phases:<br>  • Verify design concept with simple PoC<br>  • Research and development with necessary resources for cell redesign<br>• Some element of risk remains - what appears to be obvious solution it is untested and unproven |
| **Cost overruns** | • Cost management through tight and controlled project management<br>• Some element of risk remains<br>• Conservative on time and capital required in project plans |
| **IP is stolen** | • Two major design concepts are undergoing patent protection |
| **Competition** | • Protect the technology by applying for patents and holding trade secrets |

# Summary

Titan Hydrogen presents breakthrough technologies for the hydrogen transport market

Titan Hydrogen has outstanding people and leadership across innovation, hydrogen and energy sectors

Investment takes paper proven technology to reality PoC and pilots

Upon completion of PoCs Titan Hydrogen will move to rapidly commercialise its technology

An investment in Titan Hydrogen is an investment in the future of energy, and the transition to a sustainable low carbon future

Titan Hydrogen is positioned to uniquely and dynamically lead the hydrogen transport market

# Contact us

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