



Review of Hydrogen Regulation Industry Consultation: Information for seminar and survey participants

Introduction

The National Hydrogen Strategy at action items 4.1 – 4.4 committed the Commonwealth and State and Territory Governments to the coordinated review of Australia's legal frameworks to assure hydrogen safety and industry development.

A Commonwealth, state and territory working group, the Legal Frameworks Review Working Group (the Working Group) was established for the purposes of conducting the review and developing recommendations to the Energy Ministers Meeting (Commonwealth, state and territory energy ministers) regarding options for regulatory reform, including national consistency where possible.

The Commonwealth, state and territory coordinated review was based around a regulatory map that identified all activities associated with six archetypal hydrogen projects and mapped them to likely interactions with all Commonwealth, State and Territory legislative instruments.

A significant number of instruments have been identified as posing a regulatory barrier or gap, or which could be amended to improve regulatory efficiency/red tape reduction and/or provide for the introduction of enabling regulatory mechanisms to assure an internationally competitive Australian hydrogen industry and support Australia's net zero-emissions by 2050 target.

The Working Group has, ahead of industry consultation, conducted consultations with more than 100 Commonwealth, state and territory policy and regulatory officials on the outcomes of the coordinated regulatory maps to identify regulatory gaps and barriers and potential options for achieving national consistency in any proposed reforms.

Regulatory barriers have been identified in the following categories:

- a. **GAPS:** regulatory gaps where hydrogen should be regulated for safety reasons, but currently isn't regulated at all, or where appropriate standards for hydrogen are not in place to inform best practice and consistent regulatory decision making;
- b. **TRANSPARENCY:** regulatory transparency where the application of existing legislation to the hydrogen industry is unclear creating regulatory approval, compliance and enforcement delays;
- c. **UNCERTAINTY:** regulatory uncertainty where the application of existing legislation to the hydrogen industry is creating the need for 'novel' regulatory approval processes, and where the onus is on the proponent to demonstrate that regulatory approval should be granted in the absence of specific guidance from the regulator about what will be accepted.
- d. **DUPLICATION:** differing regulatory regimes between states and territories where hydrogen industry projects will cross state boundaries resulting in multiple different approval processes for the same activity.

The preliminary scope of the areas of the hydrogen supply chain most affected by identified regulatory barriers, and which may be amenable to reform or development to address gaps or improve efficiency, and which may be amenable to a nationally consistent approach include:

Hydrogen production – regulation of hydrogen production may provide the opportunity for hydrogen specific safety regulation. Safety regulation has otherwise been developed in the context of mining and petroleum and is not necessarily appropriate and adapted to hydrogen, and sits in a range of different legislative instruments not developed with hydrogen in mind.

Hydrogen refuelling station safety – there are currently, at the regulatory level, no agreed standards for the equipment, storage and dispensing of hydrogen in a hydrogen refuelling station. Existing regulatory frameworks for petrol stations, or major hazard facilities are not appropriate and adapted to the specific safety issues associated with hydrogen. A number of international jurisdictions, trading partners and competitors, have already developed specific hydrogen refuelling national laws and safety codes. It may be possible to improve the transparency and certainty of the construction and operation of hydrogen refuelling stations, and improve safety and ensure social license without wholesale regulatory reform by developing a national model code of best practice.

Transport sector (vehicles) and (vessels) – there are currently no agreed standards for the certification of vehicles and vessels against safety standards for hydrogen fuel cells, and gaps in dangerous goods legislation about carrying hydrogen as a cargo. This is forcing the use of ‘novel’ regulatory compliance processes. It may be possible to fast track adoption into relevant legislation some fuel cell standards and prioritise collaboration and information sharing of demonstration projects where agreed certification standards are not yet readily available.

Hydrogen industry appliances - There are different regulatory approval processes in each state or territory for appliances that are central to the growth of the hydrogen industry (for example electrolyzers, mobile fuel cells). In each jurisdiction, regulatory frameworks are not appropriate and adapted to hydrogen appliances, which do not sit neatly in traditional appliance regulatory frameworks. It may be that safety standards and approval processes could be developed in a national model code without the need for wholesale regulatory reform.

Provision of regulatory guidance to industry and investors – Whilst not targeting a particular regulatory issue, publishing a regulatory map to facilitate regulatory transparency, pending broader, and more time-consuming regulatory reform options may be of benefit to industry. Many of Australia’s trading partners have already produced a regulatory map and this would ensure Australia’s competitiveness.

We are now seeking industry views on proposed areas for reform, priority and preferences for hydrogen specific regulation and national consistency.

At this time it is likely that recommendations that are provided to energy ministers for regulatory reform options will be provided at the in-principle level, and as such, any recommendations that are accepted will be returned to industry for detailed consultation, including regulatory impact statements, following agreement from Energy Ministers to progress particular identified areas.

Hydrogen Production

The regulation of a hydrogen production facility would include specific regulatory approvals for production per se, as well as instruments that may find ‘regulatory efficiency’ in co-location/consideration with production facility regulation.

Legislative Framework

States and territories have responsibility for most regulatory frameworks that would regulate a hydrogen production facility:

- Construction including; land planning and environment, Environmental Protection Agency, and
- Operation including; environment and planning compliance, storage and pipeline, and WHS.

Commonwealth regulation which has the potential to intersect with hydrogen production regulation at the state and territory level:

- fuel quality, fuel measurement, emissions accounting
- export rules and documentation
- National security, including energy security, critical infrastructure and economic security
- Safety of industrial chemicals

Economic and hydrogen supply chain background

Significant financial commitment has been made by federal and state governments to 'hydrogen hubs' which include hydrogen production facilities at scale. While hydrogen has been produced commercially for many years, it has not been produced in the locations and at the scale now predicated by the Hydrogen Hubs Grants Program. Scale and location significantly change the planning and environment risks mitigated under the existing legislative regimes.

Regulatory issues: gaps, transparency, clarity, duplication

- No jurisdiction has a single or clear regulatory pathway for the approval of a hydrogen production facility. Jurisdictions largely rely on 'administrative practice' and a combination of regulatory frameworks. Relevant frameworks may include, depending on the jurisdiction: Major Hazard Facility, major projects legislation, environmental protection legislation, among others.
- To ensure that Major Hazard Facility (MHF) regulation is fit for purpose for hydrogen production in a range of contexts now anticipated by the industry, some consideration may have to be given to MHF thresholds in different hydrogen production contexts, such as refuelling, and whether in different contexts of lower storage volumes, MHF regulation is the most appropriate and adapted.
- Planning Acts in most jurisdictions have gaps in relation to building standards for hybrid or multipurpose constructions where there is a novel combination of chemicals, hazardous areas, electrical and mining.
- There is no specific accreditation/licencing of workers for particular hydrogen applications, this is in contrast to other substances with identified safety issues.
- Hydrogen quality (purity) is determined at the production stage. Hydrogen purity is necessary at the 'labelling' and use level and, if hydrogen is to be dealt with consistent with other substances, new regulation will be necessary.
- There are no agreed standards in place for either hydrogen or ammonia for pipeline safety.
- Hydrogen when burned is a zero emissions fuel. However, un-combusted hydrogen that escapes into the atmosphere contributes to the greenhouse effect.
- Disposing of brine, created by desalination / waste water plants, for hydrogen production is the most significant environmental regulatory issue with regards hydrogen production. It is noted that environmental approval for waste water disposal may take up to a year. Nationally consistent standards for waste water from hydrogen production could alleviate time delays, and environmental concerns.

Hydrogen Refuelling Stations

The regulation of hydrogen refuelling stations relates to both the construction and operation of a hydrogen refuelling station (HRS), including:

- Planning and Environment regulation for refuelling facilities;
- Bunkering (storage facility);
- Hydrogen fuel cell bowser or dispensing equipment safety regulation and standards;
- Fuel quality standards, weights and measures standards.

Legislative Framework

States and territories have responsibility for the majority of planning and environment approvals and regulation associated with the construction and operation of refuelling stations.

The Commonwealth has legislation that covers the field in respect of fuel quality (emissions); fuel measurement; fuel security; fuel excise.

Economic and hydrogen supply chain background

Significant financial commitment has been made by state governments which have various market approaches for refuelling stations along the Hume Highway set to commence in mid 2023. Non-public refuelling stations are currently operating in three jurisdictions.

Regulatory issues: gaps, transparency, certainty, duplication

- The States and Territories take different approaches to the regulation of petrol stations, and variably use WHS, Major Hazard Facility, Dangerous Goods legislation and petrol station specific licenses.
 - Under current Major Hazard Facility (MHF) regulation hydrogen refuelling stations are unlikely to be categorized as Major Hazard Facilities (or their equivalent), due to volume storage thresholds. This means that a regulatory tool that can manage novel, or circumstantial safety issues is not available to regulators for hydrogen refuelling station approvals.
 - The pressure (300-700 Bar) at which hydrogen is stored (which is substantially higher to other fuels) means that usual approaches to petrol station safety regulation is not appropriate and adapted to hydrogen refuelling stations. Concerns are that existing safety regulation with respect to Major Hazard Facilities, where it would be caught, would impose a higher regulatory burden that might otherwise be necessary if bespoke rules for hydrogen were developed.
 - As the risks and standards (where they exist) are substantially different refuelling stations are/will be assessed on novel tracks. Novel tracks create compliance uncertainty, regulatory approval delays and increase costs: For example:
 - Planning approval for site permission where there are no agreed standards about extent of debris fields from pressure vessel failure and exclusion zones creates uncertainty for planners about providing site approval.
 - A hydrogen bowser is an appliance that requires approval to operate, but there is no regulatory clarity about whether it is an electrical or gas appliance and confusion regarding where it would sit in existing regulatory frameworks, and who has the expertise to provide compliance advice.
 - Hydrogen purity is required to be determined for safe operation in a fuel cell. There is no labelling or certification standards in place for hydrogen bowsers dispensing hydrogen.
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Transport: Vehicles

Transport (vehicle) regulatory review covers the construction/certification and operation of hydrogen and ammonia fuelled vehicles as well as the carriage of hydrogen and ammonia as a cargo in road transport vehicles.

Legislative Framework

The States and Territories and the Commonwealth do not have a clear regulatory split. Regulatory issues within state jurisdiction include heavy vehicle standards (model law), standards for the handling and transport of dangerous goods (model law) and the registration and licensing for the operation of vehicles.

The relevant Commonwealth legislation applies to vehicle standards and fuel quality. The Australian Design Rules, (made under the Road Vehicle Standards Act 2018) regulate standards for the importation of vehicles. This is the only example of where the Commonwealth exercises its import regulatory authority for the purposes of specifying minimum Australian standards before a machine can be imported. It is not exercised for any other hydrogen plant or equipment or appliance.

Economic and hydrogen supply chain background

Significant financial commitment has been made by several state governments with current market approaches for the delivery of refuelling stations by 2023. Non-public HRS are currently operating in 3 jurisdictions under novel regulatory processes. Market analysis is providing that hydrogen is at, or close to, price parity with diesel. Hydrogen is a zero emissions fuel replacement in a high emitting sector that is not, particularly in the heavy vehicle sector, amenable to electrification. This means that we must regularise the importation of vehicles that have fuel systems suitable for hydrogen use to enable the take-up of hydrogen as a zero emissions fuel.

Regulatory issues: gaps, transparency, certainty, duplication

Vehicle safety standards

- There is no regulation at either commonwealth or state level which regulates hydrogen emissions from fuel cells. There is probably no need to regulate hydrogen fuel like other traditional fuels for emissions standards when combusted, given it is a zero emissions fuel when combusted in internal combustion engines. However, hydrogen leakage of un-combusted hydrogen into the atmosphere is an emissions issue, and may need to be regulated. Nitrogen Oxides (NOx) emissions from hydrogen/diesel blends or ammonia in internal combustion engines may need to be regulated.
- Hydrogen fuel quality (purity) is a regulatory gap that will need to be addressed as the known quality level of hydrogen is necessary for the safe operation of a fuel cell. This is also related to labelling laws which will also have to be addressed in conjunction with regulation that identifies fuel purity certification/regulation.
- There is currently no standard pathway to import a hydrogen fuel cell passenger vehicle as the existing regulatory instrument has not adopted the relevant international standard.
- Cannot currently import in a regularised manner a hydrogen fuel cell heavy vehicle as the National Heavy Vehicle Law does not have standards in place for heavy vehicles as it relates to the particularities of hydrogen fuel cells.

Cargo safety standards

- Transport of dangerous goods code presents a regulatory gap and it is not appropriate and adapted to the scenarios now being considered by the hydrogen industry. Transport of hydrogen and

ammonia is not well established and while ammonia production has occurred previously, it is on a significantly different scale and in different locations. In a regulatory and safety standards sense, hydrogen and ammonia transport occurring at scale and in different places means that there are not appropriate and adapted regulations in place to address the specific safety issues that are novel to hydrogen and novel to hydrogen at scale.

- Skills and accreditation to drive and operate dangerous goods are necessary. Accreditation is required by the existing legislation, however there is no relevant standards to assess hydrogen against. This means that industry has a regulatory compliance obligation, but is unsure how to meet it. As it relates to human health and safety, this is a high priority area. Training in regard to emergency management for road vehicle accidents is absent protocols and standards.

Transport: Vessels

The transport (vessel) regulatory review relates to the construction/certification (vessel design standards) of hydrogen and ammonia fuelled vessels as well as the carriage of hydrogen and ammonia as a cargo in vessels (carriage of dangerous goods in vessels).

Legislative Framework

As a consequence of referral of powers by the states and territories for domestic vessels, Commonwealth legislation relates to vessel standards and cargo regulation - Marine Safety (Domestic Commercial Vessel) National Law Act 2012 (cth). The Commonwealth also otherwise has legislation which regulates fuel quality and tax/incentives schemes as they relate to fuels used by vessels.

Economic and hydrogen supply chain background

There is significant interest and commercial viability in maritime decarbonisation both in respect of the blue water fleet and domestic vessels. As an otherwise hard to electrify sector, it is already an early mover in the use of green hydrogen, and green methanol. Maersk, one of the world's largest shipping fleets, has announced its commitment to decarbonisation through its use of hydrogen/methanol. Domestic vessels where proponents have commenced feasibility on projects include tugs, tenders and tourism and fishing operators.

Regulatory issues: Gaps, Transparency, clarity, duplication

- There are no published standards, under the National Commercial Vessels Standards, which the certification rules (Regulations) rely on to certify :
 - Hydrogen powered vessels;
 - Hydrogen carrying vessels;
 - Ship-to-Ship refuelling where the fuel is hydrogen fuel;
- This requires a novel regulatory process to be undertaken, increasing actual safety risk and in cost and time required to achieve regulatory compliance. For example, it currently takes 6 months and \$30,000 to achieve vessel certification for a traditional fuel vessel, but \$500,000 and more than two years for a hydrogen fuelled vessel. As the proponent is the entity that pays for the independent assessment of safety, that knowledge and information cannot therefore be applied to the next novel certification application.

Hydrogen Appliances

Hydrogen ‘appliances’ is the general term we are adopting to include all ‘appliances’, or ‘plant’ or ‘equipment’ that is used for production, use and consumption of hydrogen. Some examples of hydrogen appliances include: catalytic reactor gas devices, combustion gas devices, and fuel cell gas devices, electrolyzers, mobile fuel cells and hydrogen fuel bowsers.

Legislative Framework

Appliances are regulated under specific legislation that relates to either electrical and gas appliances, and the WHS legislation. This approach differs in each jurisdiction.

Regulation includes both approval for use and installation. Regulation includes certification for both certifiers (regulatory approvals) and installers (for example gas fitters, plumbers). While the Commonwealth could regulate some hydrogen appliances, either through customs/import controls, or potentially the Greenhouse and Energy Minimum Standards Act 2012, it currently does not capture any identified hydrogen appliance and all regulatory frameworks sit within jurisdictional regulatory frameworks.

Economic and hydrogen supply chain background

Hydrogen appliances underpin the ability of the industry to get to scale. Electrolyzers, which make hydrogen, are one of the appliances that importers, and Australian companies planning to manufacture electrolyzers onshore, need clear regulatory approval pathways for. Similarly, electrolyzers are one of the appliances which regulators in each jurisdiction have identified as having regulatory uncertainty, and no agreed standards in place.

Regulatory issues: gaps, transparency, clarity, duplication

- In each jurisdiction there is a different approach to appliances, in what legislation they sit, how they are categorised, how they are approved in administrative arrangements sense. For example, in some legislation, some types of ‘appliances’ are referred to as appliances, whereas in another jurisdiction that same appliance will be referred to as ‘plant’ or ‘equipment’ and will be regulated under a different type of regulatory instrument. For example, WHS laws instead of appliance specific laws.
- For a hydrogen industry proponent importing appliances, or operating across jurisdictional boundaries this causes uncertainty and delays in approvals and higher costs of doing business.
- Hydrogen appliances are different to the traditional categorisation of appliances. There is confusion among regulators who are either ‘gas’ appliances or ‘electrical’ appliances about who should be responsible for hydrogen appliances, such as an electrolyzers or mobile fuel cells. This slows down regulatory approval processes and acts as an effective barrier to market entry. This is even more difficult for novel hydrogen appliances, eg hydrogen fuel bowsers, or applications such as the Lavo unit (a combined electrolyser and hydrogen fuel cell), or a ‘Hero’ unit (industrial heating using a catalyst)
- The gas characteristics of hydrogen are fundamentally different to other gases. These differences include combustion speed, explosiveness, fugitive emissions, and embrittlement (where hydrogen reacts corrosively with some metals).
- This requires different safety standards and technical specifications to be in place for hydrogen appliances, even where they are not a novel appliance and are already an approved gas appliance. Appliances require re-certification when the gas fuel is amended, irrespective of the blend rate.
- Trade accreditation to install appliances is attached to existing categorisation. Accreditation on plumbers and electrician licenses is for the purposes of safety. Transfer of these accreditations between jurisdictions (mobility of trades) is also problematic. Categories of people who require

accreditation under regulatory frameworks potentially include regulators, first responders, project proponents, appliance manufacturers, gas fitters, electricians, and mechanics.

Further Information

Website: [Growing Australia's hydrogen industry – Improving Hydrogen Regulation](#)

Contact

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Acknowledgement of Country

We acknowledge the Traditional Custodians of Australia and their continuing connection to land and sea, waters, environment and community. We pay our respects to the Traditional Custodians of the lands we live and work on, their culture, and their Elders past and present.

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