# An effective regulatory framework for Queensland's hydrogen industry

Consultation paper

# Contents

# Acknowledgement of Country

In the spirit of reconciliation, the Queensland Government acknowledges the Traditional Custodians of Country throughout Queensland and their connection to land, sea and sky.

We pay our respects to their Elders past, present and emerging and extend that respect to all Aboriginal and Torres Strait Islander people today.

The Queensland Government acknowledges the continuous living culture of First Nations Queenslanders – their diverse languages, customs and traditions, knowledge and systems.

The Queensland Government is committed to ensuring First Nations people and communities benefit from the development of a hydrogen industry in Queensland. As we work towards this, the Queensland Government is committed to genuine partnerships and meaningful engagement with Queensland's First Nations people.

# Help shape Queensland's hydrogen industry

Growing a safe, sustainable hydrogen industry is a key action in the *Queensland Energy and Jobs Plan* which outlines a clear pathway to transform Queensland's energy system to deliver clean, reliable and affordable renewable energy. The Queensland Government is seeking feedback from the hydrogen sector and the broader community on the development of Queensland's hydrogen industry.

Your feedback will guide the process as we build an industry that is:

- sustainable
- safe
- provides economic, environmental and community benefits for all Queenslanders.

This consultation paper provides:

- an outline of the current regulatory environment
- an overview of the regulation barriers, issues and opportunities
- potential options for reform
- opportunities to support effective regulation of the hydrogen industry as it evolves.

Questions have been included throughout the paper seeking feedback on all of the above topics. If you have additional feedback on the regulation of the hydrogen industry, this is also welcome as part of this consultation.

## Have your say

1. Read the consultation paper.
2. Provide your feedback by either:
    a. filling out the online survey
    b. uploading a written submission.

Consultation closes at 5pm on Friday **1 March 2024**.

For more information on the consultation visit qld.gov.au/hydrogenreform or if you have any questions please email haveyoursayhydrogenqld@epw.qld.gov.au.

All feedback submitted via this consultation will be considered in the analysis of reform options and their impacts, prior to any regulatory changes.

The timing to implement preferred options identified through this consultation may vary according to the priority and complexity of the issue. A phased approach may be taken to implement regulatory reforms.

As the hydrogen industry develops over time, it is likely that further issues will emerge, requiring further legislative amendment.

# 1. Introduction

## Queensland's hydrogen opportunity

Global demand for hydrogen is growing rapidly.

Countries including Japan, South Korea, Singapore, and those in the European Union, are putting in place ambitious hydrogen targets underpinned by significant funding commitments. The International Energy Agency, in its *Global Hydrogen Review 2023*[1] report, suggests that global hydrogen demand could increase five-fold to 470 mega tonnes per annum by 2050.

The Queensland Government has long recognised the significant opportunity renewable hydrogen presents in transforming our energy system and securing a broad range of local industries and opportunities within an increasingly decarbonised global economy.

Queensland's abundant solar and wind resources, large areas of land, deep water ports and state-owned energy generation assets, as well as our highly skilled and experienced workforce, positions us well to secure the opportunities presented by hydrogen. The development of a world-class, commercially viable renewable hydrogen industry has the potential to support thousands of jobs, significant economic growth, new infrastructure, and emissions reduction.

The release of the Queensland Hydrogen Industry Strategy 2019-2024[2] was the first step in the state's commitment to developing a sustainable hydrogen industry; highlighting our unique competitive advantages, and positioning Queensland as a significant potential hydrogen trading partner.

In Queensland there is increasing interest from local and global hydrogen proponents seeking to establish large scale production for export markets, with over 50 hydrogen projects currently underway across the state. These projects range in size and scale and are a mix of domestic applications from trialling of hydrogen trucks and buses to international renewable hydrogen export projects.

Growing a safe, sustainable hydrogen industry is a key action in the *Queensland Energy and Jobs Plan*[3] (the plan), which outlines a clear pathway to transform Queensland's energy system to deliver clean, reliable and affordable renewable energy and to support industries to decarbonise.

## What is hydrogen

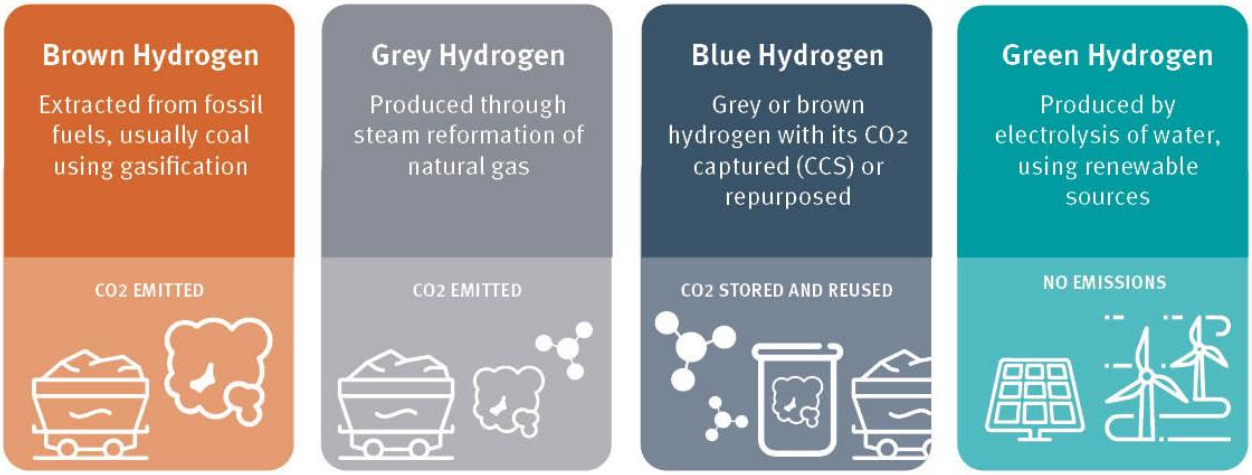
Hydrogen has been used in Queensland industrial processes for decades, including ammonia synthesis for fertiliser manufacturing.

While hydrogen has traditionally been produced locally from fossil fuels – so called 'brown or grey hydrogen'– there is growing global interest in hydrogen produced from renewable energy sources and other zero emissions pathways to meet global decarbonisation commitments. Blue hydrogen is produced from natural gas using steam methane reforming or from coal using gasification coupled with carbon capture technology. Green hydrogen is produced by using renewable energy sources, such as solar or wind power, to split water into two hydrogen atoms and one oxygen atom through a process called electrolysis.

[1] International Energy Agency, 'Global Hydrogen Review 2023' https://iea.blob.core.windows.net/assets/8d434960-a85c-4c02-ad96-77794aaa175d/GlobalHydrogenReview2023.pdf.

[2] Queensland Government, 2019, 'Queensland Hydrogen Industry Strategy 2019-2024', Department of State Development, Manufacturing, Infrastructure and Planning, 2019/05, https://www.statedevelopment.qld.gov.au/__data/assets/pdf_file/0018/12195/queensland-hydrogen-strategy.pdf.

[3] Queensland Government, 2022, 'Queensland Energy and Jobs Plan' Department of Energy and Public Works, 2022/09, https://www.epw.qld.gov.au/energyandjobsplan, accessed August 2022.




To transport hydrogen at scale, particularly for export, it needs to be converted to products that are higher in energy density. These are known as hydrogen carriers and may include liquefied hydrogen, which is formed by chilling hydrogen to approximately -253 degrees Celsius or by chemical conversion to substances such as ammonia, methylcyclohexane or other liquid organic chemicals.

## Queensland Energy and Jobs Plan

The Queensland Government is committed to net zero emissions by 2050 and has made an interim commitment to reduce economy-wide emissions by 30 per cent below 2005 levels by 2030 and 75 per cent by 2035.

The plan sets a path for the transformation of Queensland's electricity system to deliver clean, reliable, and affordable energy[4]. It includes a range of actions to decarbonise the existing system and support the growth of emerging industries like renewable hydrogen and critical minerals. The plan also commits to 70 per cent renewable energy by 2032 and 80 per cent by 2035.

The plan focuses on Queensland's overall clean energy transformation and provides a range of actions including commitments to:

- create a $4.5 billion Queensland Renewable Energy and Hydrogen Jobs Fund to support publicly owned businesses to invest in renewables, storage, and network infrastructure
- release the draft *Regional Energy Transformation Partnerships Framework* to maximise the local benefits from clean energy driven by the plan
- develop a draft *Queensland Renewable Energy Zone (REZ) Roadmap*, which identifies three regions for developing REZs in Northern, Central and Southern Queensland. These areas have high quality renewable resources, such as strong wind and solar, which can be developed in a coordinated way to achieve Queensland's renewable energy targets.

To achieve the ambitions of the plan, the Queensland Government released the Queensland *SuperGrid Infrastructure Blueprint*[5] which sets out the optimal infrastructure pathway to develop and connect large-scale solar and wind projects across the state and unlock new renewable capacity and storage to decarbonise existing loads and meet future demand. This will enable Queensland to build a SuperGrid by 2035 with zero regular reliance on coal fired power.

[4] Ibid.

[5] Queensland Government, 2022, 'Queensland SuperGrid Infrastructure Blueprint' https://www.epw.qld.gov.au/__data/assets/pdf_file/0030/32988/queensland-supergrid-infrastructure-blueprint.pdf.

The Queensland Government has introduced into Parliament the Energy (Renewable Transformation and Jobs) Bill 2023 to legislate renewable energy targets, advisory functions, the Job Security Guarantee, and key enabling mechanisms like the REZ framework and Priority Transmission Investment framework to deliver the required energy infrastructure to build the SuperGrid. The Bill has been referred to the Transport and Resources Committee for examination.

## Action 1.6: Grow the future renewable hydrogen industry

The plan continues to bring focus to the opportunities presented by hydrogen. It recognises hydrogen's potential to grow demand for renewable energy, support domestic decarbonisation of local industries, and create the opportunity to export Queensland's renewable resources to the world.

Action 1.6 of the plan recognises the importance of displacing natural gas with hydrogen in the short term to provide lower emissions gas, with the long-term objective to shift towards renewable hydrogen for deep energy storage, such as through hydrogen-fired gas peaking power generation.

The plan outlines a range of actions to support the growth of Queensland's hydrogen industry. These actions include:

- providing $15 million to supercharge, coordinate and further plan for renewable hydrogen hubs in key locations across the state such as Gladstone, Townsville and Abbot Point
- investing in a new 200 megawatt hydrogen-ready gas peaking power station (that is a power station that generally runs only when there is a high demand for electricity in order to balance the grid), at Kogan Creek from the Queensland Renewable Energy and Hydrogen Jobs Fund by CS Energy in partnership with Iberdrola
- updating the Queensland Hydrogen Industry Strategy, including investigating the potential for hydrogen gas target/s
- $5 million to support a range of programs to ensure communities are aware of the uses and benefits of hydrogen as the industry develops at scale.

Importantly, Action 1.6 also includes a commitment to prepare legislation to support effective regulation of hydrogen development and use. Likewise, the *Queensland Hydrogen Industry Strategy 2019-24*[6] committed to evaluate Queensland's regulatory environment and undertake reforms required to streamline a safe and sustainable development of the hydrogen industry.

These commitments are in line with recommendations from the International Energy Agency (IEA), which called on governments to "quickly address regulatory barriers, particularly for project licensing and permitting" in their *Global Hydrogen Review 2023*[7]. The IEA noted that governments "should work to make licensing and permitting processes as efficient as possible and to improve co-ordination among different authorities involved in the process, to minimise their significant impact on project lead times."

[6] 'Queensland Hydrogen Industry Strategy 2019-2024' https://www.statedevelopment.qld.gov.au/__data/assets/pdf_file/0018/12195/queensland-hydrogen-strategy.pdf.

[7] 'Global Hydrogen Review 2023' https://www.iea.org/reports/global-hydrogen-review-2023.

# 2. Purpose of this paper and objectives for reform

## Purpose

Queensland's existing hydrogen industry regulatory frameworks have been analysed and reviewed in the development of this paper and potential options for reform have been identified. This process included literature reviews, jurisdictional analysis, and consideration of stakeholder feedback obtained through a range of industry engagements sessions.

This paper sets out:

1. the current regulatory environment applicable to hydrogen industry development
2. the potential barriers, issues, and opportunities for effective regulation of hydrogen industry development
3. the potential options for reform (including maintaining the status quo) to address barriers, issues, and opportunities to support effective regulation of the hydrogen industry as it evolves.

The intent of this paper is to seek public feedback on key areas of reform to ensure regulatory settings support the hydrogen industry to develop safely and efficiently, as well as deliver economic, environmental and community benefits for all Queenslanders.

Questions have been posed throughout the paper to seek feedback. These conversation starters include options for reform; however, a combination of options could be introduced to respond to any barriers, issues or opportunities identified through this consultation.

Feedback on other matters related to the regulation of the hydrogen industry that may not have been identified in this paper is also welcomed.

When the consultation period is closed, all feedback will be considered in the analysis of relevant reform options and their impacts prior to the progression of any regulatory changes. The timing for implementation of the preferred options may vary according to the priority and complexity of the issue and a phased approach to implementation of regulatory reforms taken.

As the hydrogen industry develops, it is anticipated that further issues requiring regulatory reform may be identified and considered by government.

### Consultation to date

This consultation paper considers and extends the consultation activities that occurred throughout 2023 for the development the *Gas Supply and Other Legislation (Hydrogen Industry Development) Amendment Act 2023* which was introduced to Queensland Parliament on 9 May 2023 and passed on 10 October 2023.

The Act addressed the critical issue identified by industry and stakeholders to enable the transportation of hydrogen in pipelines. Through consultation on the Bill, stakeholders also raised other issues which have been considered in the development of this paper.

## Queensland's regulatory framework

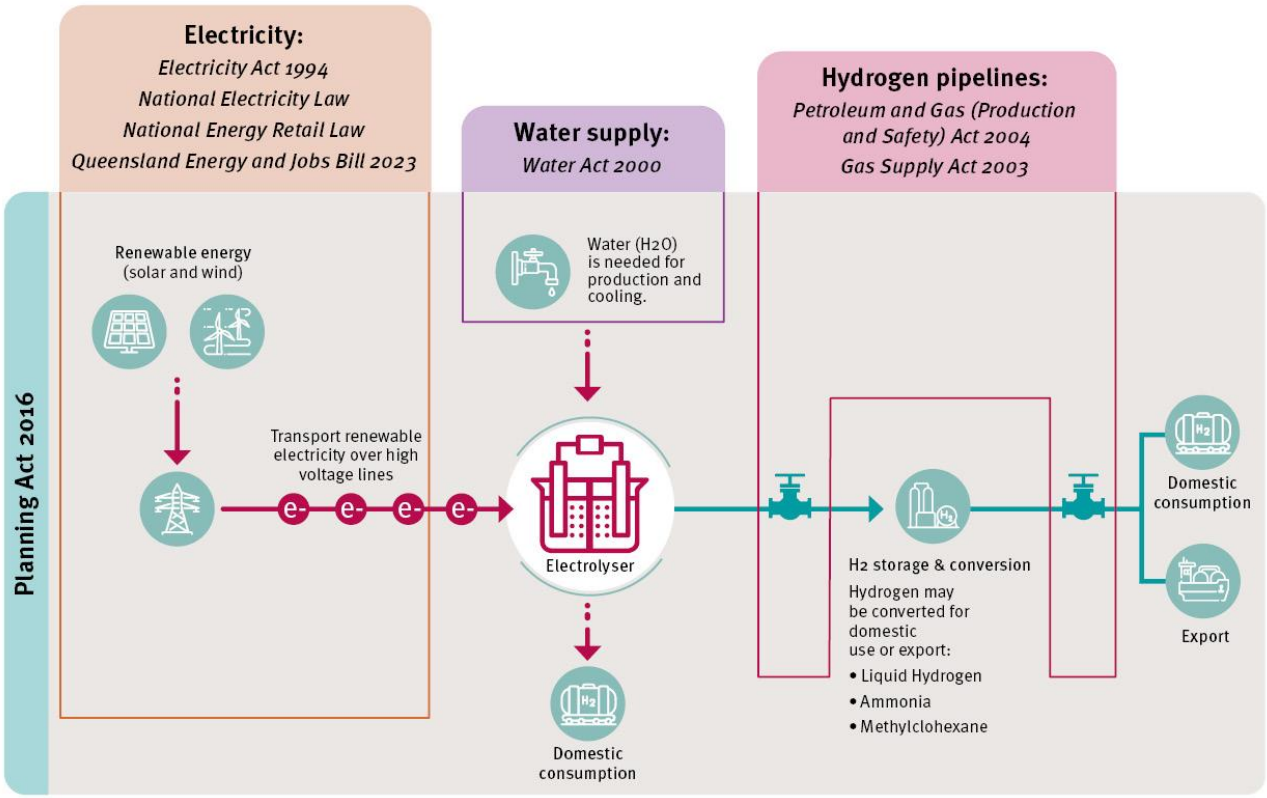
Queensland's regulatory framework largely accommodates hydrogen industry development, however the complexity of the regulatory processes as well as roles, responsibilities and timeframes, have the potential to cause uncertainty and confusion. This is particularly the case where proponents need to navigate local, Queensland and Federal government regulations.

Historically, a diverse range of uses of hydrogen have been authorised in Queensland and since the release of the *Queensland Hydrogen Industry Strategy*[8] in May 2019, all development applications have been approved (at either the initial or an alternative location).

## Regulation of renewable hydrogen

Queensland's current renewable hydrogen regulatory framework encompasses a range of regulatory instruments. A high-level example of the regulatory instruments that may apply to a renewable hydrogen project in Queensland are provided Figure 1 below. These include regulations for planning, renewable energy, pipelines, common user infrastructure, water, safety and environment. These elements of the regulatory framework are further discussed in detail throughout the paper, along with potential options for reform where issues and barriers have been identified.

**Figure 1 – Queensland's current renewable hydrogen regulatory framework**




Relevant Acts that may apply across the hydrogen life cycle, include the *Environmental Protection Act 1994*, the *State Development and Public Works Organisation Act 1971*, *Work Health and Safety Act 2011*, *Aboriginal Cultural Heritage Act 2003*, *Torres Strait Islander Cultural Heritage Act 2003*, *Native Title Act 1993* and *Biosecurity Act 2014*. *The Electrical Safety Act 2002* applies to electricity generation, distribution and utilisation of electricity in electrical installations and equipment.

Given the regulatory instruments that could apply to a hydrogen project, the resulting complexity may be difficult for proponents in a new and emerging industry to navigate. This complexity could lead to a lack of clarity for proponents and has the potential to create significant project risk and delay. It may also result in proponents choosing to invest in jurisdictions with clearer and more efficient project assessment pathways.

The industry is growing rapidly. While the largest project currently approved in Australia is around 1.25 megawatts, it is likely that projects will reach 650 megawatts in the near future and scale up to 3-5 gigawatts

[8] 'Queensland Hydrogen Industry Strategy 2019-2024' https://www.statedevelopment.qld.gov.au/__data/assets/pdf_file/0018/12195/queensland-hydrogen-strategy.pdf.

in the 2030s. As the industry grows and develops over time, it is important that the regulatory settings are reviewed and remain fit for purpose to enable this scale of growth.

It is anticipated that as the industry is relatively new, maturity levels for navigating regulatory frameworks may still be developing. That is why the Queensland Government has released guidance material to support local government decision-making – the *Hydrogen Developments: Guidance for local government in plan drafting*[9]. Support has also been provided for industry in the *Queensland Hydrogen Investor Toolkit*[10].

The complexity of the existing regulatory framework is the subject of this consultation paper, and feedback is sought from stakeholders to help inform and address potential confusion and uncertainty.

### Regulation of other types of hydrogen production

Hydrogen has been produced in Queensland for decades, through brown or grey hydrogen production methods, where hydrogen is produced through gas or coal, and the emissions are captured, this is known as blue hydrogen. This paper **does not** examine regulatory frameworks for this type of hydrogen production, as they are already in place.

There is growing research that suggests that hydrogen may be naturally occurring in underground reservoirs which could be extracted like any other natural gas. This is called naturally occurring or geogenic hydrogen. While the exploration for geogenic hydrogen is underway in other jurisdictions, Queensland does not currently have a regulatory framework to enable exploration for or extraction of this type of hydrogen. Given the complexity of this process, which needs to consider both the environmental impacts and safety considerations. This topic **is not** explicitly explored in this paper, however comments and feedback on this issue are welcome to inform future work.

## Objectives for regulatory reform

The commitment in the plan to support the effective regulation of hydrogen development demonstrates that Queensland is positioning itself as a global leader in the emerging hydrogen industry. It also provides an opportunity to guide industry development for the benefit of all Queenslanders, support domestic decarbonisation of industry and complement the achievement of renewable energy targets.

To continue to attract investment and ensure the safe, transparent, and sustainable development of Queensland's hydrogen industry, key objectives are proposed to guide regulatory reform. These objectives are to:

- provide a clear regulatory pathway for the safe and effective development of the hydrogen industry in an ecologically sustainable and safe way
- support the actions in the Plan to ensure reliability of the electricity system with low to no emissions gas like renewable hydrogen
- support domestic decarbonisation, including encouraging domestic production and use of hydrogen to reduce emissions in hard to abate sectors
- support industry in its efforts to show accountability and responsibility in their business practices, particularly in environmental, social, and corporate governance
- ensure net environmental and economic benefits for Queensland, such as emissions reduction, meaningful employment opportunities and broader economic growth outcomes

[9] Queensland Government *Hydrogen Developments: Guidance for local government in plan drafting* https://www.statedevelopment.qld.gov.au/__data/assets/pdf_file/0027/18558/guidance-for-local-government-plan-drafting-hydrogen-development.pdf.

[10] *Queensland Government Queensland Hydrogen investor toolkit* https://www.statedevelopment.qld.gov.au/__data/assets/pdf_file/0023/17843/queensland-hydrogen-investor-toolkit.pdf.

- facilitate industry's social licence to operate, greater coexistence between present and future land uses, new economic opportunities and ensure host communities benefit from the development of Queensland's hydrogen industry
- ensure participation of, and early engagement with, First Nations people in relation to industry development, which includes preserving cultural heritage
- align, where possible, with national reforms and international best practice.

# 3. Regulatory issues, opportunities and options for reform

Enhancements to the existing regulatory framework could provide a more coordinated, holistic approach to assessment of hydrogen developments and ensure projects are co-located for efficient, complementary land use.

This section of the paper details key elements of the current hydrogen regulatory framework and discusses existing issues and potential opportunities with the existing regulatory environment. Based on these issues and opportunities, a range of options for reform are then presented, including retaining the status quo, for consideration and feedback.

The following key areas of the regulatory framework are explored:

3.1. Planning framework
3.2. Renewable energy
3.3. Pipelines
3.4. Common user infrastructure
3.5. Water
3.6. Safety
3.7. Environment
3.8. Community impacts and benefits
3.9. Hydrogen storage in geological formations

It is important to note that the options are not mutually exclusive and that a combination of options could be progressed to respond to a barrier or issue if required.

## 3.1. Planning framework

In a new and emerging industry, clarity of processes and assessment is required to support industry growth.

Hydrogen industry proponents are required to navigate local, State and Australian government regulations across various regulatory environments to secure approvals for projects to develop hydrogen.

The *Planning Act 2016* (Planning Act) sets out the system for land use planning, development assessment and related matters in Queensland, including types of development, applications for development, referral agency assessments, assessment decisions and development conditions. The assessment process considers matters such as surrounding sensitive land uses, zoning of sites, existing approvals and constraints over the site, access to appropriate transport infrastructure and potential for collocation or access to renewable energy sources.

The existing Queensland planning framework provides established and proven mechanisms that enable assessment of new hydrogen related developments with appropriate coordination by state government through the State Assessment and Referral Agency (SARA) where a state interest is triggered.

The framework also enables strategic planning for the industry, with engagement from local governments through regional plans and local government planning schemes.

The assessment manager role and land use definitions are both prescribed under the Planning Regulation 2017. Where a proposed development impacts a state interest, the State becomes involved as either the assessment manager or the referral agency. SARA is responsible for carrying out this function and uses criteria from the State Development Assessment Provisions (SDAP). The SDAP defines the state's interest in the development assessment and includes the assessment benchmarks or matters SARA will assess an application against. Applicants are required to address criteria to demonstrate the way in which development manages impacts on a matter of state interest.

The Development Assessment Rules detail the relevant process and timeframes. Development applications are assessed against requirements identified in the following paragraphs and may include environmental impacts, water access, cultural heritage, workplace health and safety and land use requirements.

Like large resources or infrastructure projects, many hydrogen developments may fall across several local government areas. In these cases, one relevant council is designated as the assessment manager by the Minister for the Planning Act and all other councils are referral agencies. Assessments are carried out against the requirements of the relevant local government planning scheme that sets out zones, tables of assessment and codes which outline the criteria development applications are assessed against. These projects may be required to prepare an environmental impact statement (EIS) under the *Environmental Protection Act 1994* (EP Act) or *State Development and Public Works Organisation Act 1971* (SDPWO Act), before an environmental authority can be issued. An EIS assesses the current environmental impact in the area of the project, potential environmental, economic and social impacts of the project and how the proponent will avoid, minimise, mitigate or offset these impacts.

There is the potential that a proponent may also apply to the Coordinator-General under the SDPWO Act to have a project declared a coordinated project particularly where the project has complex approval requirements, significant environmental impacts, significant infrastructure requirements or is of strategic significance to the locality, region or state. Assessment by the Coordinator-General requires the proponent to prepare an environment impact assessment or impact assessment report to demonstrate that environmental, social, and economic impacts will be properly managed. The Minister responsible for the SDPWO Act may declare a project to be a prescribed project if it is of economic or social significance to the State or region.

State Development Areas (SDAs) are clearly defined areas of land that are established to facilitate economic development in Queensland. Each SDA is subject to a development scheme, managed by the Coordinator-General, that controls planning and development within an SDA. There are several strategically located SDAs in Queensland, including in Gladstone and Abbot Point, where there is significant interest in hydrogen due to its existing industrial demand, gas infrastructure, port access and skilled workforce.

The planning regulations applicable to a particular hydrogen proponent will largely depend on the location, nature, and scale of development. As new and innovative uses of hydrogen emerge in Queensland, the planning and other regulatory requirements may need to respond. The Queensland Government has developed guidance materials for industry and local governments to navigate the planning framework. Feedback is encouraged from stakeholders on regulatory reforms that have been identified that could streamline the development assessment process.

## Option 1. Status quo

The benefit of maintaining the status quo is that the current planning framework is established, largely accommodates hydrogen developments, and ensures all development proposals are subject to the same assessment framework.

As part of this option the government will continue to update guidance material to support industry and local governments to navigate the framework. Guidance materials will continue to identify responsible government agencies that can facilitate and support proponents to navigate the regulatory framework.

### Option 2. Introduce a threshold into the planning framework for hydrogen projects to be assessed by the state

The planning regulations applicable to a particular hydrogen proponent will largely depend on the location, nature and scale of development. While the state may in many circumstances under the planning framework be the decision-maker for development applications, the planning framework ensures that for developments that are below relevant thresholds, the local government will be the decision-maker. This can cause some uncertainty for proponents about the assessment processes that may apply to their projects, but this can be managed through early engagement (including formal pre-lodgement services) by project proponents with either the local or state government.

An option to provide greater clarity and consistency for proponents on the degree of assessment necessary and consistency in the development assessment process could be to establish a threshold for projects over a certain scale (for example, based on electrical load), to be assessed by the State. The threshold could be set as the same for a hydrogen generation licence discussed in the below section.

Amendment of the Planning Act to make the state the assessment manager for hydrogen production facilities could require the creation of a new state code to establish the assessment benchmarks for hydrogen developments. Any specific state code for hydrogen developments would need to be consistent with State Code 21 for hazardous chemical facilities.

The introduction of a state code for hydrogen developments might assist in providing additional clarity to proponents regarding a level of consistency in assessment and a coordinated approach to assessment of the development application. This may help ensure that projects are co-located for efficient, complementary land use and potential realisation of other benefits such as common use infrastructure.

The benefits of this approach could also be a clearer and coordinated consideration and approval process for large projects, whilst maintaining the same level of scrutiny in terms of planning and safety requirements. It could also relieve resource burden for local governments given assessments are highly technical, and also provide a consistent state-wide planning and safety approach to all medium-scale and above projects.

The risk of adopting this approach may be the perception of overly constraining or overriding local planning schemes and community concerns. For local communities, this risk could be effectively managed by communications explaining the new process, inherent protections in place with this approach, and clear articulation of the associated benefits to the local community.

However, as discussed below for common user infrastructure, this option cannot override the legislative requirements of local utility service providers (e.g. port, water, energy government-owned corporations (GOCs)). Proponents will still be required to engage with relevant utilities to ensure their project plans are consistent with the separate approval requirements from utilities (and/or government) for project agreements on commercial terms and to establish appropriate tenure arrangements.

**Consultation questions**

1. *Are reforms to the planning regulatory framework needed, or is guidance material for renewable hydrogen proponents enough? Why or why not?*
2. *Would any other process innovations or improvements in government agency engagement be beneficial?*
3. *Should a threshold be put in place so the state is the decision-maker for hydrogen projects? If yes, what should this threshold be set at and why?*
4. *Are there any other considerations relating to these options?*

## 3.2. Renewable energy

Development of large-scale renewable energy will be required for hydrogen production and it is critical that this development supports Queensland's decarbonisation efforts and complements renewable energy targets.

Given electricity input prices are the single largest contributor to the cost of production of renewable hydrogen, access to affordable, large-scale renewable energy is critical for the long-term economic viability of the industry. It will be important for renewable hydrogen producers to consider how access to renewable energy and transmission is secured, both physically and commercially.

The scale of renewables required for hydrogen could be vast, as illustrated in the *Enabling Queensland's hydrogen production and export opportunities*[11] report which identified in excess of 40 gigawatt (GW) of renewable energy could be developed for export of hydrogen in Abbot Point and Gladstone alone. By comparison, the plan identifies that 25GW of renewables will be required to decarbonise the entire Queensland electricity grid. Therefore, as the renewable hydrogen industry grows, there is a risk this may have impacts on the renewable energy available and transmission capacity to meet the needs of other energy users such as households and other existing and future industries. This, in turn could impact upon plan objectives, renewable energy targets and broader domestic decarbonisation efforts.

Under the *Electricity Act 1994* (the Electricity Act), the Regulator can provide the following types of authorities:

- a generation authority, which authorises the holder to connect an electricity generation asset to a transmission grid or supply network
- a transmission authority, which authorises the holder to operate a transmission grid and may also authorise them to connect to another transmission grid
- a distribution authority, which authorises the holder to supply electricity within a specified distribution area.

Under the Electricity Act, the Regulator can also provide a special approval to an entity to perform the same or a combination of activities as is authorised under a generation authority, transmission authority or distribution authority.

Under the current framework, a hydrogen producer may access renewable energy a) in front of the meter (energy is purchased from a utility company through the National Energy Market) or b) behind the meter (electricity is generated by an on-site asset for self-consumption or a through a direct non-grid connection to a nearby electricity generation asset). Some proponents are also considering a hybrid configuration – option c) below.

**a) In front of the meter connections to renewable energy**

Connection to the National Energy Market (NEM) through a Power Purchase Agreement (PPA) with an authorised market retailer and renewable energy generator provides a base level of energy for production. In some circumstances, hydrogen proponents are planning to be both the renewable energy generator and consumer of the energy (including through subsidiary companies).

The Electricity Act currently ensure that connections to the grid and acceptance of customers will not compromise grid stability or impact existing customers. Under the Electricity Regulation 2006, the holder of a distribution authority may limit the size of an electrolyser or regulate a renewable hydrogen producer's energy consumption. Collectively, this legislation provides protections for the stability of the grid, however there is currently no specific mechanism to consider the impact of large renewable hydrogen loads and demand on the grid.

In locations where there is no or inadequate existing transmission, infrastructure proponents will need to negotiate access to the electricity grid with Powerlink as the operator of Queensland's transmission network. If a connection of greater than 30km in length is required, the National Electricity Rules Designated Network Asset requirements also apply[12]. These requirements mean the infrastructure would be considered part of the transmission network, which allows for the application of existing arrangements for settlement, metering, calculation of loss factors, transmission use of system charges, system strength and performance standards, with only minor modifications.

[11] 'Enabling Queensland's hydrogen production and export opportunities' https://www.epw.qld.gov.au/__data/assets/pdf_file/0017/33191/enabling-qld-hydrogen-opportunities-report.pdf.

[12] Powerlink Queensland, 2023, 'Connect to our Network' https://www.powerlink.com.au/connect-our-network, accessed August 2023.

**b) Behind the meter connections to renewable energy**

Under this arrangement, a hydrogen producer will either connect to a dedicated renewable energy generation asset on site for self-consumption; or purchase renewable energy through a PPA with a renewable energy generator for the direct sale and supply of energy to a co-located business or to a number of businesses through a non-grid connected local private network or microgrid. A feature of the behind the meter connection includes not having to purchase electricity through the NEM where prices may fluctuate based on forecast supply and demand.

**c) Hybrid arrangement including in-front and behind the meter connection**

Some hydrogen producers are considering configurations which may source renewable energy from the electricity network (in front of the meter) as well as behind the meter (via private arrangements or self-generation). This would represent a hybrid arrangement and would benefit Queenslanders by providing electricity to the NEM when required and could provide greater flexibility to the system.

## Option 1. Status quo

Under the Electricity Act, there is no specific requirement for hydrogen proponents to demonstrate they have sourced sufficient renewable energy to meet their operational needs. As the industry grows and develops over time, the scale of renewable energy required as an input into renewable hydrogen production will increase accordingly. Depending on the specific project, a hydrogen proponent may require generation, transmission or distribution authorities. If a proponent was seeking to undertake a range of these activities, they may also apply for a special approval.

The benefit of retaining this framework unchanged maintains a level playing field for all industries using a known regulatory framework.

## Option 2. Require a hydrogen generation licence for renewable hydrogen production

To ensure renewable hydrogen developments have properly considered and planned for their renewable energy needs, consideration could be given to introducing a requirement that a proponent obtain a hydrogen generation licence (HGL). The HGL could be required to authorise the construction, installation, operation, maintenance and decommissioning of a renewable hydrogen production facility.

The HGL could set application and eligibility criteria that require the proponent to demonstrate they have secured access to renewable energy for their operational needs from an existing or related development and will not adversely impact the electricity transmission network. This would also consider the effects of the project on achieving the objectives of the plan.

A threshold could be developed to exempt proponents of small projects from requiring an up-front assessment by the State.

The assessment criteria for granting a HGL approval could require the proponent to demonstrate that:

- sufficient renewable energy has been sourced to meet project operational needs
- there will be no adverse impact to the electricity networks or diversion of renewable energy resources from the objectives and renewable energy targets of the plan (noting that projects designed for flexibility of energy demand for electrolysis could play a significant role in this regard)
- requirements under the *Electrical Safety Act 2002* (ES Act) and Electrical Safety Regulation 2013 (ES Regulation) have been met
- a Safety Case has been completed in accordance with the *Work Health and Safety Act 2011* (WHS Act) and Work Health and Safety Regulation 2011 (WHS Regulation).

In addition to specifying the generation, transmission and distribution activities that are authorised, the HGL could stipulate additional requirements such as:

- reporting on project scoping and when the facility becomes operational
- annual reporting on its operations and production
- contributions to domestic decarbonisation
- social impacts
- mandatory incident reporting.

Consideration could be given to whether this licence would fit under the Electricity Act or a stand-alone Hydrogen Act. Careful consideration of the interactions and consistency with the Electricity Act would be required, including whether any activities that are authorised under a generation, distribution, transmission or special approval should be covered by the HGL. Interactions with the planning framework would also need to be considered and addressed.

## Option 3. Leverage the proposed Renewable Energy Zone framework to provide for hydrogen projects

Renewable Energy Zones (REZs) are designed to unlock renewable energy capacity to decarbonise the electricity system and achieve the state's renewable energy targets. Renewable energy capacity is finite due to access to land suitable for renewable energy generation, and therefore must be carefully managed so that Queensland's hydrogen export industry complements domestic decarbonisation efforts.

Under the plan, the REZ framework is being legislated via the Energy (Renewable Transformation and Jobs) Bill (once passed). Key features of the proposed REZ framework include:

- Ministerial declaration of a REZ, which then empowers the REZ delivery body to control connection to the grid in a geographical area
- a REZ management plan to be developed for each area, which details the network connections, while also streamlining and coordinating the connections for multiple projects by specifying the timeframes for development and the process required for participants to connect. A draft plan must be open for public consultation for a 60-day period and submissions considered in finalising the plan
- a REZ delivery body, to be appointed by the Minister for Energy and Clean Economy Jobs, will be responsible for providing advice on proposed REZs to the Queensland Government, developing draft and final management plans, consulting with the community and determining access and connections to a REZ.

There is an opportunity to consider renewable energy usage for hydrogen production requirements more broadly. Particularly for hard to abate industries, hydrogen production for domestic use could complement the existing REZ framework and vision to support Queensland industries to decarbonise and energise regional areas.

An option to support the infrastructure planning and development of renewable areas for hydrogen production where there would be multiple proponents proposing to develop renewable energy assets could be the introduction of a hydrogen specific REZ framework – a Hydrogen REZ (H2REZ). This framework could leverage the features of the proposed REZ framework but would be adapted to the unique features of the hydrogen industry. This could allow the government to recognise areas that have significant renewable energy potential, but that are not required to be developed solely for domestic decarbonisation and also enable government to coordinate the development of these zones. While the zones could be connected into the NEM, this would only occur if the system is better off as a whole, and consumers benefit.

Similarly, to the proposed REZ framework, legislation would be required to provide that declaration of a H2REZ by the Minister, which would then empower a delivery body to plan the connections and associated energy infrastructure for a particular area. This approach could then manage the potential cumulative impact of multiple proposed developments on the local area.

The key benefits of an H2REZ would be to coordinate and connect renewable hydrogen projects with sources of renewable energy and to support private sector investment in defined areas ideal for the hydrogen export industry.

**Consultation questions**

5. *Are reforms needed to any aspect of the electricity regulatory framework to support the effective and efficient development of the hydrogen industry? Why or why not?*
6. *Is an approval or licensing regime a suitable way to ensure there is enough renewable energy for the domestic market?*
7. *What benefits and costs would the proposed options have on you, your organisation, the industry, workers or the broader community?*
8. *Are there any other barriers that should be reviewed to stimulate renewable hydrogen industry growth?*

## 3.3. Pipelines

Pipelines will be essential for the hydrogen industry.

Pipelines are critical infrastructure for transporting hydrogen to markets or other facilities. Industry and stakeholders identified a critical need for amendments to Queensland's legislative framework to enable hydrogen and its carriers to be transported in pipelines.

Recognising this important issue, on 10 October 2023 the Queensland Parliament passed the *Gas Supply and Other Legislation (Hydrogen Industry Development) Amendment Act 2023*. The Act amends the *Gas Supply Act 2003* (Gas Supply Act) to expand its jurisdiction to include hydrogen, hydrogen blends, biomethane and other renewable gases.

It also amends the *Petroleum and Gas (Safety and Production) Act 2004* (Petroleum and Gas Act) to provide a clear and effective regulatory pathway for a proponent to apply for a pipeline licence for the transmission of hydrogen and other hydrogen carriers. This framework is in addition to the development application process available under the Planning Act for obtaining a pipeline licence. These amendments are expected to commence in early 2024.

No further amendments to Queensland's pipeline frameworks are currently proposed.

**Consultation Question**

9. *Are there further issues about the pipelines relating to hydrogen production that need to be considered as part of this review?*

## 3.4. Common user infrastructure

Hydrogen industry development will involve investment in large-scale new or expanded infrastructure.

The large upfront capital expenditure on new or expanded infrastructure often creates barriers for developers of new projects. On the other hand, early movers in the hydrogen industry may potentially benefit from initial access to resources including land for corridors and access to ports.

Queensland is supporting the development of critical infrastructure projects that will drive down the cost of renewable energy and improve upfront capital efficiency. This includes the $5 billion CopperString 2032 Project, a 1,100km overheard high voltage electricity transmission line from south of Townsville to Mount Isa that will connect Queensland's North West Minerals Province to the national electricity grid and unlock one of Australia's largest renewable energy zones.

Government support to establish common user infrastructure can act as a catalyst for development, ensure land and other resources are used efficiently, and avoid unnecessary duplication of infrastructure. The government takes a principles-based approach to guide its role in delivering common user infrastructure to ensure this achieves net benefits for Queensland. The *State Infrastructure Strategy*[13] provides for a place-based approach to infrastructure planning through Regional Infrastructure Plans. These plans identify common user infrastructure opportunities in regional Queensland that also align with the government's common user infrastructure assessment principles.[14] They also provide opportunities to guide hydrogen industry development in Queensland's regions.

[13] Queensland Government, 'State Infrastructure Strategy' https://www.statedevelopment.qld.gov.au/industry/infrastructure/state-infrastructure-strategy, accessed August 2023.

[14] Queensland Government, 'Common User Infrastructure – Queensland Government assessment principles' Queensland Treasury, https://s3.treasury.qld.gov.au/files/CUI-QG-Assessment-Principles.pdf.

Going forward, given the scale of infrastructure development required to facilitate a hydrogen industry, a whole of industry approach may be needed to balance economic regulation with common user infrastructure funding considerations. A common user infrastructure solution is particularly beneficial where proponents are seeking access to, and use of, common inputs such as water, or critical infrastructure like dams, weirs and port berths.

With long lead times, the government is undertaking studies in relation to the infrastructure needed to meet the hydrogen industry requirements, such as the $8 million detailed business case on a common user desalination site in Gladstone. The Queensland Government is working with GOCs and similar utility authorities to ensure a common user infrastructure approach is possible and can align or accommodate existing regulatory assessment and GOC/government project assessment and investment approval frameworks.

Projects which involve common user infrastructure are usually undertaken by regulated or quasi-regulated entities via regulatory regimes that require customers to underwrite the creation, expansion or augmentation of infrastructure which may not facilitate the right sized, timely and strategic infrastructure through long term contractual arrangements, and are premised on a user pays principle. Examples of these include Queensland GOCs for the regulated businesses of energy generation and transmission, water storage and supply and port berth and channel access and usage.

Going forward, consideration will continue to be given, on a case-by-case basis, as to how to balance the economic and commercial issues for each project through legislative and non-legislative means.

One option canvassed in this paper is for Hydrogen REZs to be established to promote the coordinated planning and connections of multiple renewable energy generation sites in a particular area.

**Consultation question**

*10. Are specific amendments required as part of this review of the hydrogen regulatory framework on matters relating to common user infrastructure?*

## 3.5. Water

Hydrogen production requires access to large volumes of water.

Water plans are developed under the *Water Act 2000* to sustainably manage and allocate water resources in Queensland. Water plans describe the overarching regulations of the water planning framework, with further details included in subordinate documents such as water management protocols, resource operations licences, water supply scheme operation manuals, and water entitlement notices. Water plans are developed with community input and tailored to balance the needs of water users, such as towns, agriculture, and other industries, with the environmental and social and cultural values. A water plan uses the latest science to set out economic, social, cultural, and environmental outcomes for the water plan area; it specifies unallocated water reserves (water not allocated for a specific use) and establishes objectives for preserving environmental water flows and water security.

Hydrogen proponents seeking water are subject to the conditions of the water plans and will therefore be engaged during the development of water plans to ensure that as water users, government's decision-making reflects their needs and other relevant technical information and risk assessments.

In summary, it is considered that the current legislative and regulatory framework around supplying water to the hydrogen industry is sufficiently flexible to cater for hydrogen project development. However, in terms of availability, while water may initially be available for hydrogen projects in some locations through obtaining existing water allocations under the water planning framework, as projects scale up and require large volumes of reliable water sources, additional sources of water will be required. This will particularly be the case with expected impacts of climate change on water availability.

On this basis, with long lead times for water infrastructure, the Queensland Government is advanced in its planning around meeting the significant water requirements of the green hydrogen industry.

The Rookwood Weir and the $983 million Fitzroy to Gladstone Pipeline has facilitated meeting the short-term water requirements of key industry proponents. The Queensland Government is also leading a $8 million detailed business case to examine desalination options to meet long term forecast water supply demand in Gladstone. Complementing these key projects is the work being undertaken by the Queensland Government and state-owned Gladstone Area Water Board to augment its existing network to meet the increasing water requirements in the Gladstone State Development Area.

Under the plan $15 million has been allocated to supercharge and coordinate the industry's development in key hydrogen hubs in Queensland. Out of this funding, $8.5 million has been committed to the Abbot Point Activation Initiative, $3 million of this has been allocated to undertaking a water supply and infrastructure options assessment for the region. This work will identify the best common-user water scenario to meet requirements within North Queensland. This approach is intended to reduce water costs for proponents, while maintaining water security and increasing water capability for future developments across urban, agriculture, and other industry sectors.

**Consultation question**

*11. Are there specific amendments required as part of this hydrogen regulatory review relating to water infrastructure and supply?*

## 3.6. Safety

Like all industrial processes, there are risks associated with the hydrogen industry that can be managed through appropriate safety measures.

As Queensland embarks on the development and growth of the hydrogen industry, safety considerations must be woven into development of regulatory frameworks to facilitate smooth project development. Hydrogen is being used safely in many industrial applications in Australia and internationally, with many countries using hydrogen safely as a fuel for transportation, with an excellent safety record. However, the hydrogen industry, as with any industry, is susceptible to hazards and risks.

With hydrogen, the safety and health issues are associated with its production, storage and use. In Queensland, where production, storage and use of hydrogen intersects many regulatory domains, the safety of workers and the community is paramount.

The Office of Industrial Relations (OIR) collaborates with Resources Safety and Health Queensland (RSHQ) to ensure effective regulatory coverage to ensure industry and the community are safe. As safety regulators, OIR and RSHQ aim to maintain agility in the interpretation and application of safety regulations. This allows responsiveness in an evolving landscape, ensuring safety measures remain responsive as hydrogen technology evolve.

### Office of Industrial Relations

The OIR, encompassing the Electrical Safety Office and Work Health and Safety Queensland, administer the ES Act and the WHS Act.

The ES Act and ES Regulation framework primarily focusses on electricity generation, distribution and utilisation of electricity in electrical installations and equipment; and plays a crucial role in ensuring the safe and efficient operation of electrical infrastructure. The ES Act establishes a framework for the safety of electrical installations, electrical equipment and electrical work in Queensland. For example, the framework imposes duties on persons who may affect the electrical safety of others, providing an electrical licencing system for electrical work, and developing requirements for the safety of electrical installations and equipment.

The ES Act framework is relevant to the role of electricity in the production of hydrogen, or electricity used in the presence of hydrogen (hazardous areas), or hydrogen use to generate electricity. The framework encompasses the electrical components within hydrogen production facilities, such as electrolysers or compressors, and electrical infrastructure required for hydrogen transport and distribution.

Complying with safety standards outlined in the ES Act and ES Regulation is essential to prevent electrical hazards and ensure safe operation of facilities that make, store or use hydrogen or related operations.

Similarly, the ES Regulation supports electrical licencing arrangements under the Act by requiring that all electrical installations, all electrical equipment sold to be electrically safe; the registration of particular (household type) equipment, requiring particular (household type) electrical equipment marking, prescribe requirements for electrical work including electrically licensed persons performing certain work and the need to engage a Queensland Government accredited auditor to confirm an electrical installation located in a hazardous area is electrically safe and complies with relevant standards, and prescribed specifications for cathodic protections systems for pipelines.

This regulation may apply to electrical systems within hydrogen production facilities, ensuring they meet the necessary electrical safety criteria. Additionally, as hydrogen may be used as an energy storage medium used in power generation, regulation can extend to equipment that uses hydrogen to generate electricity or uses electricity to create hydrogen, and other electrical equipment, installations, connections and safety protocols within hydrogen-based electricity generation systems, ensuring they align with electrical safety standards.

In the context of hydrogen, the WHS Act requires duty holders, including employers and operators of hydrogen facilities and facilities that use hydrogen, to identify and control workplace hazards associated with the production, storage, and utilisation of hydrogen. This includes assessing risks related to hydrogen leaks, explosions, and fire hazards, and developing and implementing appropriate safety procedures and emergency response plans to mitigate these risks. The WHS Regulation also demand that duty holders provide adequate training and information to workers regarding hydrogen safety, ensuring they are aware of potential dangers and equipped with the knowledge and skills to work safely with hydrogen.

Furthermore, the WHS Act and WHS Regulation emphasise the need for consultation and cooperation between employers, workers, and relevant stakeholders to develop and implement effective safety procedures and emergency response plans. In the hydrogen context, this involves collaboration to establish stringent safety protocols for handling and storing hydrogen (may be classified as a major hazard facility (MHF) if the threshold for the on-site storage of a hazardous substance under schedule 15 of the WHS Regulation is triggered or a manifest quantity, conducting risk assessments (considering the consequences), and preparing for potential incidents. By adhering to these regulations, the hydrogen industry in Queensland can prioritise safety and mitigate the unique risks associated with hydrogen production, storage, and usage, ultimately contributing to a safer working environment and community.

## Resources Safety and Health Queensland (RSHQ)

RSHQ works with industry and the public to regulate and improve safety and health in relation to fuel gases under the Petroleum and Gas Act. This includes regulating hydrogen when it is used or intended to be used as a fuel gas.

Standards Australia is finalising the first of its technical specifications for the storage and handling of hydrogen. Guidelines will follow for gas blending in pipes and 100 per cent hydrogen Type A gas appliances. The safety framework, supported by advances in the standards, is deemed capable of managing the variety and severity of health and safety risks associated with hydrogen and other renewable gases. Safety frameworks that apply when conducting hydrogen activities in Queensland are outlined in the 'Hydrogen Safety Code of Practice 2023'[15]. Relevant parts of the Hydrogen Safety Code of Practice have been prescribed as the preferred standards for hydrogen-related activities under the Petroleum and Gas (Safety) Regulation 2018.[16]

The Petroleum and Gas Act regulates petroleum exploration and production activities, pipeline licensing other than distribution pipelines, and manages safety and technical matters for the upstream and downstream petroleum industries, and gas consumers. The Petroleum and Gas Act provides for the licencing of transmission pipelines and petroleum facility licencing.

[15] Resources Safety & Health Queensland, 2023, 'Hydrogen Safety Code of Practice' RSHQ, 2023/08, https://www.rshq.qld.gov.au/__data/assets/pdf_file/0003/1746453/Hydrogen-Safety-Code-of-Practice.pdf.

[16] Note: Amendments to the Petroleum and Gas (Safety) Regulation 2018 were made by the Petroleum and Gas (Safety) and Other Legislation Amendment Regulation 2023 and commenced on 11 August 2023 – https://www.legislation.qld.gov.au/view/html/asmade/sl-2023-0102.

These activities assist the production of petroleum and its transport to the market. The production of hydrogen as a fuel gas, falls within the main purpose of the Petroleum and Gas Act, however it is not specifically provided for under the Act. To address this, the government is progressing legislation amendments to clarify that the production of hydrogen as a fuel gas is an activity to which operating plant under section 670 of the Act applies. This will help address issues raised from production using on-fossil fuel sources, such as through electrolysis.

Amendments are also proposed to the Petroleum and Gas Act to allow production via domestic scale and micro-electrolysis. These legislation amendments will clarify and address the contemporary nature of the resources industry and emerging technologies.

**Consultation questions**

12. *Is the current regulatory approach to safety proportionate to the safety risks of the hydrogen industry? If not, what are the key issues or gaps?*
13. *What are your views regarding including safety provisions in a standalone Act versus maintaining provisions in existing Acts?*
14. *Should consideration be given to changing the thresholds that apply to Major Hazard Facilities? Explain your view.*

## 3.7. Environment

The potential environmental impacts of large-scale hydrogen production require a holistic assessment across the whole hydrogen supply chain.

The *Conserving Nature – a Biodiversity Conservation Strategy for Queensland*[17] recognises climate change as a key threat to biodiversity, as well as biodiversity's role in addressing climate change and mitigating its impacts. Environmental impacts in relation to pollution, emissions and management of dangerous chemicals need to be considered as part of approval processes for hydrogen development.

These impacts may already fall within existing frameworks, including those for environmental relevant activities under the *Environmental Protection Act 1994* (EP Act) and Environmental Protection Regulation 2019 (EP Regulation) and Major Hazard Facilities (MHFs) under the WHS Act. Under the *Environment Protection and Biodiversity Conservation Act 1999*, an environmental impact assessment would be required where the project may impact Matters of National Significance, such as heritage sites, marine areas and threatened and migratory species.

Under the EP Act, an environmental authority (EA) is required to undertake an Environmentally Relevant Activity (ERA), which includes industrial and resource activities with the potential to release contaminants into the environment. Potential hydrogen related ERA triggers include manufacture of more than 200 tonnes in a year (ERA 7) or storing more than 200 tonnes or more of solids or gases or 220m$^3$ of liquids (ERA 8). In addition, the general environmental duty in section 319 of the EP Act applies to the development and production of hydrogen.

Where forming part of a development application, approvals to undertake an ERA, and advice on application of EA requirements are provided through SARA. Standalone ERAs can be applied for directly through the Department of Environment, Science and Innovation.

Where a project is declared a coordinated project by the Coordinator-General under the *State Development and Public Works Organisation Act 197*1, a rigorous impact assessment is conducted, involving whole-of-government coordination, either through an environmental impact statement (EIS) or a targeted impact assessment report (IAR).

[17] Queensland Government 'Conserving Nature – a Biodiversity Conservation Strategy for Queensland' https://www.qld.gov.au/__data/assets/pdf_file/0015/222081/queensland-biodiversity-conservation-strategy.pdf.

Declaration as a coordinated project does not exempt the project proponent from the need to obtain necessary development approvals or comply with relevant planning and environment laws and planning instruments.

An EIS for a coordinated project must include an assessment of the key economic impacts of the project, both positive and negative, and provide information to allow the Coordinator-General to weigh up the social, economic and environmental impacts of the project. An IAR process may be used if the Coordinator-General is satisfied that the environmental effects of the project are low-medium risk, highly predictable and the proponent has well-defined proposals to avoid, minimise, mitigate and/or offset those impacts.

A wide range of government departments (known as 'advisory agencies') are responsible for reviewing the draft EIS or draft IAR. It is also considered by relevant local governments and the Australian Government. The coordinated project process replaces the information and referral stages of a related assessment under both the Planning Act and an EA under the EP Act. The decision stage under both of these Act commences when the Coordinator-General's evaluation report on the EIS or IAR is provided to the relevant assessment.

At this stage, it is not proposed for amendments to be made as part of this review in relation to environmental assessment considerations as they are considered fit for purpose and apply equally to all development proposals.

**Consultation questions**

15. *Are specific amendments, or any other process innovation or improvements, needed to help proponents identify and navigate the necessary environmental approvals?*
16. *Are there any risks with the development and production of hydrogen that are not adequately covered by existing environmentally relevant activity processes?*

## 3.8. Community Impacts and Benefits

Assessment and management of community impacts and benefits should be as clear, efficient and effective as possible for proponents and communities.

As hydrogen projects and hubs evolve, the interaction between hydrogen developments and local communities needs to be understood and considered. Early engagement with communities including a framework for engagement with landholders and Aboriginal and Torres Strait Islander communities will be necessary to ensure positive economic benefits and employment opportunities are shared equally in local communities. Partnerships with First Nations people and communities are required to support economic aspirations while minimising potential impacts on cultural rights.

Currently, not all projects, including hydrogen, trigger the requirement to undertake social impact assessments. A social impact assessment assesses the potential impacts and benefits of a project on the local community and how these may be managed.

There are considerable benefits for industry in addressing community impacts in terms of building social licence to operate in host communities. Due to the infrastructure footprint and resource consumption, whether specific to a renewable hydrogen project or as part of a cumulative impact, social licence is essential to gain and maintain access for industry to develop. In the same vein, addressing the issue of community benefits such as providing local employment and training opportunities can also be beneficial to industry.

The cultural, economic, physical and social wellbeing of people and communities is considered throughout all aspects of the planning framework under the defined term *ecological sustainability*. Broad consideration has been given to current regulation and frameworks to ensure community benefits are delivered. Regulatory environments that can facilitate enhanced coexistence outcomes and build industry social licence are essential.

Depending on the nature of the renewable hydrogen project or cumulative projects at hydrogen hubs, there could be significant impacts on a local area that may include, but are not limited to:

- provision of significant amounts of renewable energy and water
- impact on agricultural land/activities
- installation of infrastructure to enable connection to the electricity grid
- transportation of hydrogen, such as via pipeline or heavy transport
- native title, cultural heritage interests and cultural rights
- health infrastructure
- road infrastructure and the impact of over-size over mass vehicles
- waste infrastructure
- recruitment and housing of a workforce to undertake the above activities, including consideration of residential and non-residential workers
- staging of multiple projects.

Where there are competing interests for land, it is important to ensure that land uses are complementary and do not impact the future economic potential of other industries or uses. The *Queensland Renewable Energy Landholder Toolkit*[18] is a resource for the agricultural sector to help negotiate mutually beneficial land sharing agreements, and allows landholders to make confident, informed decisions regarding land usage. This guidance has some aspects that could be used to support favourable negotiations between landowners and hydrogen proponents.

Queensland's *Hydrogen Industry Workforce Development Roadmap 2022-2032*[19] sets a path to achieve a strong and adaptable workforce to support Queensland's hydrogen industry while providing benefits to communities and First Nations people. The Queensland Government is working in collaboration with industry to deliver a range of actions associated with building a pipeline of skilled and adaptable workers, knowledge sharing to support skill development, maximising the benefits of hydrogen for Queensland communities, and using data insights to plan for industry workforce needs.

The roadmap also recognises the importance of national processes to respond to industry demand for hydrogen focused competencies in national vocational educational training packages. The development of nationally aligned regulations and standards would be a feasible option to support the progression of national training program development. This work is underway and being coordinated by the Commonwealth with input being provided by the Queensland Government.[20] Hydrogen is also identified as a key emerging industry in the Queensland Government's *Good people. Good jobs: Queensland Workforce Strategy 2022-2032*[21].

## First Nations engagement and participation

Ensuring First Nations people and communities are not only involved in but can benefit from the hydrogen industry in Queensland is also a key priority shared at both the State and Federal levels, including through commitment to Closing the Gap Outcome 8 - Strong economic participation and development.[22] Hydrogen developments such as renewable developments, pipelines and underground storage may impact the cultural rights of First Nations people as they may be across areas of land that have native title or cultural heritage interests which would require engagement and agreements with First Nations groups. Cultural water rights may also be impacted due to the volume of water hydrogen production may require. These rights are protected under the *Queensland Aboriginal Cultural Heritage Act 2003* and the *Torres Strait Islander Cultural Heritage Act 2003*. All developments need to negotiate for land and water access and these agreements should be transparent to demonstrate the costs and benefits are shared fairly.

[18] Queensland Government, 2023, 'Queensland Renewable energy Landholder Toolkit' https://www.qff.org.au/wp-content/uploads/2023/07/QFF-Renewable-Energy-Toolkit-June23_web-1.pdf.
[19] Queensland Government, 2022, 'Hydrogen Industry Workforce Development Roadmap 2022-2032' Department of Youth Justice, Employment, Small Business and Training, 2023/03, https://www.publications.qld.gov.au/dataset/832919da-fb92-41a6-889e-3052a67f1d74/resource/5fffcbcc-7605-46ed-86b4-2c2a91e7acad/download/hydrogen-industry-workforce-development-roadmap.pdf.
[20] Australian Government, 2023, 'Providing regulatory clarity to support development of Australia's hydrogen industry' Department of Climate Change, Energy, the Environment and Water, 2023/04, https://www.dcceew.gov.au/energy/hydrogen/regulatory-review, accessed August 2023.
[21] Queensland Government, 2022, 'Good people. Good jobs: Queensland Workforce Strategy 2022-2032' https://desbt.qld.gov.au/employment/support-employers/workforce-strategy/about, accessed October 2023.
[22] Closing the Gap, https://www.closingthegap.gov.au/national-agreement, accessed September 2023.

At the Commonwealth level, the *Native Title Act 1993* sets out processes for Native Title groups to negotiate agreements with other parties in relation to the use of land and waters. The Queensland *Human Rights Act 2019* requires all decisions made by the Queensland Government to consider the cultural rights of Aboriginal peoples and Torres Strait Islander peoples. Queensland's *Path to Treaty Act 2023* has been enacted as part of Queensland Government's commitment to reframing the relationship with Aboriginal and Torres Strait Islander Queenslanders.

Nationally, Energy Ministers have committed to developing a co-designed First Nations Clean Energy Strategy.[23] The $5.5 million Strategy aims to ensure First Nations people have a say in policies and programs in the transition to net-zero. Additionally, within the Federal Budget $2 million was allocated over two years to assist First Nations communities to engage with hydrogen project developers.

Elements of the Queensland Procurement Policy and Queensland Indigenous Procurement Policy[24] may provide guidance for proponents in development of procurement strategies and initiatives for local suppliers, including Aboriginal and Torres Strait Islander owned businesses.

## Option 1. Status quo

Under the existing frameworks, such as through the environmental impact statement process either under the *Environmental Protection Act 1994*, the *State Development and Public Works Organisation Act 1971* (SDPWO Act) or *Strong Sustainable Resource Communities Act 2017* (SSRC Act), some hydrogen projects will be required to consider social impacts. However, this is not the case for all hydrogen projects, and may not consider cumulative impacts of projects.

Outside of the regulatory requirements, proponents have corporate and social responsibilities to engage, consider and address a range of impacts of their projects. However, it is important to note that without a specific regulatory requirement to assess and manage social impacts, the approach to managing impacts could vary amongst the industry and present a risk to the industry's social licence to operate as a whole. This will particularly be the case where there is not a minimum standard to demonstrate a transparent, systematic consultative and early-stage social impact assessment.

## Option 2. Consider community benefits in assessment for a hydrogen generation licence

To ensure hydrogen projects properly consider social impacts and benefits for local communities, including First Nations communities, if a HGL is progressed, it could include a criteria requiring proponents to demonstrate community impacts and benefits have been assessed and how they will be managed. It could also include requirements to consider cumulative impacts of projects. This approach could also include specific requirements to manage engagement with First Nations people and communities, demonstrate how cultural rights have been protected, and identify economic opportunities for First Nations communities to benefit through the project. The decision-maker would then be able to impose conditions to ensure that these matters are managed.

This could provide certainty to proponents, community and other stakeholders about what is expected to obtain a licence. It would also ensure that identifying social benefits would occur early in the process and in a transparent way. The requirement to properly identify and manage community impacts and benefits support both proponents and communities.

## Option 3. Extend existing assessment pathways to ensure stakeholders benefit from large-scale hydrogen projects

There are existing assessment pathways that could be used for hydrogen proponents to demonstrate social impacts and benefits have been considered. Existing frameworks such as the environmental impact statement process either under the Environmental Protection Act or the SDPWO Act may provide an appropriate framework for hydrogen projects.

[23] Australian Government, 2023, 'First Nations Clean Energy Strategy' Department of Climate Change, Energy, the Environment and Water, 2023/05, https://www.energy.gov.au/government-priorities/australias-energy-strategies-and-frameworks/national-energy-transformation-partnership/first-nations-clean-energy-strategy, accessed August 2023.

[24] Queensland Government, 2016, https://www.dsdsatsip.qld.gov.au/resources/dsdsatsip/work/atsip/business-economic-development/qipp/queensland-indigenous-procurement-policy.pdf.

In addition, the SSRC Act, which aims to ensure that residents of communities near large resource projects benefit from the construction and operation of the projects, is another legislative framework that could be considered. Under the SSRC, the Social Impact Assessment (SIA) is used to identify, analyse, assess, manage and monitor the potential social impacts of a project, both positive and negative. A SIA under the SSRC Act currently captures resource projects requiring an environmental impact statement or projects that will have 100 or more employees.

While the SSRC Act currently only applies to resource projects, an option that could be progressed is for hydrogen projects over a certain threshold (e.g. based on electrical load or number of employees), could be included in the SSRC Act. Through the process under the SSRC Act, the Coordinator-General may require consideration of cumulative and social impacts for any project declared a coordinated project and completing an EIS. Extending this requirement to hydrogen projects that may not currently trigger the SSRC Act or be declared projects could provide certainty and consistency regarding considerations and processes in relation to key project developments.

An alternative option could be consideration of criteria to be included in the development assessment process under the planning framework for hydrogen projects.

**Consultation Questions**

17. *How should social impacts and benefits be assessed and managed for hydrogen projects?*
18. *What are the impacts, costs or benefits associated with each of the options?*
19. *What is the best way to ensure mutually beneficial engagement with, and outcomes for, First Nations peoples?*

## 3.9. Hydrogen storage

Large-scale use of hydrogen is expected to require significant amounts of storage to cope with seasonal fluctuations in demand.

A key challenge for the emerging hydrogen industry is how to store large quantities of hydrogen, whether for export or domestic use. Storage of hydrogen faces challenges due to its low volumetric density, being the lightest of all elements, and to store in liquid form requires it to be cooled to -252.8 degrees Celsius. Hydrogen can be stored physically as a compressed gas or a liquid or in the form of another carrier such as ammonia or methylcyclohexane. Hydrogen gas is usually stored in high pressure tanks (350-700 bar or 5000-10,000 psi)[25].

All projects, whether hydrogen related or not, must gain approval under the Planning Act. If a site stores chemicals greater than 10 per cent of a threshold quantity listed in schedule 15 of the Work Health and Safety Regulation 2011 (WHS Regulation), or is deemed high risk, it will be regulated as a Major Hazard Facility under the WHS Regulation. Workplace Health and Safety Queensland regulates major hazard facilities to protect people and property from major incidents by licensing facilities who have demonstrated they can operate safety and have appropriate safety management systems to control risks. This framework is considered fit for purpose and no amendments are proposed; however feedback is welcomed on whether there are improvements that could be made to this framework to support the hydrogen industry.

Large scale storage of hydrogen could be used to store surplus renewable energy to back up energy supply when needed to meet peak demand or counter the intermittency of wind and solar energy generation. Unlike battery storage, energy stored as hydrogen can be stored indefinitely with minimal energy loss[26].

For cost-effective and safe large-scale storage of hydrogen, globally, there is increasing interest in exploring the potential of underground storage. As noted by the IEA, a key factor being investigated to reduce these costs is underground storage of hydrogen in geological formations such as salt caverns or depleted gas

[25] TWI, 'What is hydrogen storage and how does it work?' https://www.twi-global.com/technical-knowledge/faqs/what-is-hydrogen-storage#HowDoesitWorkisitStored, accessed November 2023.

[26] CLOUGLOBAL, 'Pros and Cons of Hydrogen Energy Storage: Is Worth the Investment?' https://clouglobal.com/the-pros-and-cons-of-hydrogen-energy-storage-is-worth-the-investment, accessed November 2023.

fields. Research suggests that bulk storage of hydrogen in these formations may prove long term to be significantly cheaper than other storage options.

An initial focus for industry has been on investigating the potential use of salt caverns, created through solution mining or leaching, to store large volumes of hydrogen. The caverns can be developed for hydrogen storage through a process where water is piped into the salt deposit then the brine is extracted. Pure hydrogen has been stored in salt caverns in the United Kingdom (since 1972) and in Clemens, Texas (since 1983) and Moss, Texas (since 2007)[27].

While salt caverns have been used to date, other underground caverns with nonpermeable geology could potentially be used to store hydrogen underground. The CSIRO has identified other potential alternatives for storing hydrogen in geological formations including depleted gas reservoirs, aquifers, engineered caverns and abandoned mines[28]

The economic viability of a particular storage site will depend on the integration of all aspects of the hydrogen value-chain, from production, to transport, to storage, to end-use. These features will also strongly affect the required storage volumes, and the frequency of cycling of the storage, which are both critical to the total cost of storage. Storage of hydrogen in tanks or similar structures is captured under the existing major hazard facility framework. The Petroleum and Gas Act contains an existing regulatory framework for the underground storage of gases in geological formations. However, hydrogen is not currently a gas that can be stored underground.

Any potential reforms related to storage of hydrogen in underground settings will need to consider a number of issues such as: the type and quality of the surrounding geology; how underground storage sites are created and how any mined minerals will be dealt with[29]; whether there is demand or a market for mined products that must be extracted; access to other infrastructure such as existing pipelines to transport hydrogen to end users or export markets; supply chain impacts; assessment and management of environmental impacts; existing land uses and authorities such as petroleum leases or other licences; First Nations interests; other commercial demands for underground sites, including depleted gas fields; and safety matters.

Any regulatory reform in this space will be complex and require time to develop a legislative framework which does not result in unintended consequences.

## Option 1. Status quo

As described above, the existing major hazard facility framework applies to any facility that stores greater than 10% of a chemical threshold quantity listed in schedule 15 of the WHS Regulation. This framework applies to storage facilities whether above or below ground.

While the existing major hazard facility framework could be applied to the underground storage of hydrogen, the existing Petroleum and Gas Act which enables a prescribed storage gas to be stored in a natural underground geological formation such as a depleted gas field, does not allow hydrogen to be stored. This effectively confines hydrogen storage to tanks or similar physical structures.

The *Mineral Resources Act 1989* (Mineral Resources Act) provides for the granting of mining leases. Mining leases authorise mining of certain minerals in an area and for all purposes necessary to effectively carry on that mining. A mining lease can be granted for the purposes of extracting salt, however, there is no legislative pathway under the Mineral Resources Act to authorise the repurposing of a salt cavern for underground storage of hydrogen.

## Option 2. Accommodate underground storage of hydrogen in resources legislation

An option to authorise the storage of hydrogen in a natural underground reservoir could be to extend the current resources legislative framework in the Mineral Resources Act and Petroleum and Gas Act.

[27] Papadias, DD & Ahluwalia, RK 2021, *Bulk storage of hydrogen,* International Journal of Hydrogen Energy (46:70), Sep. 2021, viewed 10 September 2023.
[28] Ennis-King, J, Michael, K, Strand, J, Sander, R & Green, C 2021, *Underground storage of Hydrogen: Mapping out the options for Australia*, https://www.futurefuelscrc.com/wp-content/uploads/FutureFuelsCRC_UndergroundHydrogenStorage2021.pdf, accessed September 2023.
[29] Note: salt is a mineral for the purposes of the *Mineral Resources Act 1989.*

Under this option, consideration could be given to establishing a pathway for salt caverns to be developed and repurposed for hydrogen storage. In addition, consideration could also be given to incorporating hydrogen as a prescribed storage gas under the existing Petroleum and Gas Act.

Details about appropriate mechanisms, processes and decision-making criteria to determine priority of applicants for licencing and land use would need to be developed.

The benefits to extending the existing resources frameworks to encompass hydrogen would be that it provides consistency and certainty for proponents in investing, exploring and progressing hydrogen generation and storage projects. In addition, this approach may also allow proponents to re-commercialise a depleted gas reservoir or other underground structure created though resource extraction such as salt caverns.

This option could be complex, and as such, would take time to further develop and ensure there are no unintended consequences. This would also need to consider the appropriate approach to managing environmental and water impacts, as well as safety matters associated with underground storage of hydrogen. Appropriate fees for administration of the regulatory framework would also need to be considered and would be subject to a separate consultative process.

### Option 3. Create a new hydrogen storage framework in a standalone Hydrogen Act

Alternatively, a new hydrogen storage licence could be introduced through a standalone Hydrogen Act to provide clarity on the requirements for different hydrogen projects and how they interact with other regulatory processes.

A standalone act could leverage the gas storage provisions in the resources legislation and would also introduce or make provision for the future inclusion of other potential above or underground storage options as technological advances improve the viability or different options. Interactions with the resources legislation would need to be carefully considered as part of this option.

Like Option 2, this option could be complex and would take time to develop and implement new legislation to ensure there are no unintended consequences to the reforms. This process would also need to consider the appropriate approach to managing both environmental impacts and safety matters associated with the storage of hydrogen. Appropriate fees for administration of the regulatory framework would also need to be considered and would be subject to a separate consultative process.

**Consultation questions**

20. *What matters should be considered in expanding existing regulatory requirements or designing a new framework to support hydrogen storage?*
21. *Should underground storage of hydrogen be permitted in Queensland? Why or why not?*

## 4. Next steps

We encourage you to provide feedback on the questions highlighted throughout this document. Your valuable insights will help to ensure Queensland's renewable hydrogen industry can develop at scale, while also balancing the needs of regional communities where hydrogen is produced and stored.

You may wish to answer all of the questions for each of the proposed reforms, or specific questions that are of interest to you. We also welcome your feedback on other regulatory issues that are not included in this consultation paper.

Visit qld.gov.au/hydrogenreform to complete the online survey or to upload a written submission by **5pm Friday 1 March 2024**.

All feedback received will be considered and will help to determine whether regulatory changes are required. A consultation report will be prepared outlining a proposed timeline to implement the preferred options.