# Hydrogen Safety & Hazardous Areas Conference


21st & 22nd February, 2024
Rydges South Bank
Brisbane QLD, Australia

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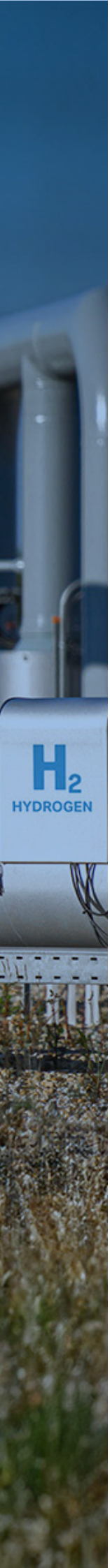



# Introduction to
# Hydrogen Safety & Hazardous Areas

Australia has been actively exploring and investing in the hydrogen industry as part of its efforts to transition to a low-carbon economy. Hydrogen is considered a promising clean energy carrier, and Australia has abundant renewable resources that can be used for hydrogen production.

The Hydrogen Safety & Hazardous Areas Conference reviews some of the current projects and investments: Including pilot projects, research initiatives, and large scale commercial ventures. Government funding and support have been allocated to accelerate the development and deployment of hydrogen technologies.

The conference has presentations from the regulators, and other institutions, addressing the collaboration between government, industry, and research institutions is crucial for the growth of the hydrogen sector. Partnerships and collaborations are formed to share expertise, develop technologies, and address challenges. This includes standards, codes, and regulations for the safe production, transport, and use of hydrogen.

Hazardous areas are classified based on the likelihood of the presence of flammable atmospheres. Zoning and classification systems help define the extent of hazardous areas and guide the installation of equipment and electrical systems.

Competency assessments and ongoing training programs are essential to ensure that personnel are well-prepared to handle potential hazards.

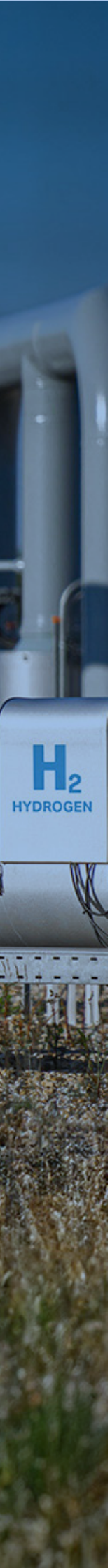
Collaboration between industry stakeholders, regulatory bodies, and safety organisations is crucial to sharing best practices and staying updated on the latest safety developments in the hydrogen sector.

This conference looks at the advancements in technology, that contribute to enhancing safety in hydrogen facilities by providing real-time data on gas concentrations and potential hazards.

As with any rapidly evolving industry, it's essential to stay abreast of updates to regulations and standards and to incorporate the latest safety technologies and practices into their operations. Regular audits and reviews of safety protocols are also important for ensuring ongoing compliance and risk management.

If you are involved in investing or operating within Australia's hydrogen industry, this conference serves as an invaluable platform to equip you with essential technical insights. It ensures that your projects align with current standards, regulations, and industry best practices. The event goes beyond theoretical discussions, offering practical lessons learned from existing projects. The industry collectively leans on shared experiences to foster mutual growth. Join us to stay at the forefront of industry advancements, connect with key stakeholders, and contribute to the collective progress of the hydrogen sector in Australia.

Held in the large ballroom at the Rydges Hotel Brisbane, providing ample space for delegates to engage and learn. The conference will serve healthy catering options to ensure your mind and body are looked after. There are ample opportunities to network in the breaks and at the conference soiree.




# 2024 Keynote Speakers

## Heidi Breen

### CEO, *Hydrogen Queensland (H2Q)*

As the CEO of Hydrogen Queensland (H2Q), Heidi Breen is at the forefront of pioneering the hydrogen industry in Australia, particularly focusing on advancing Hydrogen projects across Queensland. Her leadership extends beyond state and organizational boundaries, engaging the broader industry in critical discussions and activities that shape the safe and sustainable development of hydrogen energy projects. Under her guidance, H2Q has become a central figure in facilitating collaboration and consultation with the government and national energy associations, driving the establishment of essential frameworks for the industry's growth.

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## International Keynote Scott Davis

### CEO - Principal Engineer, *Gexcon*

**Highest Rated Speaker Hydrogen Safety & Hazardous Areas Conference 2023**

Dr. Scott Davis is the CEO at GexCon US and specializes in the engineering analysis and testing of combustion, thermal, and fluid processes. Dr. Davis received his Ph.D. and M.S. degree in Mechanical and Aerospace Engineering from Princeton University. He is responsible for fire and explosion related activities, which include post-incident investigative work, worldwide training and experimentation. Dr. Davis performs risk assessments and safety studies for petrochemical facilities and chemical processing facilities. Dr Davis has investigated hundreds of fire and explosions, and is a member of GexCon's docents' group, which develops and delivers worldwide industrial seminars to owners, operators, safety engineers, and regulatory agencies, on the hazards associated with gas and dust explosions, flammable refrigerants, hydrogen and LNG.

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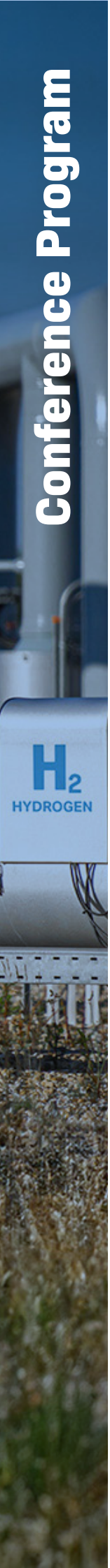
## Neil Dennis

### Technical Director, *AECOM Australia Pty Ltd*

Neil's professional background spans over 40 years' experience as a designer and safety advisor for industries with a range of explosion hazards.

Neil has been an active member of Australian Standards committees for hazardous areas since 1992 and International Electrotechnical Commission committees since 2000. His roles have included that as chair of Australian Standards committees, chair of IEC subcommittee for the classification and installations for hazardous areas and active membership in numerous working groups in both forums.

In more recent years Neil has been appointed as liaison from the standards committees related to hazardous areas to other standards committees in the IEC and ISO including refrigeration systems and hydrogen systems.




# Day One | Wednesday 21st February, 2024

## 9:00am Opening of the Conference

**Kim Richards MP**
Member for Redlands, *Queensland Parliament*

Kim is the Member for Redlands in the Queensland Parliament. Before being elected to represent Redlands in the Queensland Parliament. She had an extensive career in leading Australian architecture and design firms in business and organisational management. In her role as the Member for Redlands, she is also the Queensland Parliament Committee Chair for Education, Employment, Small Business and Training, she is a Member of the Parliamentary Ethics Committee, Kim is Australia's first Hydrogen Champion and Chair of the Queensland Government's War on Wrecks Taskforce.

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## 9:30am Session One | Keynote Presentation

### Navigating the Future of Hydrogen: Ensuring Safety, Advancing Standards, and Fostering Growth

**Heidi Breen:** CEO, *Hydrogen Queensland (H2Q)*

In this insightful presentation, Heidi Breen, CEO of Hydrogen Queensland (H2Q), delves into the critical aspects of developing a robust hydrogen industry in Australia, emphasizing safety, training, policy, and supply chain management. Drawing from her extensive experience in leading H2Q and collaborating with diverse stakeholders, Heidi will provide a comprehensive overview of the challenges and opportunities in scaling hydrogen projects to commercial success while maintaining the highest standards of safety and compliance.

The session will explore the following key areas:

- Safety in Hydrogen Energy: Examining the latest safety protocols and measures necessary to mitigate risks in hydrogen production, storage, and distribution.
- Training and Workforce Development: Discussing the importance of specialized training programs to equip the workforce with the necessary skills and knowledge for a burgeoning hydrogen economy.
- Policy and Regulatory Frameworks: Analyzing the current policy landscape and advocating for regulations that support sustainable growth and innovation in the hydrogen sector.

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## 10:15am Morning Tea

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## 10:45am Session Two

### Delivering the Central Queensland Hydrogen Project: Navigating Technical, Safety and Operational Risks

**Brad Stemp:** Lead Instrument, Control and Process Safety, *Central Queensland Hydrogen (CQ-H2) Project. For Stanwell.*
**Doug Galbraith:** Lead Process Engineer, *Central Queensland Hydrogen (CQ-H2) Project. For Stanwell.*

The Central Queensland Hydrogen (CQ-H2) Project is one of Australia's largest renewable hydrogen developments. The project will involve the production of renewable hydrogen from water electrolysis using renewable energy at a Hydrogen Production Facility. Hydrogen will then be transported via a 20km Hydrogen Transfer Facility (pipeline) to an Ammonia Synthesis Plant (ASP) and a Hydrogen Liquefaction Facility (HLF) at Gladstone Port. The project plans to export renewable hydrogen via different carriers to Japan and Singapore as well as supply large industrial customers in Central Queensland. The initial phase of commercial operations is planned to commence in 2029 with the supply of 200 tonnes per day (tpd) to the ASP and scale up to supply 400 tpd to the HLF in 2031.

To achieve delivery of a project of this scale there are several technical, safety and operational challenges that need to be addressed. The presentation will delve into some of these challenges and associated mitigations, including a focus on how to manage process and functional safety, evolution in technology, incorporate flexibility in design and operation and manage vendor risks. Two areas of focus for management of risk have been the design of large-scale gaseous hydrogen storage and design optimisation to allow for a substantial period of ongoing simultaneous operation (SIMOPS) as the plants are built over multiple stages.

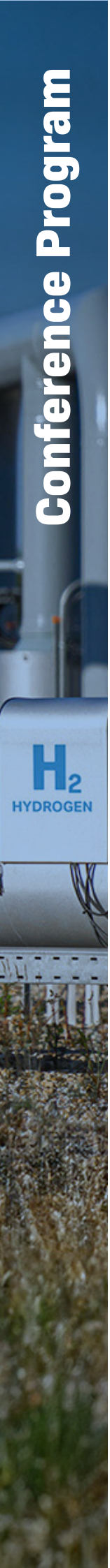
## 11:30am Session Three

### Lessons Learnt and Scaling Hydrogen Projects

**Diane Hinson,** Senior Advisor - Renewable Gas Development, *AGIG*
**Robert Davis,** Senior Engineer Low Carbon Future, *AGIG*
**Andrew Hynes,** Head of Facilities, *AGIG*

Hydrogen Park South Australia is an Australian first renewable hydrogen project developed by AGIG, which has been an operation since May 2021. Starting with a 1.25 PEM, electrolyser, delivering a 5%, hydrogen blend by volume to 700 customers, it has expanded in March 2023 to reach 4000 customers. We will share some lessons learnt from this landmark project, its operation and how hydrogen can safely be used as a replacement for natural gas. We will also give a forward view of how this project will be leveraged to develop Hydrogen Park, which is a 60 MW electrolyser project with, hydrogen blending at 20% and the potential to reach 350,000 customers.

## 12:30pm Lunch




## 1:30pm Session Four

### Hydrogen Project Safety

**Joel Albertson:** Owner, Managing Director, Principal Mechanical Engineer, *Iris Engineering*

The rapid development of the hydrogen industry has created an increasing need for a robust systematic approach to create safe projects, import equipment, and achieve regulatory compliance. The dominant trends display a need for greater safety in design and adherence to the engineering design process in the initial stage of development. Hydrogen equipment requires an increased awareness of international codes and standards accepted in Australia or the ANZ equivalent for design, construction and installation. These factors are combined with the state and territory requirements for regulatory acceptance and to deliver a safe asset.

We use experience from decades of capital project delivery and five years of hydrogen project development as the foundation of our processes.

## 2:15pm Session Five

### Understanding and Managing Risks for the Hydrogen Technology

**Scott Davis:** CEO – Principal Engineer Gexcon, *Gexcon USA*

Hydrogen is gaining popularity and is positioning itself to play a significant contribution in the Net Zero Emissions Scenario to decarbonize sectors where emissions are difficult to abate. While suitable for various uses, hydrogen presents a unique set of challenges that begin during its production and continue throughout it use and storage. The risks and rewards of such processes need to be evaluated so that we can safely manage the hazards associated with the hydrogen technology to ensure its safe implementation. This includes important feasibility studies and novel research activities to help manage and mitigate undesirable consequences associated with hydrogen fuel.

## 3:15pm Afternoon Tea

## 3:45pm Session Six

### Biomass – Hydrogen Steam Reformer Panel Discussion

**Travis Stewart:** Managing Director, *Zero Industries*
**Derek Cross:** Team Lead, *Gexcon*
**Joel Albertson:** Owner, Managing Director, Principal Mechanical Engineer, *Iris Engineering*

This Panel discussion will showcase the first installation of a Raven SR2 biomass steam reformer that produces green hydrogen in Australia - The installation is in Victoria for the East Gippsland Shire, a region with abundant natural gas resources and a strong commitment to renewable energy.

The Steam Reformer is a non-combustion thermal, chemical reductive process that does not require fresh water or expensive catalysts. It also reduces CO2 emissions by 40% compared to conventional steam methane reforming (SMR). Its process involves heating waste and methane until they turn into synthetic gas, which is then separated into hydrogen and carbon. The hydrogen can be used for various applications, such as fuel cells, while the carbon can be sequestered or sold as a solid bio-carbon. This ground-breaking technology can process multiple and mixed wastes, including biomass, municipal solid waste, bio-solids, industrial waste, sewage, medical waste, and low methane natural gas.

The case study explores the technical, economic, and environmental benefits of the installation, as well as the challenges and opportunities for expanding green hydrogen production in Australia and globally. Our Panel aims to provide the engineering community with practical insights and lessons learned from this innovative project.

# Day Two | Thursday 22nd February, 2024

## 9:00am Session Seven | Presentation & Panel Discussion

### TBA

**Resources Safety & Health Queensland, Electrical Safety Office**

**Stacey Ozolins:** Director, *Electrical Safety Office, Office of Industrial Relations*
**Dr Brian Krieger FRACI Cchem:** A/Director, *Major Hazard Facilities Unit, Specialised Health and Safety Services, Workplace Health & Safety Queensland, Office of Industrial Relations*
**Robert Wicks:** Director Renewable Energy, Compliance & OED, *Electrical Safety Office, Office of Industrial Relations*
**Marshall Holmes:** Executive Petroleum Engineer, B. Eng (Mech), M.Eng Sci, MIEAust, CPEng, NER, RPEQ, *Resources Safety & Health Queensland*




## 10:00am Morning Tea

## 10:30am Session Eight | Keynote Presentation

### Hazardous Area Classification Developments for the Hydrogen Industry

**Neil Dennis:** Technical Director, *AECOM Australia Pty Ltd*

Australian standards for classifying hazardous areas have evolved at every edition with new structures and technical details. The rapid development of the hydrogen industry also results in greater interest in hazardous area classifications for hydrogen as part of industry guidance programs by government agencies and organizations such as the International Energy Agency (IEA) and equipment certification schemes such as IECEx.

This presentation looks at the development of standards for hazardous area classification, focusing on issues for hydrogen-related industries considering both the development processes and technical aspects.

This session will present a hierarchy of control for hydrogen and will consider the technologies that can be deployed to safely manage hydrogen in the value chain.

## 11:15am Session Nine

### Static Electricity & Lightning in Hazardous Areas

**Carmello (Cem) Novella:** Managing Director, *Novella Group Pty Ltd TA Static Electricity Control*

In many branches of industry, hazardous atmospheres exist due to the presence of flammable liquid, gases, combustible dusts and fibres. No matter how the explosive atmosphere is classified, all potential ignition sources must be eliminated, with static electricity and lightning perhaps being the most insidious of them all.

Static electricity is the prime culprit for at least two serious fires or explosions in industry worldwide every day of the year. In the U.S. alone, static electricity causes on average 280 industrial incidents each year reported to fire and emergency departments, resulting in injuries and fatalities, hundreds of millions of dollars in property damage, lost production or plant downtime and environmental release issues.

Lightning causes industry closures worldwide every day of the year. In Australia alone, lightning results in production, plant or process closure costing millions of dollars in downtime and recovery losses.

In light of this, how can we better design and protect hazardous area facilities and processes, such as storage, loading and unloading from static electricity and lightning?

How will AS/NZS 1020, AS 1768 and newly adopted IEC TS 60079-32-1 standards affect the Australian and New Zealand Hazardous Area landscape? What do you need to know?

## 12:00pm Lunch

## 1:00pm Session Ten

### Hydrogen Code of Practice Framework - Legislative Clarity & Compliance

**Kayne Herriman:** Principal HA Engineer, *Hazardous Areas Specialists*

The Hydrogen Code of Practice in Queensland plays a pivotal role in ensuring hydrogen safety, specifically in hazardous areas and its utilisation as a fuel gas.

This code has been developed in collaboration with industry and government stakeholders, offering a comprehensive framework operating under the Petroleum and Gas Act (2004).

Its principal objective is to provide clear guidelines to industry professionals on how to adhere to safety requirements for hydrogen fuel gas, streamlining approval processes and specifying safety requirements for unodourized hydrogen fuel.

The Code of Practice offers a consolidated reference for hydrogen fuel requirements, ensuring legislative clarity and compliance.

## 1:45pm Session Eleven

### Case Study: Hydrogen Leakage Safety Risks

**Satiesh Muniandy:** Principal Risk Engineer, *Draeger Australia Pty. Ltd.*

Hydrogen is an elusive gas with many unique characteristics making it challenging to manage. For starters hydrogen is 14 times lighter than air, has a large flammability range, odourless, burns with an invisible flame and can self-ignite due to its low ignition energy. A variety of processes, tools and technologies can be deployed to safely detect and manage hydrogen in the value chain.

Due to vast project execution experience in this field, we understand that every site is unique and poses various challenges and having the right subject matter experts involved early on in the design phase is critical to close the safety gaps. This presentation/paper will discuss the hierarchy of control for hydrogen and the technologies that can be deployed to safely manage hydrogen in the value chain. It will also contain lessons learned and the do's and don'ts based on real case studies.

## 2:30pm Session Twelve

### Critical Skills for the Energy Transition - Lessons from Experience

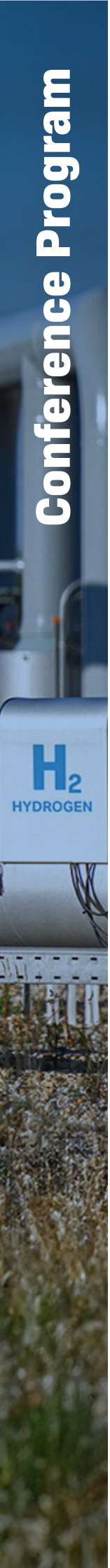
**Brian Inglis:** Director, *Inglis Consultants*

Technical training and competency are critical for safety and operational reasons, and more so now as we transition to a new energy industry future. A future that combines existing hazardous processes, new technologies, and a changing workforce mix.

Many of the traditionally trained, competent, and experienced workers will choose not to make the transition, and this combined with an already tight and reducing skilled labour market is a recipe for risk exposure and negative consequences.

This presentation provides some observations, learning's and tips from grey haired experience in operations and training roles in major hazard facilities and the process industry.

## 3:15pm Afternoon Tea




## 3:30pm Session Thirteen

### Ensuring Hydrogen Safety in Australia's Thriving Hydrogen Industry

**Scott Brownlaw:** *Standards Australia*

Australia is poised to become a prominent player in the global hydrogen market. With abundant renewable energy resources, a solid track record in energy exports (especially in coal and liquefied natural gas), and strategic geographical proximity to key trading partners like Japan and South Korea, the potential for growth in Australia's hydrogen economy is significant. However, as this industry expands, we must not overlook the crucial aspect of safety.

Despite our knowledge of hydrogen's explosive properties since its discovery, there has been limited focus on safety measures concerning large-scale hydrogen production, transportation, storage, and usage. To ensure the responsible growth of Australia's hydrogen industry and reduce our dependence on fossil fuel exports, it is imperative to establish robust safety standards and practices.

#### Hydrogen Safety Standards in Australia

Australia is actively developing international hydrogen safety standards through Standards Australia's participation in ISO (International Organization for Standardization) and IEC (International Electrotechnical Commission). Additionally, Standards Australia diligently monitors other standards development bodies to identify gaps and opportunities in hydrogen safety standards. The work of Standards Australia aligns with the ISO Technical Committee on Hydrogen Technologies (SC-197) through the Australia Hydrogen Technologies Technical Committee (ME-093).

As of now, Australia has adopted thirteen hydrogen-specific standards from international bodies (ISO and IEC), and Standards Australia has developed two hydrogen Technical Specification documents, and a hydrogen Technical Report. The standards cover various hydrogen aspects, including fuel quality, fuel cell technologies, storage, and transport (including metal hydrides), hydrogen generation methods (e.g., fuel and water electrolysis), detection equipment, fuelling stations, and basic safety protocols. Additionally, numerous Australian and Australia/New Zealand standards indirectly impact hydrogen use, such as gas safety, pressure equipment, gas and electrical installations, explosive atmospheres, gas-fired appliances, and gas testing. Furthermore, international standards extend to compression, pumps, vent systems, chemical handling, cryogenic storage, pressure swing absorption, liquid hydrogen storage, handling, distribution, technology codes, and fuelling protocols for heavy vehicles, including trucks.

The Australian hydrogen technical committee has recently updated its Strategic Work Plan for 2024-2026, which outlines the goals of four working groups: Production, Handling and Storage, Gas Liaison (pertaining to pipelines and applications), Fuel Cell Applications, and Mobility Use Applications.

#### HyStandards Project

In a collaborative effort with CSIRO, Standards Australia developed a visual and interactive tool known as "HyStandards." This tool serves as a central point of reference for hydrogen standards, aiming to facilitate the safe and effective operation of the hydrogen industry.

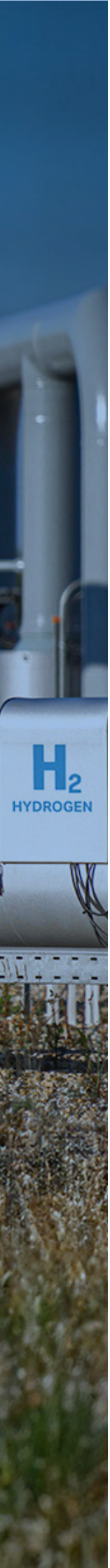
HyStandards has initially focuses on four key hydrogen scenarios: electrolyser production, gaseous hydrogen road transport, gaseous hydrogen pipeline transport and refuelling. It will expand to encompass additional scenarios as new standards are developed and evolving needs are identified. Access to HyStandards is given through CSIRO's Hydrogen Knowledge Centre website, where it provides essential guidance for adhering to hydrogen safety standards.

## 4:30pm Session Fourteen

### Boc's Expertise in New and Emerging Hydrogen Opportunities

**Shane Whalley:** Project Manager at BOC South Pacific,
*BOC Limited, a Linde company*

Hydrogen versus Battery... really? If you came to debate this then this is NOT the presentation for you. Moving away from the LinkedIn banter BOC (a Linde Company) aims to demonstrate real-world, in-operation technology that is providing an alternative option to emissions free transport as you are reading this. Covering the typical pieces that form a Hydrogen Refuelling Station (HRS), protocols that set limits on the refuelling process, key safety, design and operation considerations and if there is time, showing some nice images of existing HRS units in their natural habitat.

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