Queensland Hydrogen Prospectus

Queensland Government

TRADE + INVESTMENT QUEENSLAND

Contents

Executive **summary**

Queensland is an emerging renewables powerhouse

By 2030, Queensland will be at the forefront of green hydrogen production in Australia.

This will be achieved through harnessing the state's abundant renewable energy resources, existing infrastructure and expertise, and industry partnerships with leading companies from across the globe.

Queensland will supply domestic markets and export partners with a sustainable, reliable and safe supply of green hydrogen. This will require large-scale solar and wind farms, presenting opportunities for investors to partner with Queensland project developers.

Given Queensland's renewable energy ambitions, the state is also an excellent location to establish battery manufacturing and assembly facilities.

Queensland's holistic approach to developing and supporting flourishing renewables and hydrogen industries means that the state will become recognised as a global innovation hotspot and an investment destination of choice. The scale of these growing industries in Queensland means that investment opportunities are bountiful, including at the energy generation, production, and downstream stages.

The growth of the hydrogen economy will create opportunities in many different areas. There is scope for all aspects of industry to reorientate and benefit, from the broad-scale to the retail level. These industries include those associated with pipe fitting, combustion engine variation, maintenance and repair, safety, coordination and audit, electrical services manufacture and alignment, cable manufacture, mining and resource security, fabrication and development, and academic pursuits for environmental efficiencies.

Alongside the many competitive advantages, there will be a need for significant upgrades to infrastructure to enable hydrogen production and export, which create enormous opportunities for investors.

Queensland is a global innovation hotspot

with opportunities in energy generation, production and downstream stages.

Queensland's commitment to supporting early adoption of hydrogen technology for commercial applications will see the state become a leader in the delivery of cost-effective hydrogen value chains. Low-cost, reliable, clean hydrogen will provide the basis for strong demand for Queensland green hydrogen as an export fuel, both as ammonia and liquified hydrogen.

Global **ambitions**

Across the globe, decarbonisation of industry and energy supply is an increasingly prominent objective.

Nations and corporations are outlining commitments and developing comprehensive strategies to ensure they meet emission reduction targets. Net zero by 2050 is now a key consideration in most commercial operations across the world.

Climate considerations and financial decision-making processes are now intertwined like never before – working together to ensure a sustainable future.

Renewable energy generation and clean fuels like green hydrogen will play a key role as the world transitions and achieves its emissions targets.

Queensland's own transition to a low carbon economy is progressing at pace and we are supporting our major trading partners and other Australian states and territories to do likewise.

The Queensland Government has set a state target to reach net zero emissions by 2050, with an interim target of a 30% reduction in emissions by 2030 from 2005 levels. A complementary target is to have the state using 50% renewable energy by 2030.

Net zero emissions by 2050

30% reduction in emissions by 2030

50% renewables by 2030

Abundant **natural resources**

Renewables, such as solar and wind, have a pivotal role to play not only in energy generation but also the production of clean fuels such as green hydrogen.

Queensland has an abundance of these natural resources, giving the state a key competitive advantage over other possible investment destinations.

Queensland experiences more than 300 days of sunshine per year and already leads Australia in large-scale photovoltaic solar array deployment. With many more solar projects in the development pipeline and an estimated 1.73 million km^2 of land, Queensland is turning this natural advantage into real investment opportunities.

The Northern, Central, and Southern Queensland Renewable Energy Zones (QREZ) across the state aim to harness some of the best wind resources in Australia. These wind resources are complementary to the state's solar resources, with wind generation highest at night, meaning Queensland can maximise its natural resources advantage. A number of large-scale projects are in development as Queensland unlocks its wind potential.

These natural resources, and the already established and quickly growing energy generation infrastructure around them, means that Queensland is forging ahead as a world-leader in the establishment of a viable and scalable green hydrogen industry.

There are multiple water supply options across Queensland, including significant unallocated water resources and existing infrastructure such as dams and pipelines. These and the state's large, flat coastline further enhance Queensland's natural and existing competitive advantages.

The green hydrogen economy is a priority for Queensland. With abundant renewable energy sources, existing infrastructure including port facilities, and extensive technical and research capabilities, Queensland is the ideal location for growing a diverse green hydrogen sector, built on the latest technology.

Why **hydrogen?**

Hydrogen is the most abundant element in the universe and is widely used in a range of manufacturing and industrial processes. Manufactured hydrogen is described as being of various colours, including green, blue, grey, brown or black, depending on the manufacturing method used.

Green hydrogen is produced using methods that do not generate greenhouse gas emissions, and where production is both sustainable and environmentally friendly.

Blue hydrogen is produced using a process called 'steam reforming', which uses steam to separate hydrogen from natural gas. This process does produce greenhouse gases, but carbon capture and storage (CCS) technologies ensure those emissions are not released into the atmosphere.

Both green and blue hydrogen are regarded as renewable hydrogen, and it is green hydrogen that is the focus of the Queensland Hydrogen Strategy. Expanding its use, as a replacement for fossil fuels, into industries such as heavy transport, earthmoving equipment, and remote power generation will support global decarbonisation efforts.

Around the world, hydrogen is attracting unprecedented interest and investments. It is estimated it will contribute over 20% of global carbon abatement by 2050. Strong public-private collaboration is required to make this a reality.

We invite you to consider Queensland, create partnerships, capture business opportunities and be part of Queensland's new hydrogen story.

H_2 Most abundant element in universe

A focus on green hydrogen

CO_2 20% of global carbon abatement by 2050

QUEENSLAND SUCCESS STORY

Proven delivery of mega-scale projects

To be globally competitive in mega-scale green hydrogen export, a complex supply chain will be required incorporating renewable energy, water assets, hydrogen pipelines, geological hydrogen storage and ports. Queensland's abundant natural resources and existing expertise means it can supply low-cost renewable power, with high reliability, to achieve globally cost-competitive green hydrogen.

Queensland has a proven track record in possessing the ability to establish, grow and sustain major new industries from the ground up. This is demonstrated by the success of the state's Liquefied Natural Gas (LNG) and Metallurgical Coal industries.

Growth in coal seam gas in Queensland has been rapid during the past 15 years, peaking at 1,634 wells drilled in 2013–2014. This growth has supported more than $70 billion worth of investment in three LNG projects that have produced approximately 26 million tonnes of LNG, annually since 2015. This represents a quarter of the total global LNG supply, with LNG export earnings predicted to climb from an estimated $32 billion in 2020-2021 to $49 billion in 2021-2022.

Queensland is Australia's largest producer of metallurgical coal. In 2019-20 it contributed $82.6 billion to the Queensland economy and supported more than 42,000 jobs.

Queensland is Australia's closest eastern state to key Asian Pacific markets and many of the same trade partners who import Queensland's LNG and metallurgical coal are expected to be key trade partners for hydrogen.

Establish major new industries

Mega-scale resource exports

Complex supply chains

Emerging **renewables powerhouse**

In addition to the state's significant natural advantages, Queensland has also created a supportive and attractive pro-business environment to support its growing renewables and hydrogen industries.

In May 2019, the Queensland Government published the *Queensland Hydrogen Industry Strategy 2019-2024*. It identified five focus areas to support the industry's development: supporting innovation; facilitating private sector investment; ensuring an effective policy framework; building community awareness and confidence; facilitating skills development for new technologies.

Delivery of the Strategy is supported by the Queensland Hydrogen Taskforce – a dedicated team of senior representatives from across government and industry with expertise in economic development, infrastructure planning, policy and regulation, skills development, and logistics.

In 2020, the Queensland Government appointed the first dedicated Minister for Hydrogen.

With a blueprint for success and an expert team in place, Queensland has set about supporting domestic and foreign investors to become involved in the emerging hydrogen and supporting renewables industries.

Through Queensland's Renewable Energy Zones initiative, Queensland is enabling renewable energy development of the size and within the timeframes required to support the establishment of the hydrogen industry. The Queensland Government has committed $145 million to establish three Renewable Energy Zones in northern, central, and southern Queensland to support significant renewables investment, foster jobs and growth, and help Queensland reach its target of 50% renewables by 2030.

The $3.34 billion Queensland Jobs Fund brings together the Queensland Government's key industry development programs, and includes the dedicated $2 billion Queensland Renewable Energy and Hydrogen Jobs Fund. This allows government-owned energy corporations to increase ownership of commercial renewable energy and hydrogen projects, as well as supporting infrastructure, including in partnership with the private sector.

The Renewable Energy and Hydrogen Jobs Fund will consider investment proposals that support additional renewable energy generation and storage capacity in Queensland, and achieving the 50% renewable energy target by 2030. This includes, but is not limited to, solar, wind, pumped hydroelectric storage, hydrogen, and supporting network infrastructure.

Queensland's commitments

$145 million
to establish three renewable zones

$2 billion
Queensland Renewable Energy and Hydrogen Jobs Fund

Range of government incentives and support

The Queensland Government is engaging with industry and qualified investors on high-impact projects, and offers a range of government incentive programs and support. The $500 million Invested in Queensland program operates two streams that can be used to support major renewables and hydrogen projects. The Industry Partnership Program will invest $350 million to continue to grow and create jobs across several priority industries, including hydrogen.

Invested in Queensland

Strategic Investment Scheme

The Strategic Investment Scheme is designed to provide tailored assistance packages to support large-scale projects that result in significant economic benefits in terms of new jobs, and wider supply chain and industry benefits. Such projects may involve new investment, significant expansions and supply chain capability enhancements.

Investment Support Scheme

The Investment Support Scheme is a rebate program for payroll tax and other state-managed taxes, designed to incentivise international and interstate businesses, with proven capability, to invest in Queensland through a transfer or expansion of operations.

Industry Partnership Program

Through the program, the Queensland Government will work together with business, industry, and research institutions to tailor flexible incentives that facilitate cross-sectoral opportunities, unlock growth in multiple industries or supply chains, and have a broad impact on the economy.

Incentives can be both non-financial and financial, offered in assistance packages developed specifically to suit each project.

These funds and incentive programs may be of assistance to companies looking to establish new manufacturing and other large employment creation projects, including those that will take advantage of new renewable energy projects.

Queensland Hydrogen Investor Toolkit

The Queensland Government has developed this to assist investors with information about each step of the planning and approval process for projects in Queensland. This includes details about selecting optimal locations, infrastructure and services, and the assessment and approval of developments. The Queensland Hydrogen Investor Toolkit is available here:

CLICK or SCAN
TO DOWNLOAD

Hydrogen innovation through R&D

The Queensland Government is directly supporting innovation in hydrogen technology.

Its $755 million flagship Advance Queensland initiative is supporting programs that drive innovation and build on the state's natural advantages. Advance Queensland includes a commitment to address energy sustainability through innovation, with hydrogen identified as a priority industry.

Expertise in hydrogen technology exists across several of Queensland's leading universities and tertiary institutions. These are at the forefront of research and development projects that will drive innovation to support competitive production, storage, transport and use of hydrogen.

Skills and workforce development

Queensland's unique advantages ensure it is well placed to establish, grow, and maintain the hydrogen supply chain. The state has a highly skilled workforce, with experience in sectors that are directly transferable to hydrogen, such as energy, high temperature manufacturing, chemical, petrochemical and gas.

Queensland is also home to internationally recognised universities and skills training institutes and boasts a lifestyle that is instrumental to retaining highly skilled workers.

The Queensland Government is acting to further develop the skilled and capable workforce that is essential to support the advancement and growth of the hydrogen industry. It is working with industry, training providers, and other key stakeholders to understand the skills required across the hydrogen supply chain and existing capabilities within the workforce, and establish training pathways to meet future skills needs.

As part of its approach to skills and workforce development, the Queensland Government has invested more than $50 million in state-of-the art training infrastructure, with renewable energy and hydrogen capabilities. Key locations across the state include:

Brisbane

- ✓ $20 million towards Stage 2 of the Queensland Apprenticeships Centre, including a Hydrogen Training Centre of Excellence that will provide apprentices with the skills and expertise to work in the hydrogen industry.
- ✓ $17 million towards the Pinkenba Renewable Energy Training Facility, to train apprentices and qualified electricians to install, operate and manage solar and other renewable energy equipment.

Townsville

- ✓ $10.6 million towards a Hydrogen and Renewable Energy training facility at Bohle TAFE.

Gladstone

- ✓ $2 million to upgrade training facilities at Gladstone State High School to prepare students for future jobs in hydrogen.

Opportunities for **development**

Across Queensland, there are 12 State Development Areas (SDAs).

These are clearly defined and strategically located areas of land planned and managed by Queensland's Office of the Coordinator-General to promote economic development in Queensland.

The Gladstone, Townsville and Abbot Point SDAs in particular are well placed to support the development of major hubs for large-scale industry activities, such as the hydrogen industry sector, with close proximity to trading ports, transport and utilities infrastructure networks, natural resources and skilled labour forces.

Other SDAs, such as the Stanwell to Gladstone Infrastructure Corridor SDA, are dedicated to multi-user infrastructure corridors for the co-location of infrastructure such as water and gas pipelines, rail lines and electricity transmission lines, which will be key to supporting the development of the hydrogen sector.

The Office of the Coordinator-General has experience in facilitating the establishment of new industry in Queensland and played an important role in the efficient establishment, assessment, and development of the LNG industry in Queensland. This utilised land acquisition powers and a range of other powers under the State Development and Public Works Organisation Act to deliver streamlined assessment processes and facilitate and expedite the delivery of large-scale and complex projects.

Gladstone

Benefits of the Gladstone SDA include:

- Access to the Port of Gladstone, Queensland's largest multi-commodity port, handling more than 30 different products.
- Proximity to extensive road and rail links.
- An established concentration of industrial development, minimising new project risks associated with environmental impacts, loss of amenity and transport conflicts.
- Access to a diverse skilled workforce within the Gladstone region.

Gladstone is Queensland's port city and considered to be the industrial heart of Queensland. The region has a history of international trade and industrial development at significant scale, confirming it as a strategic investment location.

The Queensland Government has a track record of assisting transformative industries take shape in Gladstone – alumina and aluminium industries in the 1980s, coal exports in the 1990s and early 2000s, and most recently the establishment of the globally competitive LNG export industry.

There is vast industrial expertise in Gladstone, with experience in energy generation, mineral processing, metal manufacturing and fabrication and material handling.

In addition to industrial expertise, the Queensland Government has dedicated and significant planning resources for Gladstone's continued industrial and economic development.

More information and details can be found by clicking or scanning the QR code provided.

Gladstone port access and capacity

The Port of Gladstone is Queensland's largest multi-commodity port and handles more than 100 million tonnes per year. It is a naturally deep water harbour, protected by islands, and has eight main wharf centres and 20 ship berths.

It is managed by Gladstone Ports Corporation (GPC) and boasts extensive landholdings, making it the most expandable port in Australia.

In addition to world-leading coal, alumina, aluminium and LNG export facilities, and bauxite and industrial chemical import facilities, GPC provides a container and break-bulk service at the 129 hectare Gladstone Port Central Facility.

GPC is targeting Fisherman's Landing as the location for future wharf and berthing infrastructure for hydrogen export. Complemented with facilities in handling major containerised freight and break bulk capability at Port Central, GPC is positioning Gladstone's port facilities to lead hydrogen and renewable industry sector domestic and international export market activities.

More information and details can be found by clicking or scanning the QR code provided.

Townsville

Townsville is an economic powerhouse in north Queensland and is the major regional centre in an area that is rich and diverse in natural resources, agricultural production and tourism opportunities.

It has a local workforce with strong relevant skills, and a range of educational facilities from technical and trade, through to universities. It offers favourable climatic conditions and is well positioned in relation to major growth economies throughout Asia and the Indian sub-continent.

The 4,915 hectare Townsville State Development Area is located about six kilometres south-east of the Townsville CBD and two kilometres south of the Port of Townsville. It is situated at the junction of the national road network, with direct connections to major rail networks and the Port of Townsville.

The Port of Townsville has several industrial land sites available, with land being increasingly made available due to the port expansion work that has commenced with channel widening works. This land is reserved for projects directly requiring access to port facilities.

More information and details can be found by clicking or scanning the QR code provided.

The Ports of Hay Point and Mackay

The Mackay and Hay Point location is well positioned to tap into renewable energy with great capacity for hydro, solar and wind energy sourced interests, making this an attractive prospect for hydrogen industry development and value chain activities. Electricity network infrastructure and easements connect to the Isaac Renewable Energy Zone with potential for capacity growth and expansion.

Dudgeon Point has up to 1,400 hectares of land available which could be allocated to accommodate the hydrogen industry potential. The Port of Hay Point is designated as a 'priority port' with existing berths facilities appropriate for hydrogen export vessels. The Port of Mackay has existing capacity to handle 550 to 600 ships per year.

More information and details can be found by clicking or scanning the QR code provided.

Abbot Point

The Abbot Point SDA offers the ideal location for industrial and port-related development that requires a large footprint, proximity to a port and separation from sensitive receptors.

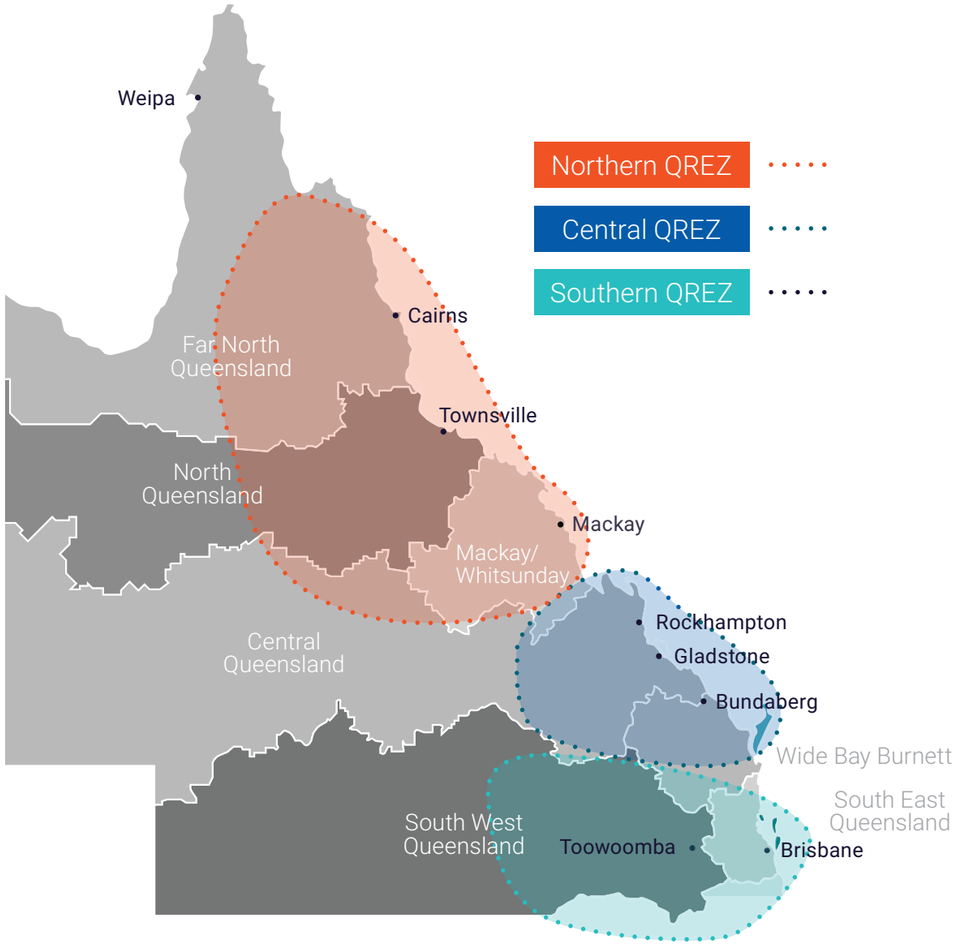
It has the potential to play a significant role in the hydrogen sector and supply chain, with potential to unlock the North Queensland Renewable Energy Zone via Abbot Point in partnership with Townsville, Mackay and Hay Point, as well as other regions.

With access to dammed and ocean water supplies, electricity transmission networks and infrastructure and planned port expansions, Abbot Point presents opportunities for economic growth in industry development in a regional location.

More information and details can be found by clicking or scanning the QR code provided.

Emerging regional **opportunities**

Queensland's regions specialise in a diverse range of industries and offer countless investment opportunities. The Queensland Government is committed to the pursuit of renewable energy opportunities to drive a greener footprint for business, new jobs and more value for Queensland.



Trade and Investment **Queensland**

Trade and Investment Queensland (TIQ) is the first point of contact for international investors. With 16 offices in 13 international markets, TIQ has one of the largest and most dynamic networks of any Australian trade and investment agency.

TIQ works with overseas firms looking to develop projects or invest capital in Queensland, as well as Queensland companies looking to attract foreign investment.

TIQ can:

- Support your company through the investment process in conjunction with a wide range of Queensland Government agencies – from land identification through to project approvals, construction, and operation – as detailed further below.
- Connect you to Queensland industry contacts and provide tailored business and project information, including detailed industry knowledge about business costs.
- Introduce you to a range of financial incentives potentially available across the three levels of Government in Australia to help you develop your business – through expansion, commercialisation, research and development, innovation, and exporting.
- Provide nominations for business visas to the Commonwealth which when granted allow high net worth individuals and successful hydrogen and energy specialists to migrate and invest in Queensland.

The Queensland Government offers a range of industry attraction and facilitation support services to assist you in establishing or expanding your business in Queensland.

These include:

- Providing business case information addressing project requirements, business costs, skills and availability, and other investment drivers within Queensland.
- Identifying suitable site options that reflect project requirements.
- Access to Queensland Government contacts.
- Coordinating pre-lodgement meetings and giving advice on the development approval process to expedite approvals and reduce barriers.
- Providing advice or introductions to various service providers – such as property groups, utilities, education and training organisations, and raw material suppliers – to allow your business to effectively expand in the state.

TIQ **Commissioners**

China	Julie-Anne Nichols, Queensland Senior Trade and Investment Commissioner
Europe	Dave Stewart, Agent-General for the United Kingdom and Trade and Investment Commissioner
Hong Kong	Julia Herries, Queensland Trade and Investment Commissioner – Hong Kong Special Administrative Region of the People's Republic of China
South Asia	Abhinav Bhatia, Queensland Senior Trade and Investment Commissioner
Indonesia	Ben Giles, Queensland Trade and Investment Commissioner
Japan	Tak Adachi, Queensland Senior Trade and Investment Commissioner
Korea	Ryan Freer, Queensland Trade and Investment Commissioner
Latin America	Alex Pessagno, Queensland Trade and Investment Commissioner
Middle East and North Africa	Donna Massie, Queensland Trade and Investment Commissioner
North America	Viki Forrest, Queensland Trade and Investment Commissioner
ASEAN	Tom Calder, Queensland Trade and Investment Commissioner
Taiwan	Patrick Hafenstein, Queensland Trade and Investment Commissioner
New Zealand	Richard Simpson, Director, Business Development

NEXT STEPS TO INVEST IN QUEENSLAND, CLICK OR SCAN THE QR CODE TO SPEAK TO ONE OF OUR ADVISERS.

TIQ.QLD.GOV.AU

Queensland Government

TRADE + INVESTMENT QUEENSLAND

22-006