Hydrogen Safety – Mobility Webinar – 26 Oct. 2021

RSHQ responses to participant questions

Question	Response
Can this recorded session be shared as representatives from the FCAI and Australian Hydrogen Council are not on this session?	Yes, slides have been shared here The recording is available here
Are you considering odorizing for FCV and FC?	The Petroleum and Gas (Safety) Regulation 2018 requires that all fuel gas be odourised. RSHQ understand that current sulphur based odourants may impact the performance of fuel cells. The Hydrogen Safety Code of Practice (the Code) being developed is to provide principles and a means of compliance for leak detection when odourant is unable to be used.
Looking for any information on Hydrogen Bus in tunnel- any requirement to modify tunnel ventilation or any infrastructure before we start driving buses in tunnels.	Tunnel requirements are outside the jurisdiction of RSHQ. Please contact Transport and Main Roads for more information: https://www.tmr.qld.gov.au/Contact-us **13 QGOV (13 74 68)**
What is the relationship between GWA and GDAA?	A gas work authorisation (GWA) is granted under the *Petroleum and Gas (Production and Safety Act) 2004* (P&G Act) to authorise the holder, or an individual working under the holder's authority, to undertake gas work in relation to a gas device type B. For example, gas work to install a gas fuelled engine or gas device. A gas device approval authority (GDAA) is granted under the P&G Act to authorise the holder to undertake gas device approval work. Essentially, this is the design approval of a gas device so that it can be installed and used. All gas devices type B must be approved by a GDAA holder prior to their installation by a GWA holder. Typically, the installer (GWA holder) will seek device approval from the holder of a GDAA prior to a device being installed.

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Is the scope limited to hydrogen used as a fuel, what about hydrogen derivatives such as ammonia used as a fuel?	RSHQ understands that there may be additional carriers of hydrogen which may be used as a fuel e.g. ammonia. Currently carriers are not within the scope of the Petroleum and Gas legislation. Future policy review may consider substances that are used as fuel gases
Does code provide any information about minimum distance of H2 storage from sensitive use areas like child care and hospitals etc.	The Code will not mandate separation distances but require project proponents to take a risk-based design approach taking account of: • Hazardous chemical storage requirements under Work Health and safety legislation and • System design requirements under the Professional Engineers Act that require all engineering projects to be designed by a Registered Professional Engineer Queensland (RPEQ) QLD Work Health and Safety Laws QLD Professional Engineers Act The Code may provide reference to standards that provide guidance on separation distances.
I would suggest a design approval process similar to pressure vessels would be appropriate for fuel cells - can this be discussed?	RSHQ are still determining the method for approval of hydrogen systems and devices. As a gas device type B, a fuel cell is subject to the gas device approval process established under the P&G Act. The Code will include guidance for the approval of hydrogen fuel cells as a gas device type B. The approval process for gas devices can provide for consideration of existing design standards for fuel cells.
With Combustion side with Odorzing will we still have to have a hazard area done, and what approval system will we be working to on the gas valves? Like AGA Note: AGA are a conformity assessment body for Type A devices	RSHQ are still determining the method for approval of hydrogen systems and devices. The existing requirements for fuel gas train components will be similar to existing requirements e.g. AGA.
Would be good to know how QLD State Code 21 and the WHS plays in this, as they have requirements for separation distances.	RSHQ are working closely with other regulators such as Work Health and Safety Queensland to ensure the Code is aligned and any gaps or overlaps are identified. Work Health and Safety requirements, including State Code 21, still apply, where relevant, regardless of lead safety regulator. QLD Work Health and Safety Laws

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Is there any coordination with other states or on federal level? Are we going to have few different codes across Australia?	The Code is intended to provide guidance for complying with existing safety requirements under the P&G Act. RSHQ is actively collaborating with State and Commonwealth Government regulators and will make the draft Code available for their consideration.
Where will the requirement of holding a certificate III trade in plumbing in addition to a gas certificate and potentially hydrogen specialised qualification apply?	RSHQ understand a skilled workforce is required to enable a hydrogen economy Specific qualifications have not yet been identified. It is proposed that the Code will provide a pathway to obtain a gas work authorisation (GWA) for hydrogen. The approval of a GWA may consider workplace training and skills, OEM provided training etc.
Can a vehicle manufacturer be a GDAA?	A person may apply to the chief inspector for a gas device approval authority (GDAA). At a high level the applicant for a GDAA would need to demonstrate appropriate skills and knowledge that would support their capacity to undertake the technical assessment for approving the type of gas device. There is also provision for the Chief Inspector to approve gas devices. The existing framework of GWA and GDAA provides a peer review oversight, it may not be appropriate for a vehicle manufacturer to approve vehicles they produce. RSHQ is considering an alternate approach for hydrogen fuel cell approval. An option may be to provide an approval/acceptance from the Chief Inspector for fuel cells and fuel cell electric vehicles that are made to a recognised International or Australian Standard without need for a GDAA.
What will freight truck suppliers intending to manufacture vehicles with fuel cells need to do??? to ensure hydrogen quality will be fit for purpose for longevity and reliability for their products?	The Code will include information to inform proponents about what they need to do to comply with safety and quality requirements. The Code may prescribe a quality for hydrogen (e.g. AS ISO 14687).
What is the role of local council in terms of planning and approvals?	Local councils are the reference point for land planning and development approvals. Where the storage quantity of hydrogen is above the defined thresholds defined in Work Health and Safety legislation, Work Health and Safety Queensland also has a role in reviewing and approving the location from a safety perspective. These functions are currently outside the scope of RSHQ activities

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How will hydrogen be treated when used in Internal Combustion Engines - either spark ignited or compression ignition?	Gas devices type B, including combustion engines using fuel gas require approval by the holder of a gas device approval authority and any gas work on the engine needs to be undertaken by the holder of a gas work authorisation holder. See above for more information about a gas device approval authority and a gas work authorisation.
What is the perception of the current state of the art in modelling and probability data? This is probably more applicable to fixed installations rather than mobility.	RSHQ understand that work is underway to quantify the safety risks of hydrogen. RSHQ are members of a number of organisations such as the Future Fuel Cooperative Research Centre (FFCRC), who are actively involved in this research. The Queensland Government has commissioned modelling of liquid hydrogen releases to inform safety requirements for liquid storage facilities. RSHQ will use findings of this research to inform the parameters for practitioners that need to meet safety requirements in the P&G Act.
Has the accuracy of H2 dispensing devices been resolved to work within Australian fiscal metering accuracy requirements? Recently European devices with accuracies of 2% were being touted whereas Australian weights and measures requirements are nearer to 1%.	The Code aims to inform proponents about what they need to do to comply with safety requirements. Meter accuracy requirements also apply and proponents need to ensure consumers are not disadvantaged.
With Standards, can we use the UK IGEM gas standards for guidance?	The intent of the Code is to leverage International Standards where gaps in Australian Standards exist. RSHQ is working with Standards Australia to ensure the Code captures the latest adopted standards.
Will there be a size limitation on these requirements? Or an R&D exemption. As a university we have small scale hydrogen production such as 2kW electrolysers and 5 watt fuel cells in our labs, will this constitute operating plant?	Safe development of hydrogen applications is important for the growth of the hydrogen industry. RSHQ understands that research and development requires flexibility in to test new concepts. The Code will include guidance about the use of hydrogen which could include a reference to international standards that provide guidance of hydrogen when it is used in laboratories operation. While hydrogen production is outside the scope of the Code and the electrolyser and fuel cells referenced would not constitute operating plant under the P&G Act, fuel cell approval and safety conditions would apply. Safety conditions may include requirements for an RPEQ engineer design for safe operation.
Are there any considerations yet for the use of liquid hydrogen on-board vehicles?	Both gaseous and liquid hydrogen are fuel gas under the P&G Act and will be provided for in the Code. In the absence of a standard for liquid on-board vehicles, requirements for an RPEQ design would apply.

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Should there be an upper limit on the amount and/or pressure of hydrogen on an FCV, considering risk in residential areas?	RSHQ understand this is the subject of international research. The Code may reference International Standards and proven OEM experience (e.g. Toyota, Hyundai).
Does the Petroleum and Gas Inspectorate cover hydrogen as a fuel additive/enhancer where there is no refuelling station, but does have compressed cylinders on-board?	RSHQ has considered this arrangement and is of the view that if the hydrogen is added at a level above the lower explosive limit then it is fuel gas and would be within the jurisdiction of the Petroleum and Gas Inspectorate.
How does the LAVO system fit in with the code of practice?	RSHQ understand that there are new concepts for gas systems in development such as the Lavo system. It is intended that the Code will provide inform practitioners of these systems of the safety requirements and how compliance with them can be achieved.
Is there a threshold storage volume at which a hydrogen station or facility becomes a major hazard facility as in WA?	Schedule 15 of the Work Health and Safety Regulation 2012 provides guidance on major hazard facility quantities and threshold limits.
With hydrogen being injected in the main natural gas line what will be the maximum % being injected in the pipe lines and how will this be regulated to maintain the right %?	RSHQ understand that blend limits into a pipeline or network will be determined through a suitability assessment of both the pipeline and the downstream users. Ensuring the blend is controlled within the determined limits will be the responsibility of the party who is managing the injection. Natural gas pipelines are 'operating plant' under the P&G Act and are regulated by the Petroleum and Gas Inspectorate who routinely undertake audits and inspections to determine compliance with safety requirements and standards. Initial projects are proposing to maintain the gas within the Natural Gas specification in AS 4564:2020 General-purpose Natural Gas (AS 4564), which allows for approximately 10% H2 addition.
What is the moisture level acceptable in hydrogen refuelling?	AS ISO 14687:2020 Hydrogen fuel quality – Product specification provides guidance on hydrogen quality requirements including moisture content.
50T is equivalent to approx. 700 m3 vessel in liquid form	N/A
Coriolis meters can measure hydrogen dispensing to better than 1% and potentially better than 1/2%	N/A
With 100% hydrogen, flame rod does not work, all hot water unit use ironizing flame detection, have we have a solution for this?	RSHQ understand the properties of hydrogen may impact the performance of devices. This will need to be taken into account in the design phase. While RSHQ has no role in the design of gas appliances, it administers the gas device approval framework which incorporates an assessment of device safety and performance.

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Did any lessons come out of the recent hydrogen incident in the Qld power station?	This incident occurred at a coal fired power station where hydrogen was used as a coolant. RSHQ is not aware of any lessons learned relating to hydrogen.
I'm working with an ASX 200 listed company to implement a hydrogen fuel cell passenger ferry. Could some one explain the approval process that will need to be followed, e.g. how would we find a GDAA	RSHQ is developing the Code to provide this information in relation to hydrogen safety approval requirements. Requirements for approving and working on hydrogen systems and devices (e.g. ferries) is yet to be finalised. It is likely that requirements equivalent for other for gas devices type B would apply including: • the approval of a gas device type B (includes fuel cells) by the holder of a gas device approval authority (GDAA) • installation of the device would be undertaken by the holder of a gas work authorisation RSHQ is considering an alternate approach for hydrogen fuel cell approval. An option may be to provide an approval/acceptance from the Chief Inspector for fuel cells and fuel cell electric vehicles that are made to a recognised International or Australian Standard without need for a GDAA
What are the real concerns with FCV hydrogen bus in a tunnel? Amount of fuel is small in comparison to NGV and diesel?	Tunnel requirements are outside the jurisdiction of RSHQ. Please contact Transport and Main Roads for more information: https://www.tmr.qld.gov.au/Contact-us **13 QGOV (13 74 68)**
In regard to leak detection systems we need to think about the storage / parking of H2 vehicles. i.e. at home in a closed garage or in a underground carpark where a leak could be a major risk.	Leak detection and management is a key safety consideration in the development of the Code. RSHQ understand that some international standards provide guidance on parking garages and repair garages. The P&G Act provides for safety requirements in relation to gas systems and devices. The Code will set out requirements for systems and devices supplied by unodourised fuel gas and the ways in which compliance with these requirements can be achieved.
Note - fantastic opportunity for lessons learned - ref PHD and prior work. Examples from the UK experience which Australia could leverage and build on.	RSHQ notes there is significant international experience in hydrogen safety. RSHQ are a member of the FFCRC, FFCRC are closely linked with UK projects and regularly share learnings
Western Australian Government's *Storage and handling of hydrogen - information sheet* provided Hydrogen Information Sheet	N/A

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Approval of H2 vehicles - how will this be managed moving forward (ref existing approvals are bespoke ref Mirai etc.)? Clarity is needed about the difference between OEM v modifications.	Currently, there are only a few approved devices in operation in Queensland. The Code aims to provide information about how compliance can be achieved for mass produced systems e.g. a hydrogen passenger vehicle.
Technicians working on H2 vehicles in Australia described their approach to manage technician training in Australia - reference to German and Korean operations.	Technicians working on hydrogen vehicles will be required to hold a gas work authorisation or have the appropriate qualifications and experience to work under a company gas work authorisation. RSHQ is collaborating with national and state entities on technical qualifications so that specific hydrogen related requirements can be included in the gas work authorisation application process.