PORT KEMBLA HYDROGEN HUB

H2 FUTURE MOBILITY DAY #6

- 27 June 2024

Illawarra Shoalhaven Joint Organisation

NSW GOVERNMENT

www.portkemblahydrogenhub.com.au

VISIT OUR WEBSITE

Future Mobility Day #6 Program

- 27 June 2024

HOUSEKEEPING

1. Turn off your camera please
2. A copy of the slide deck will be posted on the webpage and will send you a copy as well
3. Put any questions you may have in the Chat, we will pick them up from there

PORT KEMBLA HYDROGEN HUB

The Department of Regional New South Wales acknowledges that it stands on Country which always was and always will be Aboriginal land. We acknowledge the Traditional Custodians of the land and waters, and we show our respect for Elders past, present and emerging. We are committed to providing places in which Aboriginal people are included socially, culturally and economically through thoughtful and collaborative approaches to our work.

Future Mobility Day #6 Program

- 27 June 2024

11.00am	Welcome - Future Mobility Strategy	Nigel McKinnon DRNSW
11.10am	Hyundai - FCEV Heavy vehicle update	Scott Nargar Hyundai
11.25am	H2 Diesel Hybrid Truck - Hydra conversion	Stuart Pratt Wasco
11.40am	TAFE Microskill Update	Chris Greentree TAFE NSW

PORT KEMBLA HYDROGEN HUB

Hydrogen Hub Vision

Port Kembla - Australia's first **5GW+ green hydrogen hub** to service domestic and export markets by 2030

The ambitious **Vision** of creating Australia's first **5GW+ green hydrogen hub** is being realised with over **$750m+** in supportive **major energy projects** to be completed by the end of 2024 and nearly **1.7GW** of **green hydrogen projects** proposed.

Port Kembla's superiority as a **hydrogen hub** is driven by significant **opportunities** for **green hydrogen** usage in **industry**, **heavy transport**, **power generation, gas network injection** and **exports.**

PORT KEMBLA HYDROGEN HUB

HOME › NEWS › ENERGY

Coregas launches Australia's first hydrogen refuelling station for heavy transport vehicles

JULY 25, 2023

PRESS RELEASE

GE Technology to Power Australia's First Dual-Fuel Gas and Hydrogen Power Plant

June 16, 2021

Major Energy Projects

By the end of 2024, **$750m+** of supportive **major energy projects** will transform the **Port Kembla Hydrogen Hub ecosystem**. These projects include:

- **Coregas - Hydrogen Refuelling Station** will enable Australia's first zero emissions **heavy vehicle trials,** including the **Remondis** hydrogen refuse truck
- **Squadron Energy – LNG Energy Terminal** will deliver Australia's first **gas importation** facility
- **Jemena - Port Kembla Pipeline Duplication +** upgrades to the **Eastern Gas Pipeline** will deliver increased **gas network capacity**
- **EnergyAustralia** - construction of **Tallawarra B** and the **Tallawarra A upgrade** will deliver Australia's first **dual fuel capable power stations**.

Hydrogen Refuelling Stations

CSIRO Report - July 2023

- **5 Operational** Hydrogen Refuelling Stations in **Australia**
- Total **combined daily** capacity = **285kg**
- **20 new stations** planned including the **$2m Coregas Port Kembla** facility assisted by a **$500,000 NSW Government** grant

coregas

Now Operational

Daily capacity = 400kg

WWW.COREGAS.COM.AU

H2 Future Mobility is Now

TRIAL #1
HYZON FCEV REFUSE TRUCK

Fleet Operator:	Remondis
Commence:	October 2023
Vehicle OEM:	Hyzon
Model:	Hyzon Refuse Truck
Vehicles:	1
Powertrain:	Fuel Cell Electric
Fuel Cell OEM:	Hyzon
Configuration:	6 x 4
H2 Storage:	25kg
Bin Lifts:	1,200/shift
Range:	200kms
FC Power:	110kw
Tank Pressure:	350 bar
HRS:	Coregas H2Station
Refuelling:	15 minutes
GVM:	22.5 tonnes

PORT KEMBLA HYDROGEN HUB

H2 Future Mobility is Now

TRIAL #2
ARCC FCEV CITY BUS

Fleet Operator:	Premier Illawarra
Commence:	December 2023
Duration:	6 + 6 Month option
Vehicle OEM:	ARCC
Model:	ARCC Hydrogen
Vehicles:	1
Powertrain:	Fuel Cell Electric
Fuel Cell OEM:	Ballard
Configuration:	4 x 2
H2 Storage:	32kg
Range:	450kms
FC Power:	70kw
Tank Pressure:	350 bar
HRS:	Coregas H2Station
Refuelling:	20 minutes
GVM:	16.0 tonnes

PORT KEMBLA HYDROGEN HUB

Global centre of excellence for heavy vehicles powered by hydrogen

The **H2 Future Mobility Strategy** builds on the range of **initiatives** over the past **three years** by **industry**, **Port Kembla Hydrogen Hub, Department of Regional NSW** and **TAFE NSW**.

The region is at the **forefront** of **Australia's heavy vehicle** decarbonisation journey and we need to build on that **momentum**.

PORT KEMBLA HYDROGEN HUB

H2 Future Mobility Strategy - Action Plan

PORT KEMBLA HYDROGEN HUB

Investment Attraction

1

1.1 Promote the region to attract **heavy vehicle/powertrain OEMs** and **suppliers** to establish **local industry capabilities** in:

- **FCEV truck** and **bus** assembly
- **fuel cell** assembly and testing
- vehicle **component manufacturing**
- conversion of **LHD FCEV vehicles**
- **H2ICE** vehicle conversions
- **FCEV** and **EV** vehicle **repowering**
- heavy vehicle **maintenance** facilities.

1.2 Facilitate major enquiries, provide **tailored assistance** based on **individual project needs.**

CASE STUDY
CITY COAST SERVICES

Case Study - Creating local jobs, skills and content

- **Foton T5** is Australia's best selling **small electric truck**, with over 200 orders taken in 2023 when it was introduced to the Australian market
- **City Coast Services** at Albion Park Rail is fabricating the **tipper bodies** for the Foton T5 as a dealer supplied option
- **BlueScope Distribution** at **Unanderra** supplies the steel for the Foton T5 tipper bodies
- **Local value adding** has been created, **imported content** replaced and **local skills** and **jobs generated**

PORT KEMBLA HYDROGEN HUB

Hyundai Motor Company Australia

Future Eco Transport

Scott Nargar

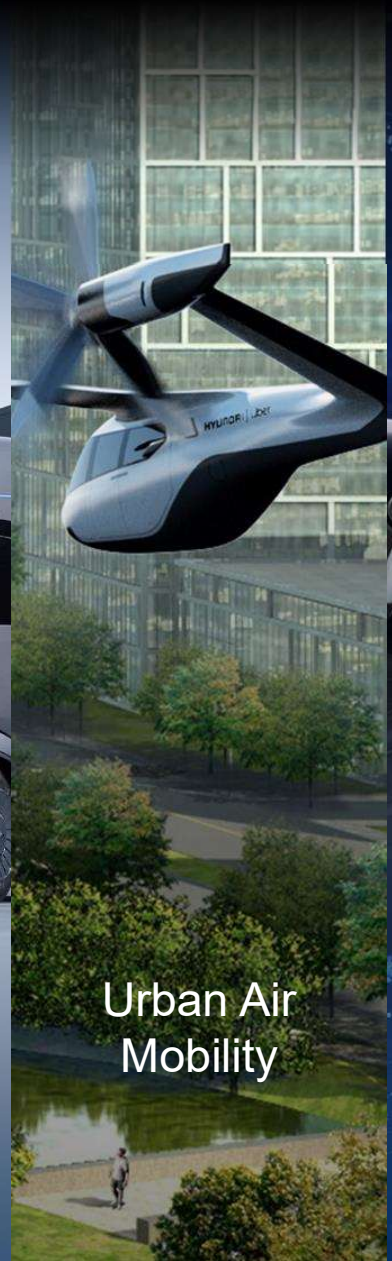
Senior Manager Future Mobility & Government Relations

HYUNDAI

Smart Mobility Solutions

Passenger Cars

Truck, Rail & Maritime Logistics



Urban Air Mobility

Autonomous Driving

Last Mile Solutions

Robotics

HYUNDAI

Hyundai EV & Fuel Cell Commercial Vehicles

BEV

Mid-Size Electric Bus | Single-Decker Electric Bus | Double-Decker Electric Bus | Articulated Electric Bus | Small Duty Electric Truck

FCEV

Fuel Cell Electric Bus | Fuel Cell Electric Truck

HYUNDAI

Hyundai Hydrogen Technology

28 years of R&D activities on fuel cell technology with the most diverse line-up of FCEVs

1998

Initiated
FC development

2000

Prototype

2013

The world's 1st
mass produced FCEV

2018

World's best-selling
FCEV

2020

The world's 1st
mass produced FC truck

2020

Mass produced FC bus
for city transportation

2022

High-performance
concept FCEV

2023

FC coach bus
for long-haul

Long-haul truck
optimised for the US

HYUNDAI

Hyundai Eco Truck Lineup

From mid-sized to heavy-duty for Australia

Mighty

Light Medium Duty Truck
(6.5t ~10.3t)

Xcient

Heavy Duty Truck
(17t ~40t)

HYUNDAI

Powerful and Clean Technology

Hydrogen Fuel Cell System

HV Battery Pack

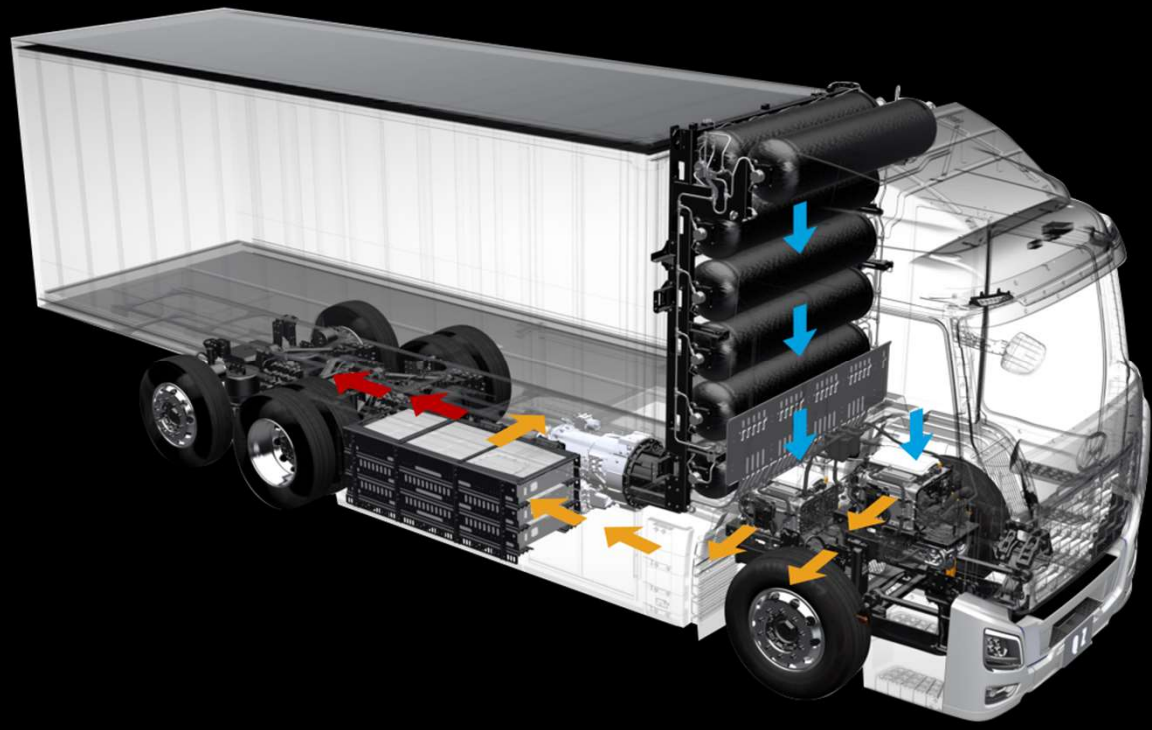
XCIENT FC Specs
Fuel Cell Stack – 180kW
Battery 72kWh
32kg H2 capacity

High Voltage Batteries

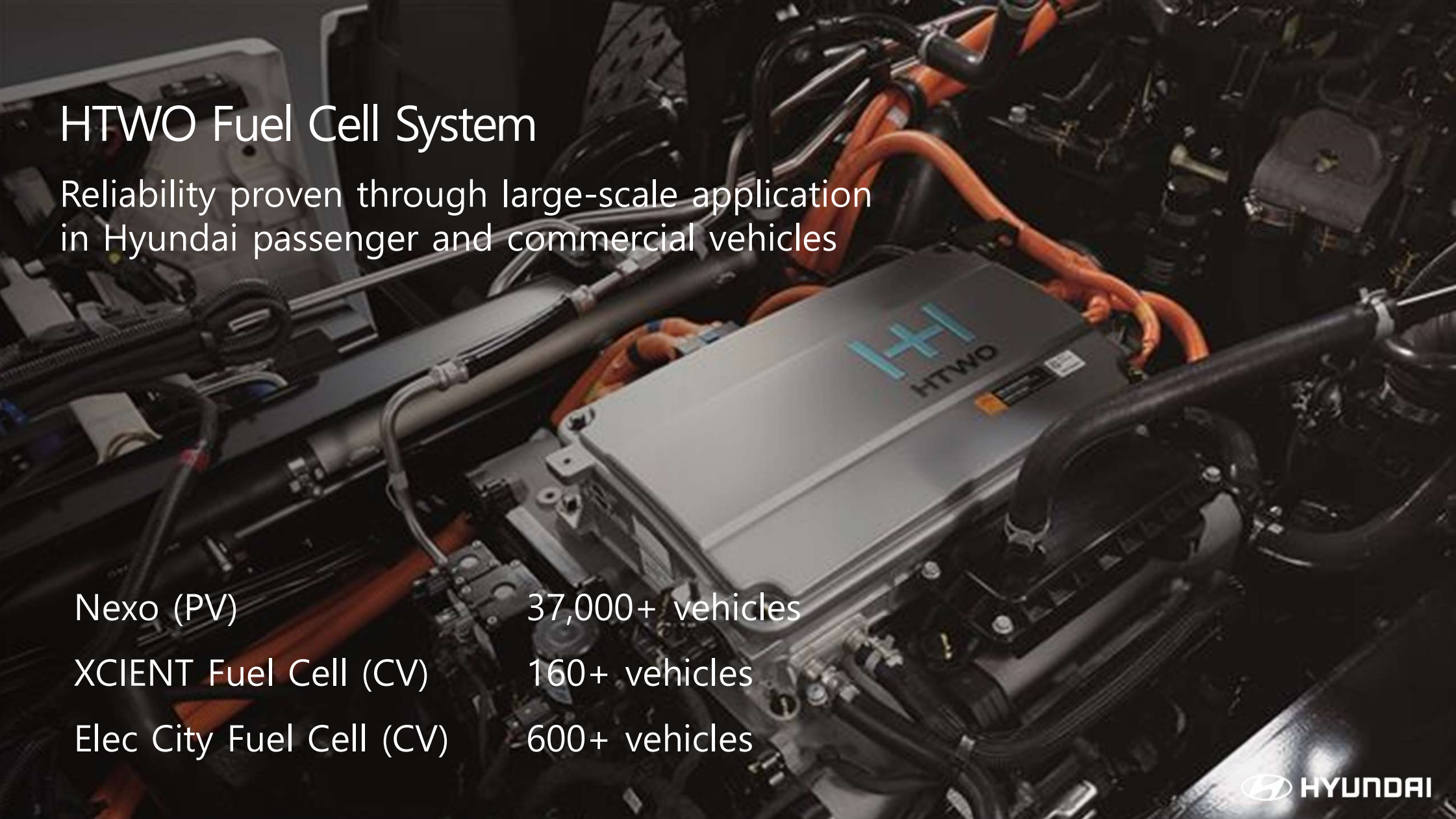
23

Hydrogen Tanks → Fuel Cell Stacks → Motor → Transmission → Driving Axle

Air Purification



HYUNDAI



HTWO Fuel Cell System

Reliability proven through large-scale application
in Hyundai passenger and commercial vehicles

Nexo (PV)	37,000+ vehicles
XCIENT Fuel Cell (CV)	160+ vehicles
Elec City Fuel Cell (CV)	600+ vehicles

HYUNDAI

New Zealand XCIENT Fuel Cell Learnings

Key data from 12 months initial trial

Usage limited by temporary H2 refuelling station ※ As of April 2024

XCIENT FC Specs

42t GCW

32kg H2 capacity

180kW fuel cell stack

72Kwh battery

EV motor 350kW/ 2237Nm

Replaced a 520Hp truck

Key Data

Mileage to date 80,000kms

Average H2 usage 12.5km/kg (urban and highway)

Diesel avoided 33,500L

CO2 avoided 89,333kg

Daily fuel usage 27–30kg/day

Next Steps

Double shift 20+hours per day

10-minute refill on new high capacity green H2 station

Daily H2 usage 50~90kg/day

800~1200kms per day (night linehaul & day metro)

Scale up truck supply with H2 station deployment

HYUNDAI

Europe FC Truck Operation Status

"Impressive vehicle with its quality and reliability. "It is sturdy, quiet, and comfortable to drive"
"We can use the truck in our usual operating structure"

147 Xcient FC truck
(4x2, 6x2 Rigid Truck)
※ As of Mar 2024

Over 9.5mil. km
(Switzerland only)

Over 5,500ton CO_2 emission saved

HYUNDAI

US FC Truck Operation Status

"Good power", "Good and strong engine brakes", "Smooth operation", "Very roomy cab"
"Good suspension and the ride is really smooth", "Cab comfort is very customisable"

35 Xcient FC truck (6x4 Class8 Prime mover)

※ As of Mar 2024

HYUNDAI

Global FC Truck & Bus Business

Deployed FC trucks and buses in 9 countries, and continuously evaluating potential markets

HYUNDAI

Why H_2

Hyundai is globally committed to hydrogen technology

World facing environmental issues

Worldwide ambitions to reduce CO2 emissions

Expansion of renewable electricity

Hydrogen necessary for the energy transition

CVs offers the best economical leverage to establish refueling infrastructure

Hydrogen Trucks also make more sense from a use case perspective than other solutions

Payload

Range

Refueling Time

Grid capacity

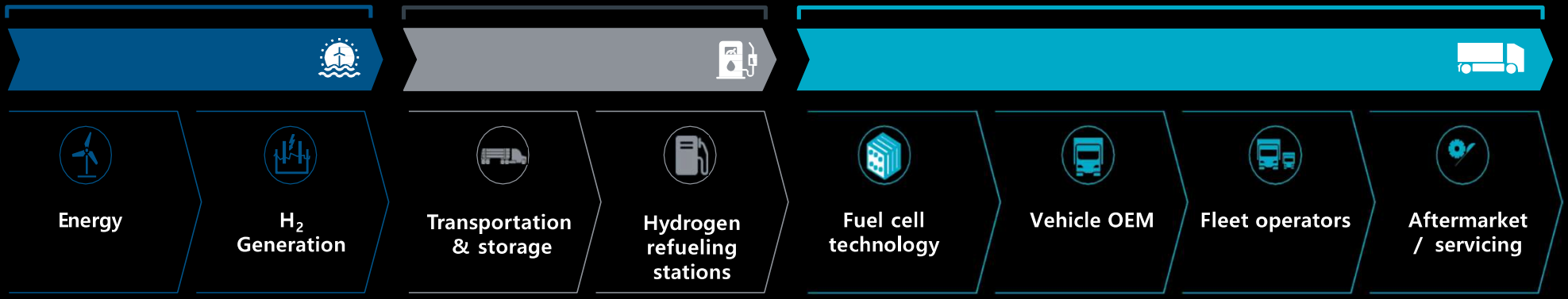
HYUNDAI

Holistic Approach in establishing an H_2 ecosystem

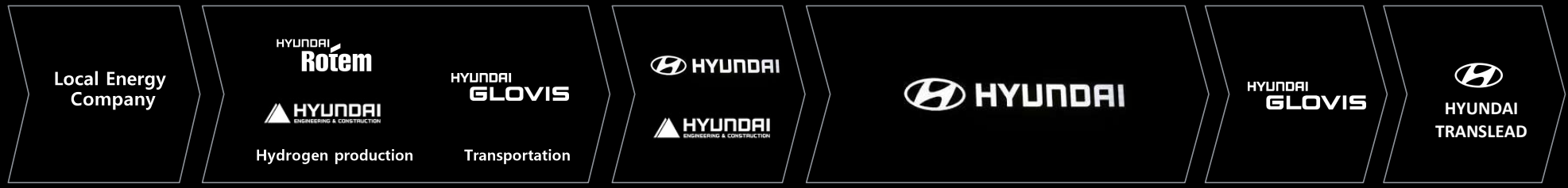
Provide an eco-system to attract fleet customer across the value chain

Reducing complexity by minimising interfaces (Horizontal value chain integration)

Parallel deployment in agreed ramp-up schedule



Next Phase - internalising with HMG Affiliates



HYUNDAI

Thank You

HYUNDAI

Future Mobility Day #6 Program

- 27 June 2024

Questions?

PORT KEMBLA HYDROGEN HUB

wasco

hydra
Real hydrogen now.

Hydrogen – Diesel Hybrid
Conversion and Demonstration

28th June 2024 – Future Mobility Day #6

What Fleets Want

Zero Upfront Costs

Low carbon fuel at comparable costs to diesel

Simple operations - Minimal training

No Range Anxiety
Fast fill up

After-sales support

Proof of Real-time benefits

Works in cold temperature

No loss in Payload
High Power Output

Hydra's Proprietary Conversion Kit

Simple 2-day conversion to run hybrid of hydrogen & diesel

H_2 tanks & gas handling components behind or under cab 40 kg (1,000 km)

H_2 injection manifold in-line with air intake blends H_2 and air before entering engine block

NO engine modification

Dedicated controller and wiring harness behind the dashboard (ECU)

NO interception/modification of OEM ECU messages

Hydra's IP

PROPRIETARY ECU

Hardware & software built from the ground up in house
Designed & spec'd by Hydra for specific outcomes

UNIQUELY PLATFORM AGNOSTIC

Can work in any internal combustion application
Easy and fast to implement to grow & scale at speed through auto-calibration made possible by machine learning (others would use manual calibration taking months to adapt to a new make and model of vehicle)

FIRST TO INTEGRATE MACHINE LEARNING

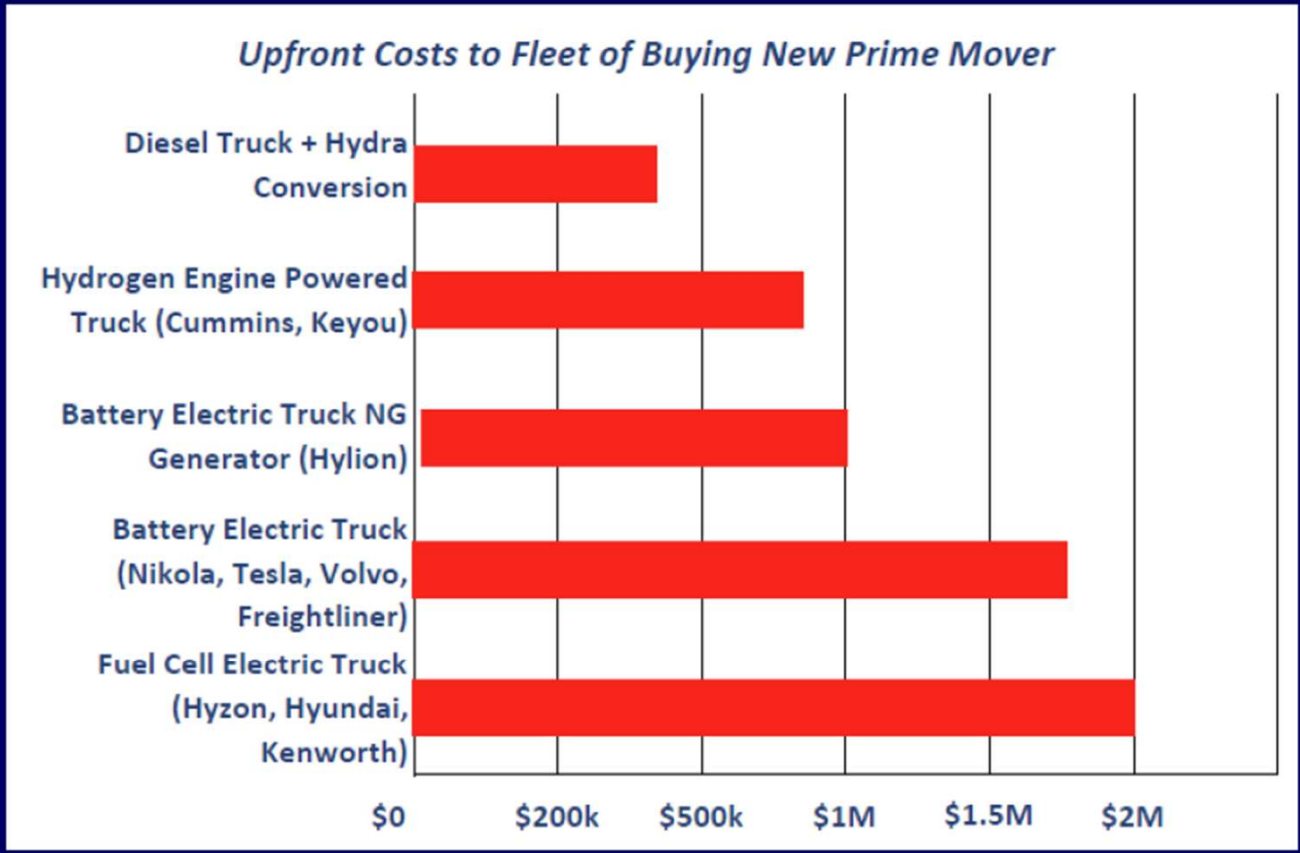
Hydra has more data than potential new market entrants from having trucks on the road since 2016
A larger data pool enables Hydra to integrate machine learning to optimise power output and fuel efficiency alongside increased diesel displacement

First company in the world to put hydrogen co-combustion heavy duty trucks on the road

300,000 kms driven and counting

- ✓ On-road data since 2016
- ✓ 1000 km range on average
- ✓ Same/superior performance compared to diesel
- ✓ Refueling in approx. 6 min
- ✓ Demonstrated all weather performance down to -46 C
- ✓ Emissions reductions up to 40%
- ✓ System ***DOES NOT*** modify the engine
- ✓ Safety operation- Zero incidents
- ✓ Happy drivers

How Hydra Compares to Other Alternatives



- ➔ Cost: No upfront cost in HaaS model; No increase in operating costs with H2 at diesel parity
- ➔ Performance: Proven to get equivalent or better power/torque than diesel-only
- ➔ Range of 1000 km - switches to diesel-only mode if H2 runs out
- ➔ Mass: Hydra's kit is 740kg
- ➔ Hydra only company with years of data needed for auto-calibration

Vehicle Safety Systems

Behind-the-cab mounted storage tanks; pressure, temperature, fire, impact, and rifle tested

T-PRD's on both ends of each tank; will safely vent hydrogen if over-temperature (110°C)

PRD located on low pressure line; will safely vent H2 if over-pressure (10 Bar)

Continuous leak-check; System will close all valves if a leak occurs and will notify operator

On-board diagnostics; Faults on the vehicle or on the system will disable the system and close all valves

Weight and Power

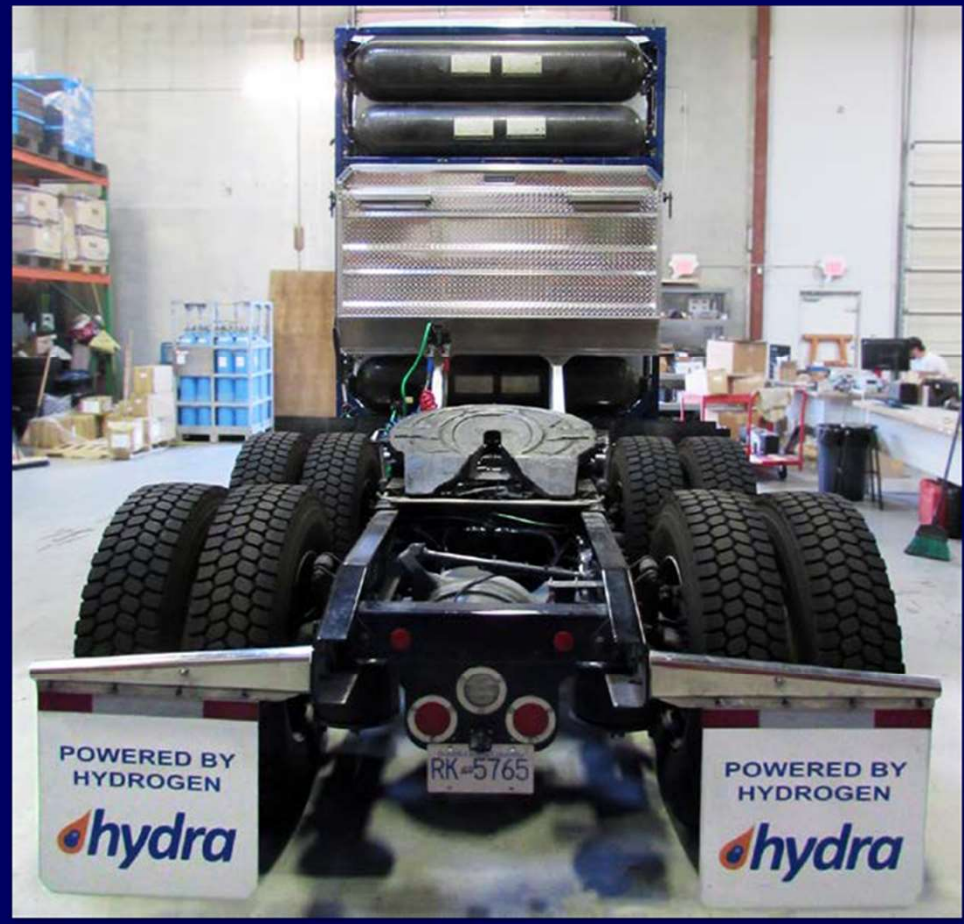
NO LOSS OF PAYLOAD

Hydra's conversion kit adds just over 700kg to the weight of the truck, mainly due to the hydrogen tanks mounted behind the cab. However, the Provinces of BC and Alberta enacted a blanket weight allowance of 1000kg for heavy-duty trucks fuelled by hydrogen.

Other provinces are considering similar policy changes to encourage adoption of clean fuels.

NO LOSS OF POWER

Hydra's trucks do not experience a loss of power when climbing hills even on the steepest of routes. Drivers have noticed a boost of power even on steep climbs.



HYDROGEN FUELLING

To refuel there needs to be hydrogen connected to a refuelling station, which is done through storage tanks. Hydrogen refuelling at 350 bar can also be an add-on to an existing cardlock or standalone integrated station that offers both hydrogen with diesel.*

*The diesel is not supplied by Hydra.

Refuelling takes under

10 minutes

and can be done at the same time as diesel

Demonstration Unit - Status

PRIME MOVER
Wasco has selected a 2021 Freightliner Coronado 114 6x4 prime mover

FUEL SYSTEM
350bar featuring 5 x horizontally configured, rack mounted, behind the cab Type III cylinders

DESIGN, SUPPLY, INSTALLATION
Design complete, cylinders, valving and electronics ordered, truck ready

CERTIFICATION
Certified by the office of the Queensland Gas Inspector and meets the requirements of the department of transport and NHV

For more information

EMAIL

sales.aus@wascoenergy.com.au

FOLLOW

LinkedIn.com/company/hydra-energy

@HydraEnergyNow

youtube.com/c/HydraEnergyCanada

Future Mobility Day #6 Program

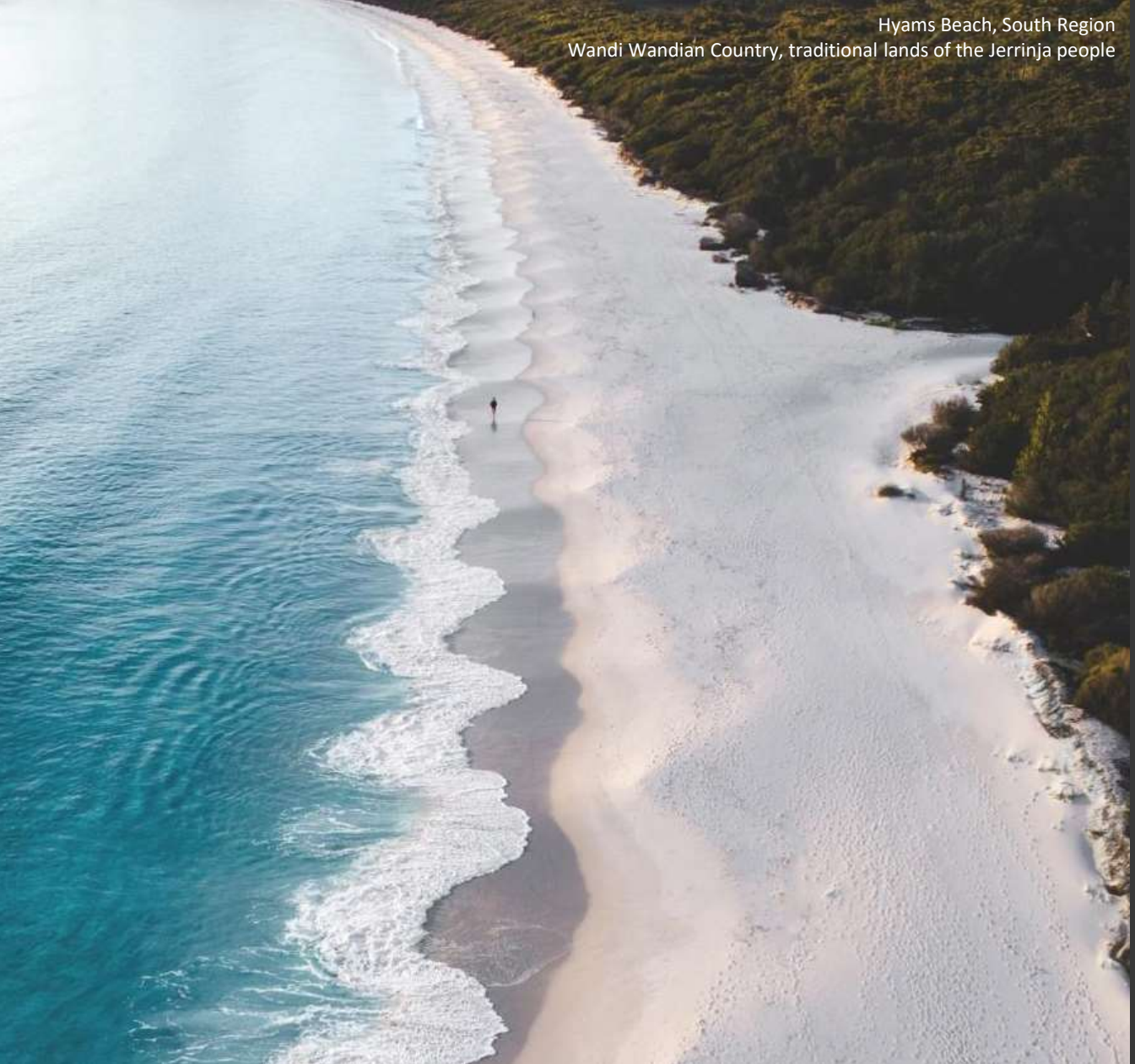
- 27 June 2024

Questions?

PORT KEMBLA HYDROGEN HUB

Hydrogen Mobility Microskills Training

Chris Greentree



Hyams Beach, South Region
Wandi Wandian Country, traditional lands of the Jerrinja people

TAFE NSW acknowledges Aboriginal and Torres Strait Islander Peoples as the Traditional Custodians of the Land, Rivers and Sea. We acknowledge and pay our respects to Elders; past, present and emerging of all Nations.

TAFE NSW ICRG - Hydrogen

Institute of Applied Technology

10 May 2023

NSW Government Agencies attending

TAFE NSW

Transport for NSW

Office of Energy and Climate Change, NSW Treasury

NSW Fair Trading

Department of Regional NSW

Fire + Rescue NSW

Regional Investment NSW

Training Services NSW

JSCs Attending

AUSMESA – Automotive and Mining

Industry Skills Australia - Transport

How would you describe your organisation

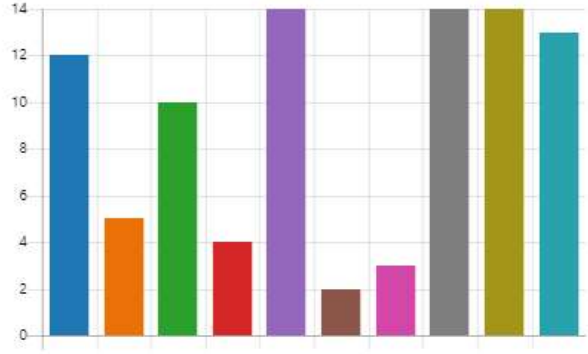
More Details | Insights

Small to Medium Business	8
Large Business	14
Industry association / peak bo...	7
Government	14
Other	1

What sector(s) best describes your area of expertise. (Click all that apply)

More Details

Hydrogen Production	12
Bulk Storage	5
Transport of Hydrogen	10
Blending Gases for consumpti...	4
Transport applications - Zero ...	14
Export	2
First Responders	3
Government Support	14
Workforce Development	14
Other	13



TAFE NSW Microskills

The courses to be rolled out over the next six months include:

1. Emergency Responder Electric Vehicle Incident and Emergency Response - **Launched**
2. Introduction to fuel-cell electric vehicles - **Launched**
3. Contextualised fuel-cell electric vehicle - **Launched**
4. Hydrogen Energy Fundamentals **- Launched**
5. Electric Vehicle Charging station baseline knowledge **– Just Launched**
6. Refuelling fuel-cell electric vehicles - **Just Launched**
7. Prepare to work in the renewable energy sector - **April/May**
8. Introduction to wind farms - **Just Launched**

Chris Minns, Premier Of New South Wales:

"The National Skills Agreement will pave the way in supporting the people of NSW to gain the skills
they require for emerging industries,

"These courses are an example of where funding from the NSA can be utilised to ensure TAFE NSW accelerates skills training in renewable energy through collaboration with industry and government.

What is a TAFE NSW Microskills

- Bite sized
- Tailored to industry needs
- Developed in partnership with industry
- Enables upskilling and Professional development
- Self-guided online learning
- Responding to emerging skill needs

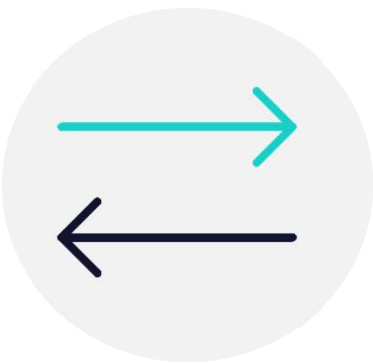
Target audience

New entrants

- ✓ School leavers
- ✓ Apprentices
- ✓ Career change
- ✓ Pathway opportunities

Existing Workforce

- ✓ Existing skills and knowledge and experience
- ✓ Training targets a specific skills gap



Transitioning/ Upskilling

- ✓ Transitioning from one job profile to another utilising transferrable skills

Refuelling fuel-cell electric vehicles

This course is tailored for individuals needing to refuel their FCEVs. It is designed for anyone operating a FCEV, exploring the best refuelling practices contributing to the safe and successful integration of hydrogen as a sustainable energy source.

Proudly developed in collaboration with ARCC and Haskel.

At the end of this course, learners will be able to:

- Identify the key components and safety features of a hydrogen refuelling stations and their functions.
- Identify the key steps involved in safely refuelling a hydrogen fuel cell electric vehicle.
- Describe the basic safety procedures for refuelling and emergency protocols.

Refuelling of a hydrogen fuel cell electric vehicle – store.training.tafensw.edu.au

Introduction to the Wind Energy Industry

This introductory course is designed for people considering a career in the wind energy industry.

Proudly developed in collaboration with Squadron Energy.

At the end of this course, learners will be able to:

- Outline the role of wind energy in the renewable energy sector
- Describe the environment, working conditions and lifecycle of wind farms
- Identify and assess career opportunities for career starters, career upgraders and working professionals
- Recognise unique operational and safety requirements for working in the wind energy industry
- Identify traditional and non-traditional pathways to transition into the wind industry.

Introduction to the Wind Energy Industry – store.training.tafensw.edu.au

What’s Next?

TAFE NSW Industry Collaboration Reference Groups

- Access to Microskills for apprentices and trainees

- TAFE NSW Staff Moodle for Teacher currency

- TAFE NSW industry Spotlights for teacher currency

TAFE NSW Microskills

Hydrogen Energy Fundamentals

Introduction to fuel cell electric vehicles, systems, and components

Refuelling of a hydrogen fuel cell electric vehicle

Get to know the Foton FTH12 Hydrogen City Bus

Thank you

Want to partner with TAFE NSW Microskills:

- **IndustryInnovationSpecialists@tafensw.edu.au**

Interested in purchasing and accessing volume pricing:

- **support.training@tafensw.edu.au**

Visit TAFE NSW Microskills for more information

- **https://store.training.tafensw.edu.au/product-category/microskills/**

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Questions?

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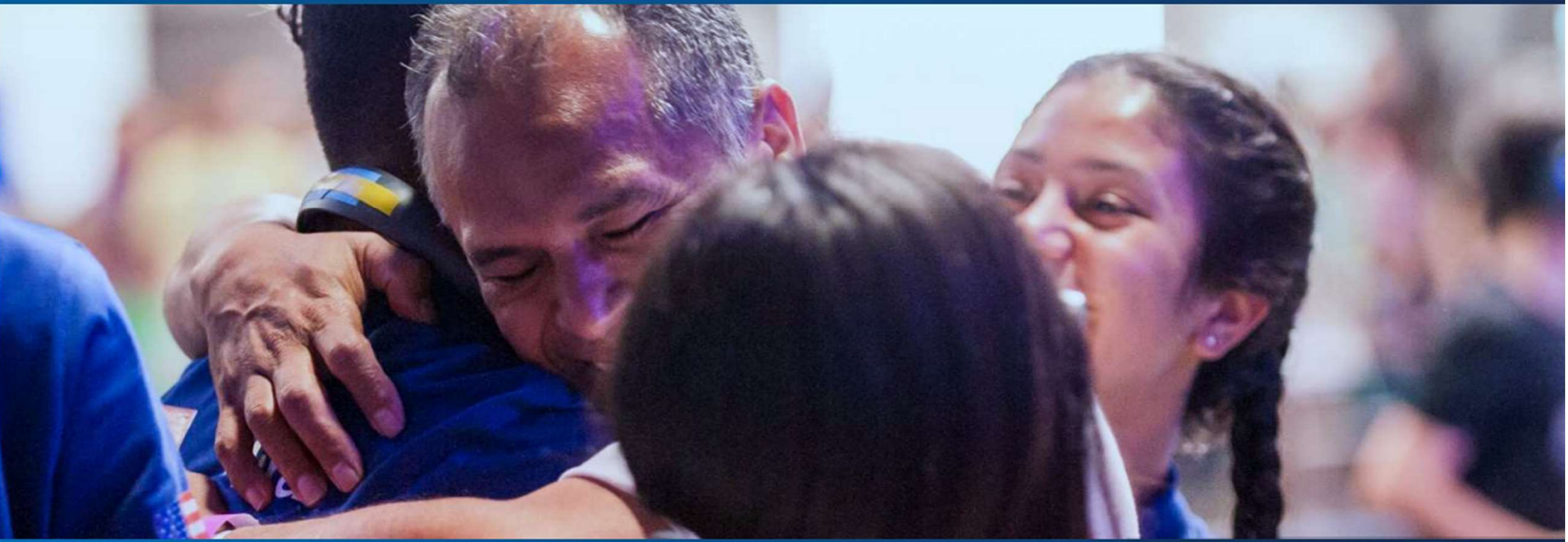
Horizon Educational

GIVING CHILDREN ANOTHER REASON TO LOVE SCHOOL



THE TIME FOR HYDROGEN EDUCATION IS NOW!

H2 GRAND PRIX SERIES

THANK OUR SPEAKERS

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