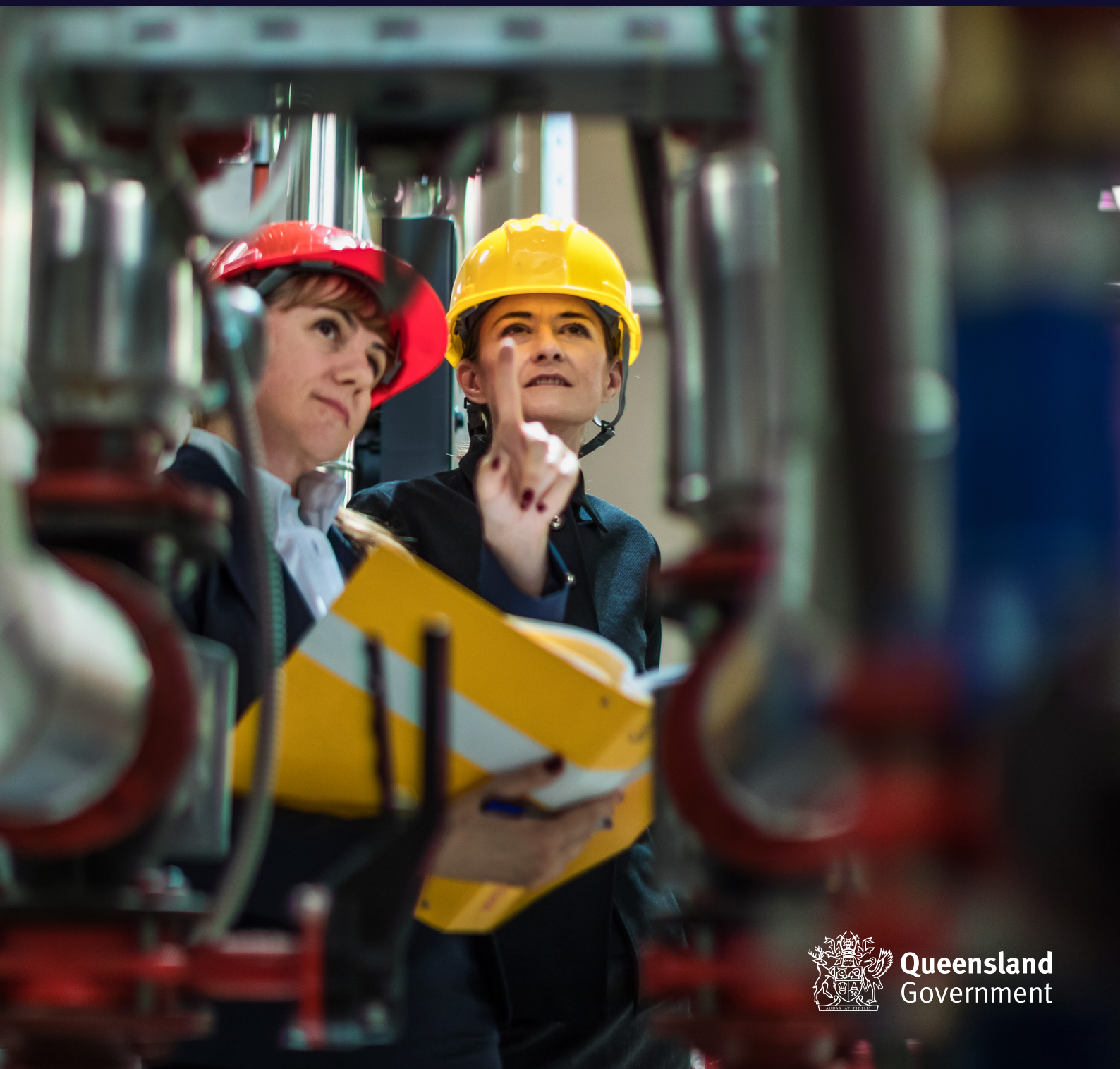
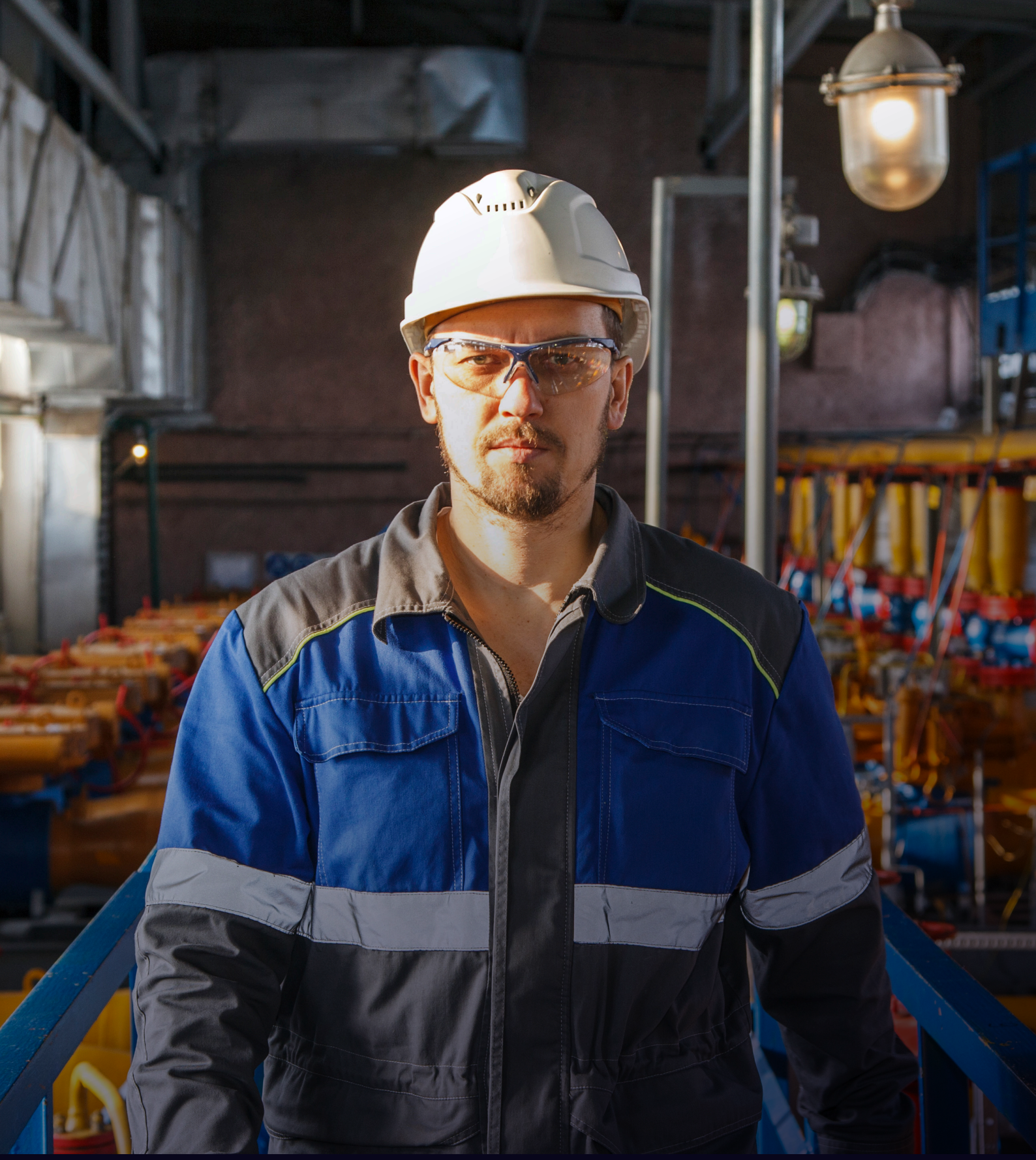
HYDROGEN INDUSTRY WORKFORCE DEVELOPMENT

ROADMAP 2022-2032



Queensland Government



Acknowledgement

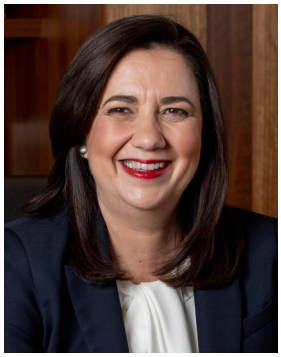
The Queensland Government respectfully acknowledges the First Nations peoples in the state of Queensland, and acknowledges the cultural and spiritual connection that Aboriginal and Torres Strait Islander people have with the land and sea.

We respectfully acknowledge Aboriginal people and Torres Strait Islander people as two unique and diverse peoples, with their own rich and distinct cultures, resilience and strengths. We specifically acknowledge the unique history and cultural heritage of Aboriginal and Torres Strait Islander people as the First Peoples of Australia.

We pay our respects to Elders past and present. We are dedicated to the inclusion of cultural knowledge and values as critical factors in the development, implementation and evaluation of strategies and actions to support First Nations people.

PREMIER'S MESSAGE

THE HONOURABLE ANNASTACIA PALASZCZUK MP



Queensland is well placed to play a leading role in the renewable hydrogen revolution, with research, significant resources, available land, and export-ready ports.

Our renewable energy industry is already worth $8.5 billion and the Queensland Government is committed to working with the private sector to continue building the industry, create jobs and keep the economy strong.

We aim to fast track the development and export of renewable energy in Queensland and ensure we are the global supplier of choice for green hydrogen.

My government's ***Queensland Hydrogen Industry Strategy 2019-2024*** outlines how we will achieve this goal.

The Strategy outlines a five-year plan to grow a sustainable hydrogen industry that supports renewable resources, creates jobs, strengthens our economy and positions Queensland to capitalise on emerging domestic and international renewable hydrogen opportunities.

Hydrogen production will help Queensland:

- create new jobs
- open a new export market for the state
- attract foreign investment.

Our environment and innovative technology presents exciting new job opportunities for Queenslanders. Investing in skills and training are vital building blocks for successful industry development and building a skilled workforce remains a priority for my government.

As part of the Strategy, in excess of $60 million has already been committed across multiple initiatives to help stimulate the hydrogen industry and support future hydrogen jobs across the state. The Queensland Government will continue to work with industry to invest in skills and training to ensure existing and new workers can seize these opportunities.

This is an exciting time for Queensland. I welcome the delivery of the ***Hydrogen Industry Workforce Development Roadmap***, which sets out key workforce development, skills and training actions to support the industry's development and growth now and into the future.

The Honourable Annastacia Palaszczuk MP
Premier and Minister for the Olympics

MINISTER'S MESSAGE

THE HONOURABLE DI FARMER MP

I'm proud of the strong skills and training ecosystem we have established in Queensland.

As interest in renewable energy grows worldwide – we need trainees, apprentices and a strong higher education sector to develop the necessary skills to respond to this need, create a skilled workforce and ensure our economy continues to grow.

We are at an important stage in developing this industry because the foundations and pathways we are establishing now will shape how businesses, workers, customers and the wider economy benefit down the track.

The ***Hydrogen Industry Workforce Development Roadmap 2022-2032*** sets a path to delivering a skilled and capable workforce that will enable Queensland to achieve its vision for the hydrogen industry, and to ensure Queenslanders are well positioned to be a part of this journey.

We know that jobs change lives and with the growth of Queensland's hydrogen industry will come life changing opportunities. The development of hydrogen projects and supporting renewable energy infrastructure will lead to industry growth with the potential to create jobs across a broad range of occupations, particularly in areas where we have renewable energy infrastructure and port facilities. This is great news for regional Queensland.

Across Queensland, more than $50 million is being invested in training facilities that will provide workers with skills to enter into the growing renewable energy and hydrogen industry.

Already, we have many young apprentices honing their skills in world-class training facilities and positioning them as future leaders in their chosen careers.

Not only are we creating new career pathways to keep up with emerging technologies – we are making headway in creating cleaner ways of operating. I look forward to seeing more Queenslanders start their careers in a clean industry that offers a bright and exciting future.

I thank the industry, skills and training, higher education and community stakeholders for helping develop the Roadmap that will shape Queensland's future.

Together we can deliver valuable benefits for our economy, our communities and our environment.

The Honourable Di Farmer MP
Minister for Employment and Small Business
Minister for Training and Skills Development

MINISTER'S MESSAGE

THE HONOURABLE MICK DE BRENNI MP

The global economy is changing fast and energy is at the centre of that transformation.

So to meet the global challenges of tomorrow, we're accelerating the development of Queensland-made hydrogen, creating more jobs in more industries, especially in regional Queensland.

With the pace and scale of our energy transformation, there's an opportunity for tens of thousands of new jobs, to achieve our goals.

We can, and indeed should, foster an inclusive transformation that provides Queenslanders the best opportunity to participate and benefit.

For those reasons, our focus on developing the local skills of Queenslanders along with driving growth in supply chain capability has never been stronger.

Global demand for decarbonised fuel consumption with renewable hydrogen is growing rapidly, bringing with it valuable export opportunities that Queensland is poised to take advantage of.

Development of our hydrogen industry will capitalise on our significant renewable resources, global gas export expertise, world-class port infrastructure, and long-standing relationships with international partners.

We're working with our global partners to secure these export opportunities, signing agreements with the Netherlands, Japan, and South Korea.

Queensland is also collaborating with New South Wales and Victoria to establish Australia's Hydrogen Superhighway that includes the nation's most critical roads and highways.

Through strategic government investment under the Queensland Hydrogen Industry Strategy 2019–2024, and our $2 billion Renewable Energy and Hydrogen Jobs Fund, we are fast-tracking progress toward a green hydrogen future.

The Queensland Government has invested over $60 million in the development of the emerging hydrogen industry. $50 million is also being invested in targeted hydrogen skills and development centres to help attract new workers to the hydrogen industry and to meet projected demand for existing apprentices and tradespeople.

I look forward to working closely with the energy sector and the community to ensure Queenslanders lead the way in the opportunities of our green hydrogen industry.

The Honourable Mick de Brenni MP
Minister for Energy, Renewables and Hydrogen
Minister for Public Works and Procurement

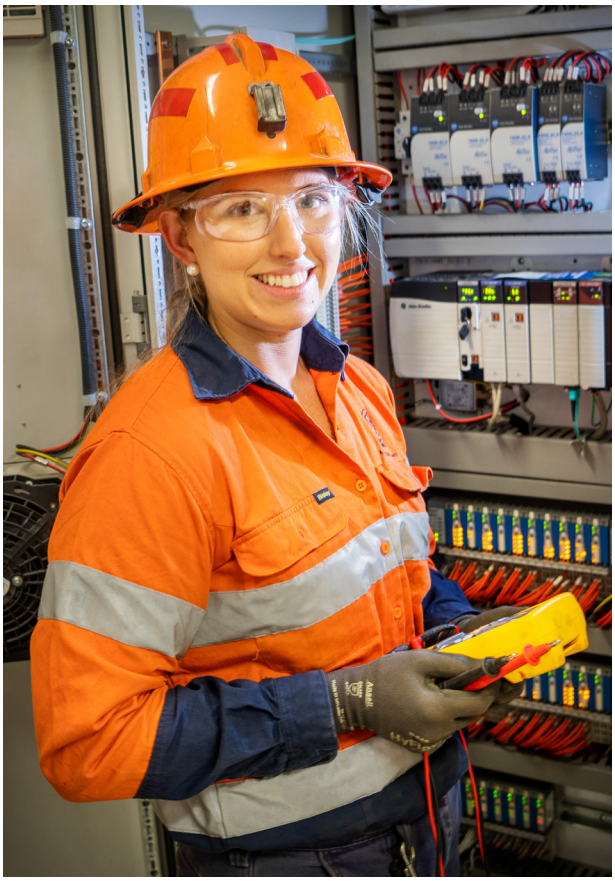
EXECUTIVE SUMMARY

Queensland is set to be at the forefront of renewable hydrogen production in Australia by 2030.

Key international companies are investing in Queensland hydrogen projects, with significant industry activity either proposed or under development from South East Queensland up to Cape York.

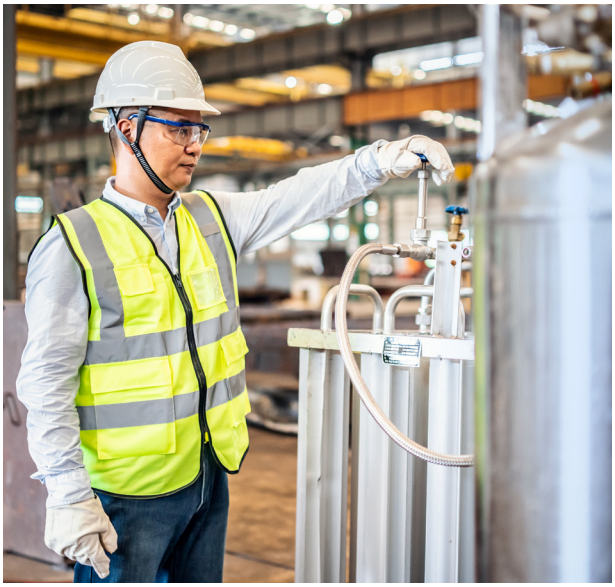
The Queensland Government is **working with industry**, skills and training providers, universities and regional bodies to look ahead, anticipate the skills needs of the hydrogen industry and plan a path to supporting a hydrogen ready workforce.

From tradespeople and construction workers through to project managers and engineers with higher education qualifications, the workforce needs of the hydrogen industry will be diverse and involve a broad range of skills and training pathways.



The ***Hydrogen Industry Workforce Development Roadmap 2022-2032*** sets a path to achieving a clear vision:

A strong and adaptable workforce for a safe and thriving Queensland hydrogen industry



This Roadmap identifies a range of short, medium and long term actions to deliver on this vision, focused on:

- Building a pipeline of skilled, adaptable workers for the hydrogen industry
- Sharing knowledge to support hydrogen skills, training and safety
- Maximising the benefits of hydrogen for communities through a local approach to skills, training and workforce development
- Using data insights to plan for industry workforce needs over time.

This Roadmap builds on the outcomes of ***the 2022 Queensland Workforce Summit***, and advances the Queensland Government's ***Objectives for the Community***, including good jobs, the delivery of better services and support for the Queensland lifestyle.

ABOUT THE ROADMAP

OUR VISION

A strong and adaptable workforce for a safe and thriving Queensland hydrogen industry

OUR APPROACH FOCUS AREAS FOR ACTION

Building a pipeline of skilled and adaptable workers for the hydrogen industry

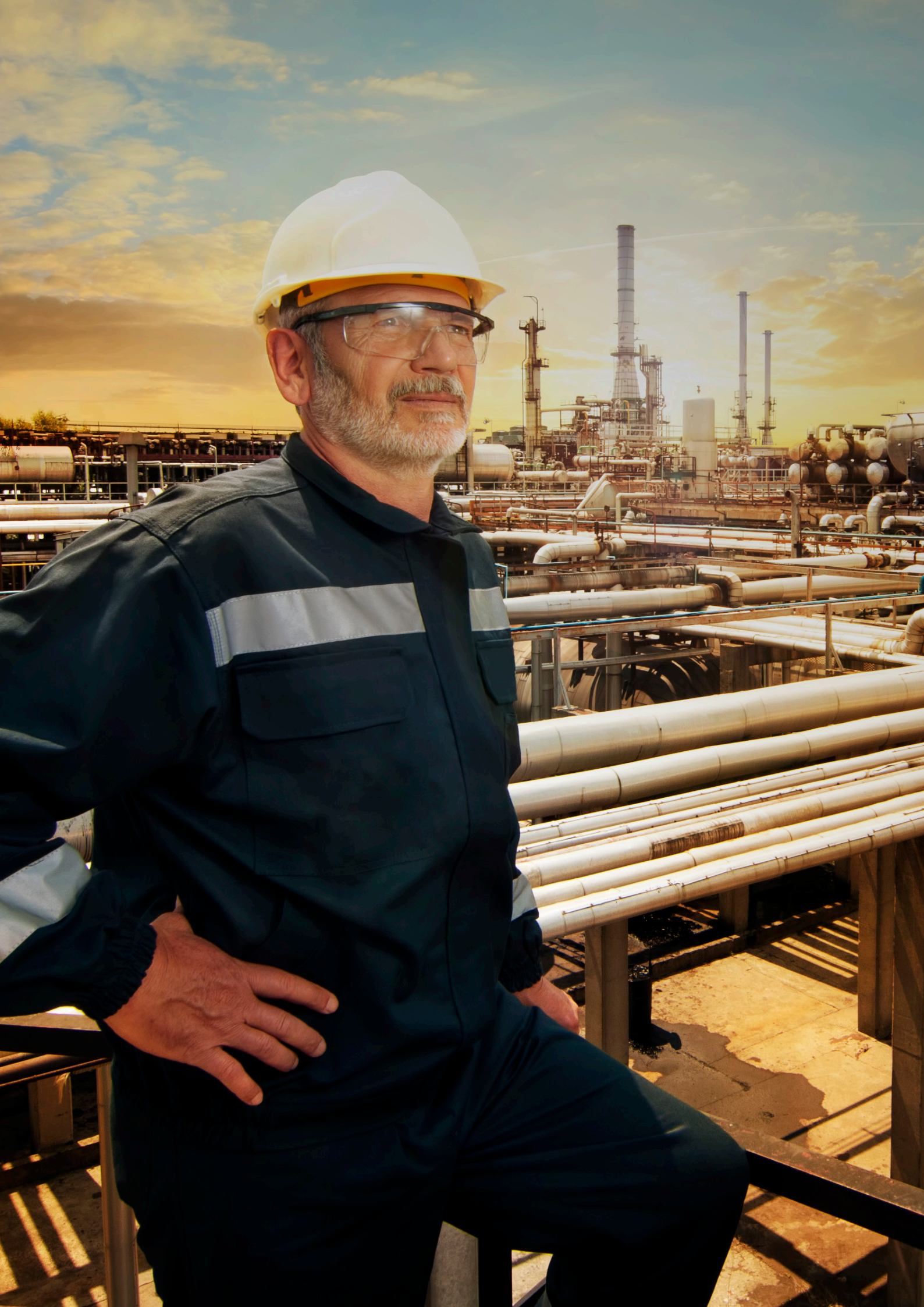
Sharing knowledge to support hydrogen skills, training and safety

Maximising the benefits for local communities

Using data insights to plan for industry workforce needs over time

SHARED RESPONSIBILITY

Government | Industry | Employers | Education & training providers | Communities



QUEENSLAND'S STRATEGIC VISION FOR THE HYDROGEN INDUSTRY

The Roadmap forms part of a suite of Queensland Government strategies and plans to help position Queensland at the forefront of hydrogen production

Queensland Hydrogen Industry Strategy 2019-2024

State Infrastructure Strategy 2022

Zero Emission Vehicle Strategy 2022-2032 and Zero Emission Vehicle Action Plan 2022-2024

Advanced Manufacturing 10 Year Roadmap and Action Plan

2022 Queensland Workforce Summit

Queensland Resources Industry Development Plan

CASE STUDY:

INVESTING IN HYDROGEN SKILLS AND TRAINING

The Plumbing Industry Climate Action Centre's (PICAC's) $20 million Hydrogen Training Centre of Excellence at Beenleigh will be Australia's first facility to train a future workforce in the hydrogen industry.

This new world-class facility will support the next generation of apprentices while upskilling existing tradespeople in the safe maintenance and installation of hydrogen systems. The new world-class training facilities have been purpose built to cater for current and emerging technologies as the hydrogen industry develops and matures over the next 10-20 years, including specialised training equipment utilising four types of gas; natural, LPG, hydrogen blend and pure hydrogen. This investment will expand training capacity from 600 to 800 apprenticeships per year to train apprentices in fire protection, gas, electrical and plumbing skills.

During construction, the project has employed 112 apprentices onsite, exceeding the previous target of 70.

> New world-class training facilities have been purpose built to cater for current and emerging technologies as the hydrogen industry develops and matures over the next 10-20 years.

PICAC is a whole-of-industry collaboration model between the Plumbing and Pipe Trades Employees Union Queensland, the Master Plumbers' Association of Queensland, the National Fire Industry Association and the Air Conditioning and Mechanical Contractors Association (AMCA).

SKILLS AND TRAINING NEEDS OF THE HYDROGEN INDUSTRY OVER TIME

WHAT SKILLS ARE NEEDED?

Opportunities across the hydrogen industry for Queensland are diverse and will require a broad range of different job roles.

- **Core skills** will appear consistently across the different stages and types of hydrogen projects, including **plumbing, electrical work, process operations, and engineering**. Different skills and occupations will appear in relation to the various hydrogen production processes and end uses, from maintenance on hydrogen powered vehicles through to ship loading for hydrogen export.
- The engineers, technicians and specialists that have supported the growth of Queensland's LNG industry have important skills that will be applicable to many hydrogen production and transport facilities, including skills in **instrumentation and pipeline construction**.
- Key skills for the hydrogen industry will also include **project management, design and workplace safety**. Many other roles in corporate and operational functions will also be needed by the industry, including **financial analysis, human resources, and Environmental, Social and Governance** (ESG) management and compliance.
- A **strong foundational knowledge of safety requirements** will be essential. Workers with existing skills will need to be upskilled to become familiar with the properties of hydrogen, handling processes, and the pressures at which it needs to be stored. Experts in hazardous areas management, on-site emergency response and quality assurance will also need to develop specialist capabilities to work with hydrogen.
- **Trainers, assessors, teachers**, and academic staff will need to be familiar with hydrogen technologies and retain industry currency as the sector develops.
- Renewable hydrogen will require further ramping up of Queensland's **renewable energy generation capacity**, with an increase in demand for new and traditional **energy skills** and significant demand for **construction workers**.

The Hydrogen Skills Map sets out the skills needs and training pathways for aspects of the hydrogen value chain. It demonstrates that a range of **different skilling pathways** will apply, including VET, higher education and non-accredited pathways.

HYDROGEN SKILLS MAP

Planning & Design

Hydrogen System and Facility Design*
- Engineers - Systems/Integration, Robotics, Automation (Higher Ed.)
- Draftspeople (VET)
- Industrial designers (Higher Ed.)

Design of Integrated Systems and Facilities
- Engineers - Systems/Integration, Robotics, Automation (Higher Ed.)
- Industrial designers (Higher Ed.)
- Draftspeople (VET)

Hydrogen Pipeline, Storage and Transport Facility Design
- Engineers - Mechanical, Electrical, Chemical, Automation (Higher Ed.)
- Draftspeople (VET)
- Industrial designers (Higher Ed.)

Planning, Approvals and Compliance processes
- Planners (Paraprof./Higher Ed.)
- Regulatory Officers (Paraprof./Higher Ed.)
- Project Managers and Consultants (Paraprof./Higher Ed.)

Water Treatment

Establishing and Operating facilities to purify water for hydrogen production*
- Plumbers and engineering trades, including for pumps (VET)
- Instrumentation & Electrical Technicians (VET/Paraprof.)
- Process Operators (VET/Paraprof.)
- Specialists in treatment, testing, and compliance of water quality (VET/Paraprof.)
- Engineers - Process, Chemical, Civil, Mechanical (Higher Ed.)

Construction & Installation

Electrolyser Installation and Commissioning*
- Project Managers (Paraprof.)
- Electrolyser Technicians* (VET/Paraprof.)
- Instrumentation & Electrical Technicians (VET/Paraprof.)
- Engineering Trades (VET)
- Mechanical Fitters (VET)

Pipeline Construction, Commissioning & Testing
- Pipeline Technicians (VET/Paraprof.)
- Project Managers (Paraprof.)
- Engineering Trades (VET)
- Surveyors (Higher Ed.)

Installation of Stationary Fuel Cells* – Industrial/Commercial Scale
- Project Managers (Paraprof.)
- Fuel Cell Technicians* (VET/Paraprof.)
- Engineering Trades (VET)

Installation of Stationary Fuel Cells* – Industrial/Commercial Scale
- Project Managers (Paraprof.)
- Instrumentation & Electrical Technicians (VET)
- Engineering Trades, including for pressure vessels, etc. (VET)

All above
- Equipment Certifiers (VET)

Manufacturing

Production & Assembly of electrolysers, fuel cells and components
- Engineers - Manufacturing, Robotics, Automation (Higher Ed.)
- Manufacturing Workers (VET/OTJ)
- Engineering Trades (VET)
- Composites Technicians (VET)

Operations & Maintenance

Hydrogen Production Process Operation*
- Specialist Hydrogen Process Operators* (VET/Paraprof./Higher Ed.)
- Engineers - Electrical, Gas, Chemical (Higher Ed.)
- Quality and Safety Managers (Higher Ed.)
- Mechanical fitters (VET)

Electrolyser Maintenance*
- Electrolyser Technicians* (VET/Paraprof.)
- Instrumentation & Electrical Technicians, including SCADA (VET/Paraprof.)

Pipeline and Hydrogen Storage Facilities Operations and Maintenance
- Pipeline Technicians (VET/Paraprof.)
- Specialist Hydrogen Process Operators, including SCADA (VET)*
- Safety Managers (VET/Higher Ed.)
- Engineering Support (Paraprof./Higher Ed.)

Hydrogen Compression, Liquefaction and Conversion using multiple carriers – for domestic use*
- Specialist Hydrogen Process Operators* (VET/Paraprof./Higher Ed.)
- Mechanical Fitters (VET)

Stationary Fuel Cell Maintenance*
- Fuel Cell Technicians* (VET/Paraprof.)

Dangerous Goods Transport
- Drivers (OTJ)
- Vehicle inspectors (OTJ)

Hazardous Areas
- Electricians (VET)
- Inspectors (Paraprof)
- Safety Managers (VET/Paraprof)

Transport

Hydrogen Refuelling/ Dispensing* – Fleet & Retail
- Service Station Workers (OTJ)

Installation of Refuellers
- Hydrogen Dispenser Technicians* (VET/Paraprof.)
- Gas Fitters (VET)

Fuel Cell Electric Vehicle (FCEV) Maintenance*
- Automotive Trades & Technicians (VET)

Future Transport Applications – Rail, Maritime, Aerospace*
- [TBD]

Export

Hydrogen Compression, Liquefaction and Conversion using multiple carriers – for export*
- Specialist Hydrogen Process Operators* (VET/Paraprof./Higher Ed.)

Ship loading for Hydrogen Export*
- Specialist Hydrogen Process Operators* (VET/Paraprof./Higher Ed.)

Energy

Injecting Hydrogen into Gas Networks*
- Pipeline Technicians (Paraprof.)

Hydrogen Combustion Turbine Design & Operation*
- Engineers - Mechanical, Electrical (Higher Ed.)
- Power Plant Operators (VET)

Residential Hydrogen System Design*
- Plumbers (VET)
- Electricians (VET)

Residential Stationary Fuel Cell Installation and Maintenance*
- Plumbers (VET)
- Electricians (VET)

Hydrogen Combustion Appliance Installation & Maintenance*
- Plumbers (VET)
- Electricians (VET)
- Gas Fitters (VET)

Industry

Use of Hydrogen as Feedstock/Input for Green Metals, Green Ammonia & Manufacturing*
- Process Operators (VET)
- Metallurgists (Higher Ed.)
- Engineers - Chemical, Mechanical (Higher Ed.)

Whole Sector

Hydrogen Emergency Response*
- On-site emergency teams* (VET)
- First Responders (VET/Higher Ed./ Specialist training)

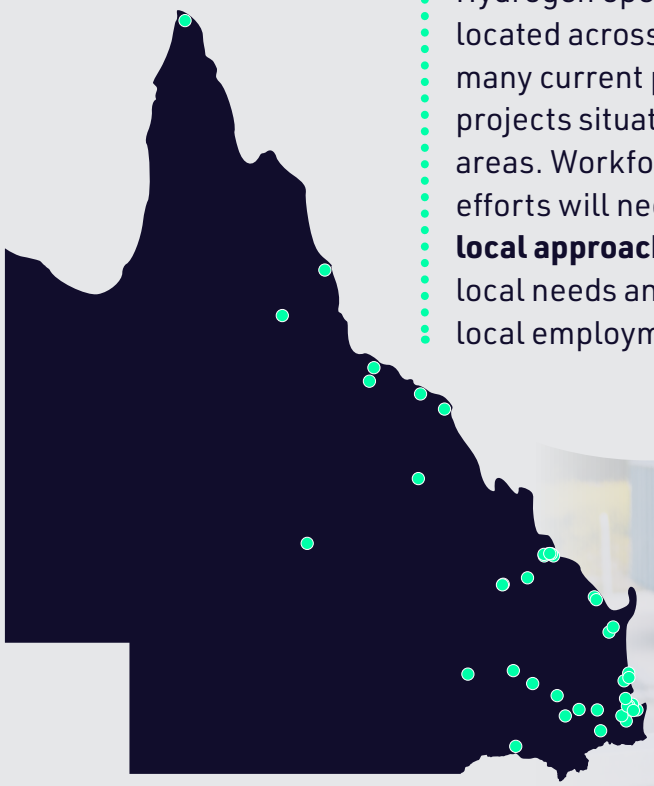
Hydrogen Familiarisation and Safety*
- All Roles (VET/OTJ)

Trainers and Teachers
- For all roles (VET/Paraprof./Higher Ed.)

***NEW SKILLS OR OCCUPATIONS:** Most others will build on existing capabilities.
SKILLS AND TRAINING PATHWAYS: Vocational Education and Training (VET); On the job training (OTJ); Higher Education – Bachelor/Postgraduate (Higher Ed.); Paraprofessional – Advanced diploma or Associate degree (Paraprof.)

This Hydrogen Skills Map has been developed and tested with industry stakeholders across Queensland
However, we know there may be many other skills and occupations not shown here. Hydrogen is a huge employment opportunity for Queensland.

WHERE AND WHEN WILL WE NEED WORKERS?



Hydrogen operations will be located across the state, with many current proposals and projects situated in regional areas. Workforce development efforts will need to **consider local approaches** to meet local needs and support local employment outcomes.

Legend Hydrogen projects in Queensland

This map is for illustrative purposes only and is current as at 8 July 2022.

Queensland's formidable skills base has developed over centuries of industrial development and change. This has led to the development of **strong regional capabilities**, from natural gas in Gladstone, to mining in Mount Isa, to metals processing in Townsville. Building on this existing base of skills to meet the needs of the hydrogen industry will unlock a new stream of opportunities for regional businesses, communities and workers.

Skills and workforce needs will change over time as major hydrogen projects move from concept to construction and then into operation. Ongoing innovation in the industry will lead to opportunities to upgrade and optimise facilities with improved technologies and processes. This in turn will impact on skills demand.

The timing of skills needs is dependent on the progress of industry development, and industry is forging ahead. For example, work has begun on building the world's largest electrolyser manufacturing facility in Gladstone, with first production to commence in 2023. Projects are also progressing towards a hydrogen export industry in order to meet international demand, including Japan's target to build the world's first full-scale hydrogen supply chain by 2030. **Now is the time to plan for Queensland's hydrogen workforce.**

CASE STUDY: CONSTRUCTION SKILLS QUEENSLAND

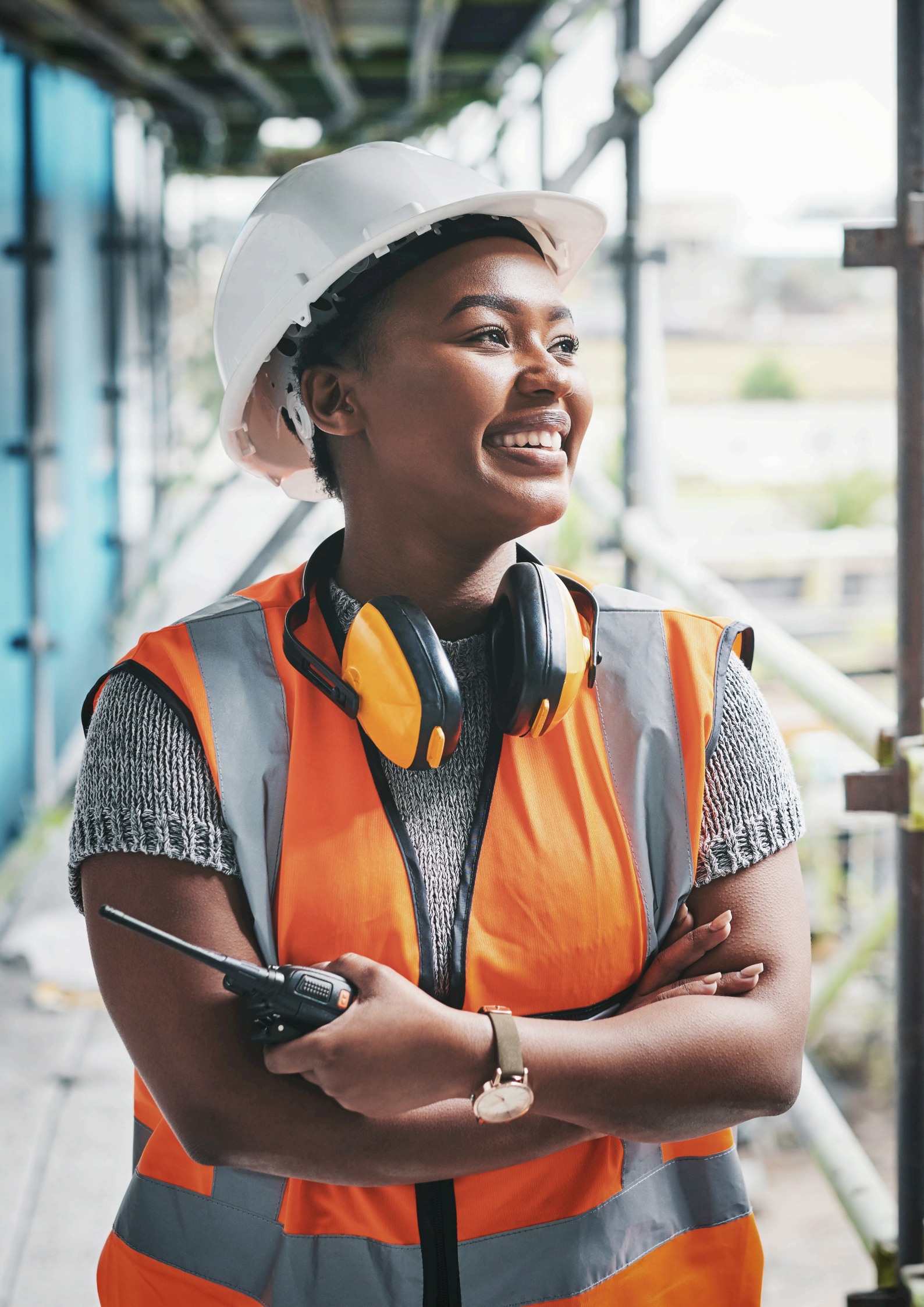
UNPACKING THE ROLE OF THE CONSTRUCTION WORKFORCE IN QUEENSLAND'S HYDROGEN FUTURE

The development of the hydrogen industry is expected to ask a lot of Queensland's construction workforce. As Queensland's peak body for construction training, Construction Skills Queensland (CSQ) is seeing the trend emerge already, with 20% of projects now concentrated in renewables-related infrastructure.

CSQ is partnering with CSIRO to understand the full implications of the increase in renewable energy projects, including hydrogen, for Queensland's construction industry and its workforce*. It will serve as a key input into local workforce development solutions to support the emergence of the hydrogen industry, as well as the broader renewables industry.

> CSQ's work will complement the actions in this Roadmap to support a long-term response to the demands of the hydrogen industry on the construction workforce.

*At time of publication, CSQ's report – *Queensland's Renewable Future*, was in the final stages of preparation for publication in August 2022.



THE WAY FORWARD
KEY FOCUS AREAS AND ACTIONS

To meet the skills needs of the hydrogen industry and ensure Queenslanders are a part of this journey, government and industry need to work together to deliver actions under four key focus areas:

Building a pipeline of skilled and adaptable workers for the hydrogen industry

Sharing knowledge to support hydrogen skills, training and safety

Maximising the benefits for local communities

Using data insights to plan for industry workforce needs over time

FOCUS AREA 1

Building a pipeline of skilled and adaptable workers for the hydrogen industry

Queensland will need a pipeline of capable workers with skills in **existing trades and disciplines** relevant to hydrogen, especially those in the construction, energy and manufacturing sectors, and **new roles and occupations** such as hydrogen fuel cell technicians, to meet the labour demands of the hydrogen industry.

Encouraging Queenslanders to access training pathways to existing trades and disciplines that are **readily transferable** will help prepare a pipeline of skilled, adaptable workers. The Queensland Government's **VET investment** framework responds to the **demand for skills driven by industry development** to ensure workers have the necessary skills and capabilities.

While many workers will have existing relevant skills, the emerging nature of the industry presents challenges to creating formal hydrogen qualifications at this time. While the industry continues to develop, the exact skill sets required for workers will need to be better understood.

Many of the occupations required by the hydrogen industry are expected to be sufficiently captured by existing VET training packages, although **some training packages may need to be reviewed through national processes** to include hydrogen-specific amendments.

The development of formal training qualifications through national processes is usually an involved and lengthy process, particularly when industry requirements are not yet fully defined.

The Queensland Government will continue to support the national training package development process, taking into account industry demand for hydrogen-focused competencies in national VET training packages.

To upskill workers in the short term and to ensure the training reflects new development and priorities of the hydrogen industry, a flexible and agile response is needed, working in partnership with industry. **Short-term skills and training actions are required** to support the industry development, in parallel with the longer-term consideration of nationally consistent approaches to hydrogen training.

Building a pipeline of skilled workers for the hydrogen industry requires the **right training infrastructure** and **training delivery modes**.

School students need to be learning foundational skills, including STEM, to enter training pathways to hydrogen-related occupations. A range of degree-qualified occupations will also be required by the hydrogen industry, and **strong higher education pathways** relevant to hydrogen will be important.

ACTIONS » Government and industry will work together to:

- **1.1** **Identify industry-led hydrogen skills and training solutions to respond to the immediate needs of industry** through the VET Emerging Industries Initiative
- **1.2** **Pilot innovative training delivery modes**, such as the use of Virtual Reality, to support delivery of hydrogen related training
- **1.3** **Expand the Gateway to Industry Schools Program (GISP)** to create school to hydrogen jobs pathways and increase student engagement with the industry
- **1.4** **Pilot a hydrogen-specific online learning program** for high school students that builds awareness of industry and foundational skills required, including in STEM
- **1.5** **Deliver world-class hydrogen training infrastructure**
- **1.6** Work with the higher education sector to **ensure university course offerings reflect the specialist skills needs of the hydrogen industry**
- **1.7** **Connect the hydrogen industry with universities to offer industry placements** to accelerate skills development and work-readiness.

CASE STUDY:

BUILDING A TALENT PIPELINE THROUGH SCHOOL-INDUSTRY ENGAGEMENT

Attracting students to the industry, and ensuring they have the right skills to succeed, is essential to building a pipeline of skilled and adaptable workers. The Queensland Government's Gateway to Industry Schools Program (GISP) connects Queensland school students to industry partners to help students gain valuable skills and experience, and explore career opportunities before they leave the classroom.

Through GISP, the Queensland Minerals and Energy Academy (QMEA) delivers a range of industry specific programs, with a focus on female and Indigenous participation. This includes a new hydrogen focused workshop, *A Future HyWay*, where students explore the production of hydrogen and its use as a clean energy source in a fuel cell.

The Queensland Government's Gateway to Industry Schools Program (GISP) connects Queensland school students to industry partners to help students gain valuable skills and experience.

FOCUS AREA 2

Sharing knowledge to support hydrogen skills, training and safety

Industry, government, training providers, universities and other key stakeholders will need to work together to support a hydrogen capable workforce that enables successful industry development.

Real-time learning about skills needs on industry projects will provide important insights into the nature of skills and training required to enable a successful hydrogen industry. **Early movers in industry development, including Original Equipment Manufacturers (OEMs) and suppliers, will be an essential source of knowledge** to inform education and training content development on the skills, capabilities and technologies needed by the industry.

The opportunities presented by hydrogen are relevant to a range of different industry sectors. The Department of Employment, Small Business and Training's **Industry Skills Advisors will continue to keep the Queensland Government** informed **about hydrogen-specific skills and training needs** across the manufacturing, automotive and electrotechnology sectors.

As the hydrogen industry develops, there will be scope for industry to consider the need for **dedicated skills partnerships**, similar to the Queensland Future Skills Partnership with BHP Mitsubishi Alliance (BMA), CQUniversity and TAFE Queensland.

Safety is a clear priority for all hydrogen industry stakeholders, including safety of those working with hydrogen, first responders to a hydrogen-related incident, and the community at large, and will need to be embedded in training and skills programs. In Queensland, hydrogen safety is regulated by government agencies under the *Petroleum and Gas (Production and Safety) Act 2004; Work Health and Safety Act 2011 and Electrical Safety Act 2002*.

A ***Hydrogen Safety Code of Practice*** is currently under development by Resources Safety and Health Queensland (RSHQ). A national approach to addressing the **hydrogen skills needs of emergency responders** is also being progressed. The Future Fuels Cooperative Research Centre is working across jurisdictions to develop a *Hydrogen Pipeline Code of Practice*. Standards Australia's Hydrogen Technologies Committee (ME-093) is also developing guidance across the hydrogen value chain, with safety knowledge embedded into each of tis working groups.

ACTIONS » Government and industry will work together to:

- **2.1** **Co-fund a dedicated hydrogen skills formation officer** to provide real time insights into hydrogen skills needs
- **2.2** Progress **collaboration between hydrogen proponents, OEMs and major suppliers with TAFE Queensland and other training providers** and share hydrogen technology and safety knowledge and skills
- **2.3** **Understand emerging hydrogen industry skills needs** through expanded Industry Skills Advisor coverage
- **2.4** **Address the hydrogen skills needs of emergency first responders** through continued participation in national processes
- **2.5** **Implement the draft *Hydrogen Safety Code of Practice*** for hydrogen as a fuel gas
- **2.6** **Embed safety requirements in training and skills programs**
- **2.7** **Consider the need for a hydrogen future skills partnership or a skills academy**

CASE STUDY:

SKILLS AND TRAINING FOR ELECTROLYSER MANUFACTURING

The expansion of the hydrogen industry brings opportunities to build on Queensland's strengths and support employment in regional areas. Gladstone is set to be home to the world's largest electrolyser manufacturing facility, the Green Energy Manufacturing Centre (GEM). The Queensland Government has partnered with Fortescue Future Industries (FFI) to deliver the facility, with first production to commence in 2023. More than 300 local jobs are expected to be created over the life of the project.

To meet the skills needs of the project and provide opportunities for local employment, FFI intends to establish a Vocational Training and Employment Centre (VTEC) program at the Gladstone facility. The VTEC program was established in 2006 by Fortescue Metals Group (FMG), FFI's parent company, to provide training and employment pathways with a focus on supporting employment outcomes for local First Nations people. VTEC guarantees participants a job following the completion of the program and has enabled FMG to tap into underdeveloped talent.

> Gladstone is set to be home to the world's largest electrolyser manufacturing facility, the Green Energy Manufacturing Centre.

FOCUS AREA 3

Maximising the benefits for local communities

Hydrogen is expected to present **significant regional opportunities**, with projects planned or under development from South East Queensland to Cape York.

Local efforts to plan for and build local workforce capabilities, support sustainable employment and engage small businesses in the hydrogen industry will ensure regional communities benefit from the industry as it develops. To **engage local workers and maximise participation across cohorts**, it is essential that **industry connects with regional students and workers** to promote hydrogen as a potential career path and to attract local participation, including through regional events focused on the hydrogen industry.

Supporting businesses, and especially Small to Medium Enterprises (SMEs), that are local to hydrogen projects is key to ensuring the flow of hydrogen workforce opportunities to local regions.

ACTIONS » Government and industry will work together to:

3.1 **Develop a hydrogen industry skills and training toolkit for SMEs**, to be hosted on the Business Queensland website

3.2 **Support local student and worker engagement with the hydrogen industry** and link individuals to relevant Government skills and training programs

3.3 **Connect participants in programs like Back to Work and Skilling Queenslanders for Work to opportunities in hydrogen-related industries** as they emerge

3.4 **Partner with regional stakeholders (including local councils) to deliver local skills and training initiatives** linked to workforce opportunities in the local hydrogen industry

3.5 Focus on **developing local skills and employing local workers** in the hydrogen industry, and recruit for a diverse workforce.

CASE STUDY:

SUPPORTING WORKFORCE DIVERSITY IN THE HYDROGEN INDUSTRY

Hydrogen's status as an emerging industry and its regional focus presents an opportunity to support employment in remote locations and build diversity into workforce considerations from the outset.

The Cape York Institute and HDF Energy Australia are working to ensure their proposed Bamaga and Thursday Island Renewstable® hydrogen projects not only provide non-intermittent green energy solutions for remote communities, but also support ongoing employment for locals. The project proponents have plans to offer traineeships at their facilities, with the aim that locals working on the proposed projects can gain the skills and experience necessary to launch a career in the renewable energy and hydrogen industry.

Examples of positive measures to support workforce diversity also include a range of initiatives already in place to support women's participation in jobs that will resource the hydrogen industry.

> The Clean Energy Council's Women in Renewables Initiative enables and champions women working in the renewable energy industry, including green hydrogen.

The Clean Energy Council's Women in Renewables Initiative enables and champions women working in the renewable energy industry, including green hydrogen. The initiative's aims include fostering positive change in the renewable industry so it can be more inclusive and supportive of women. It includes a range of scholarships aimed at supporting the professional development of female employees in the industry.

The development of the hydrogen industry will involve significant demand for construction workers and electrical tradespeople. Organisations like the National Association of Women in Construction (NAWIC) work to champion and empower women working in a range of trades that will play important roles in the development of the hydrogen industry.

Internationally, the Women in Green Hydrogen network is working to increase the visibility of women working in hydrogen, and offers a mentoring program that supports young women in the early stages of their careers in the green hydrogen sector.

FOCUS AREA 4

Using data insights to plan for industry workforce needs over time

Reviewing **data and insights from the hydrogen industry as it develops over time** will be key to maintaining an up-to-date understanding of the industry's workforce needs. Insights gathered from the industry as it grows will be used to identify and plan for skills demand.

ACTIONS » Government and industry will work together to:

4.1 **Monitor hydrogen workforce demand over time** through a labour force and skills demand analysis every two years.

4.2 **Participate in the national hydrogen skills and training research program** and further skills and training actions under the National Hydrogen Strategy, and interpret outcomes and implications for the Queensland context.

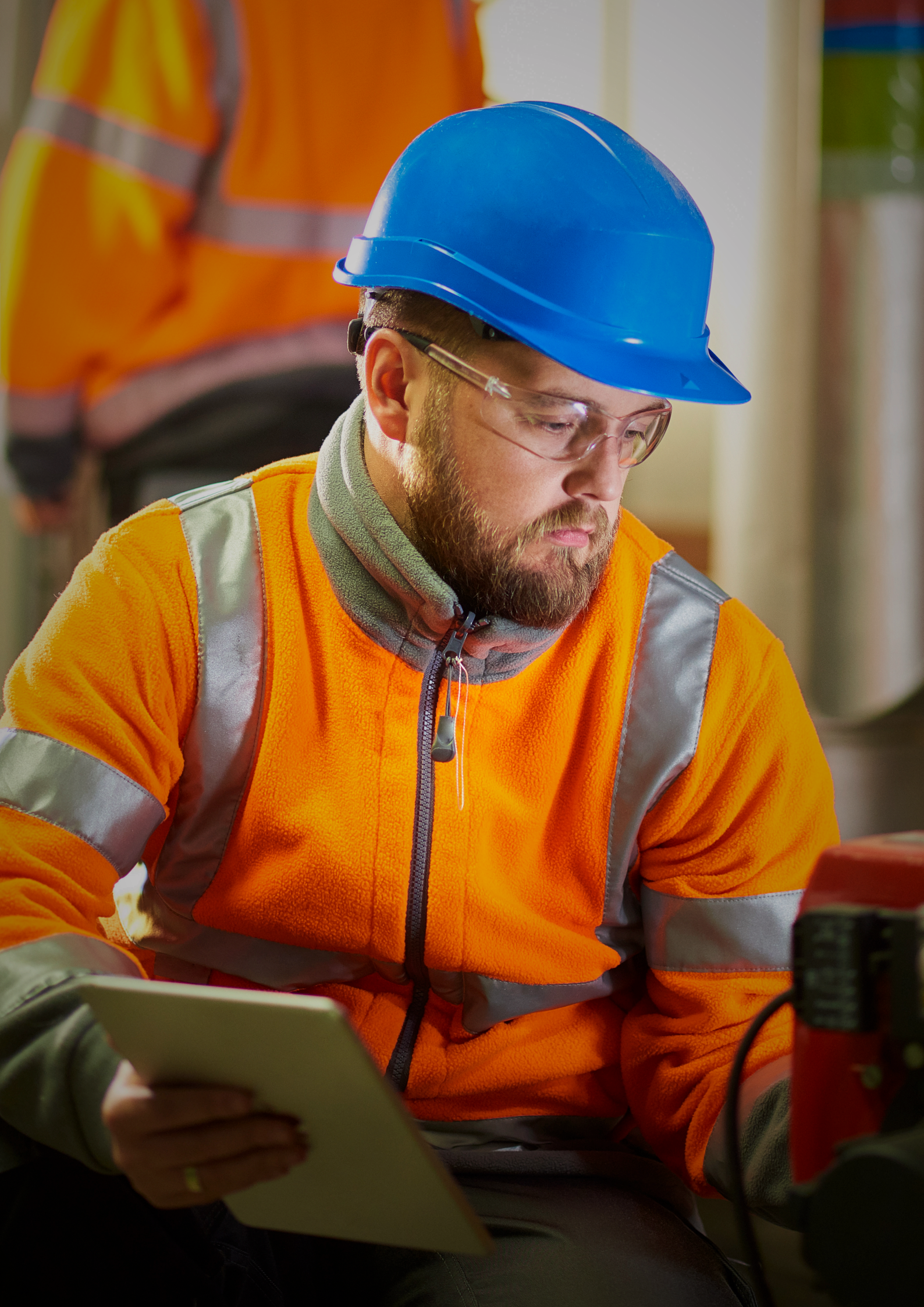
CASE STUDY:

MAPPING LOCAL BUSINESS HYDROGEN CAPABILITY

Government-Owned-Corporation CS Energy and the Toowoomba and Surat Basin Enterprise (TSBE) have partnered to deliver an online portal for Toowoomba and Western Downs businesses to sign up for opportunities in the emerging hydrogen industry. CS Energy's Kogan Creek Renewable Hydrogen Demonstration Plant near Chinchilla is an advanced hydrogen project that will take advantage of the portal when construction begins ahead of hydrogen production in 2023.

Through the portal, TSBE maintains a directory showcasing the regional supply chain and available local skills. Launched in February 2022, the mapping project has already collected substantial data to build a big picture view of local capability. It has provided information that is opening the door for further work around training and upskilling to support the development of a local hydrogen industry and its value chain.

CS Energy's Kogan Creek Renewable Hydrogen Demonstration Plant near Chinchilla is an advanced hydrogen project that will take advantage of the portal.



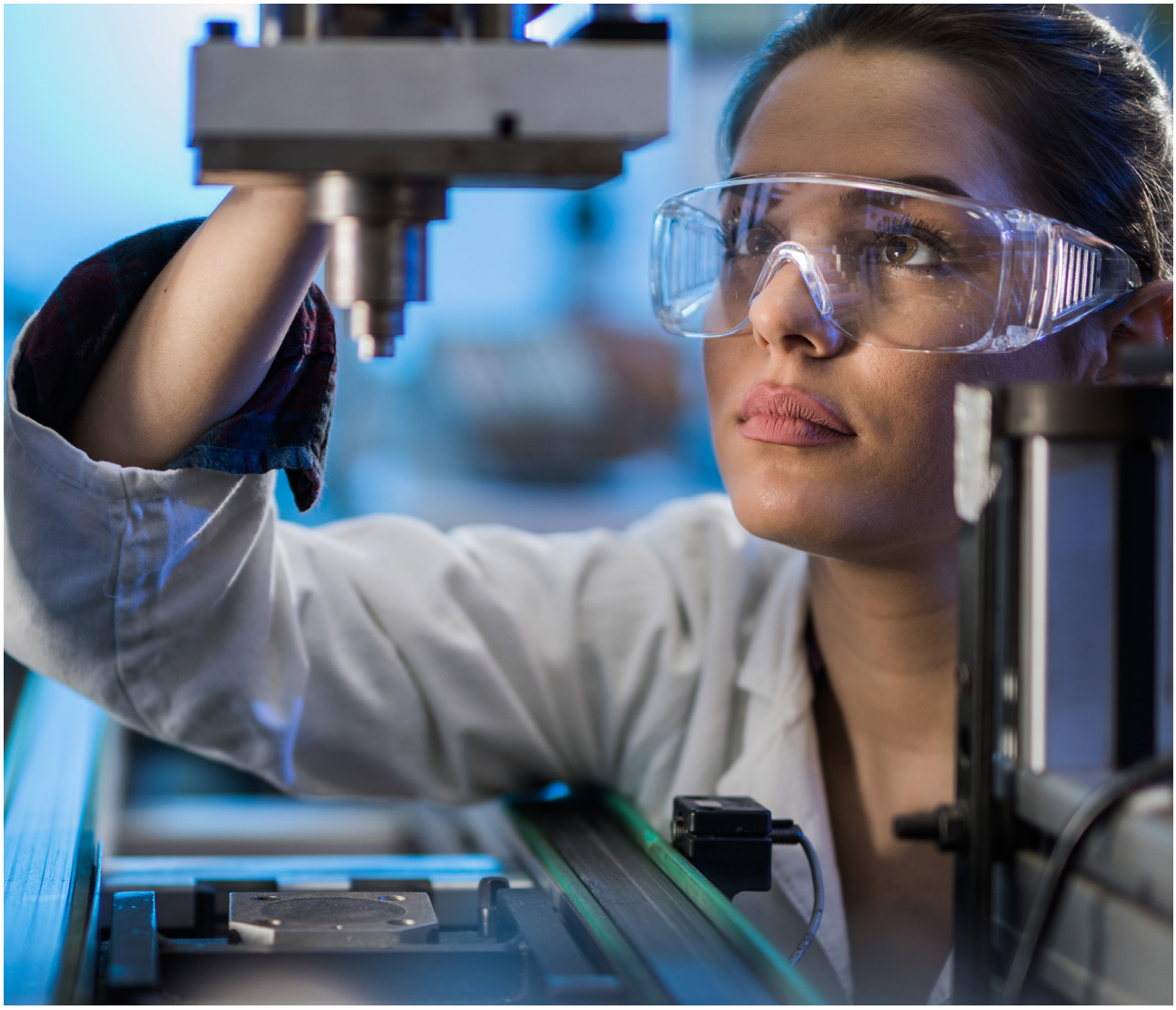
IMPLEMENTATION AND REVIEW

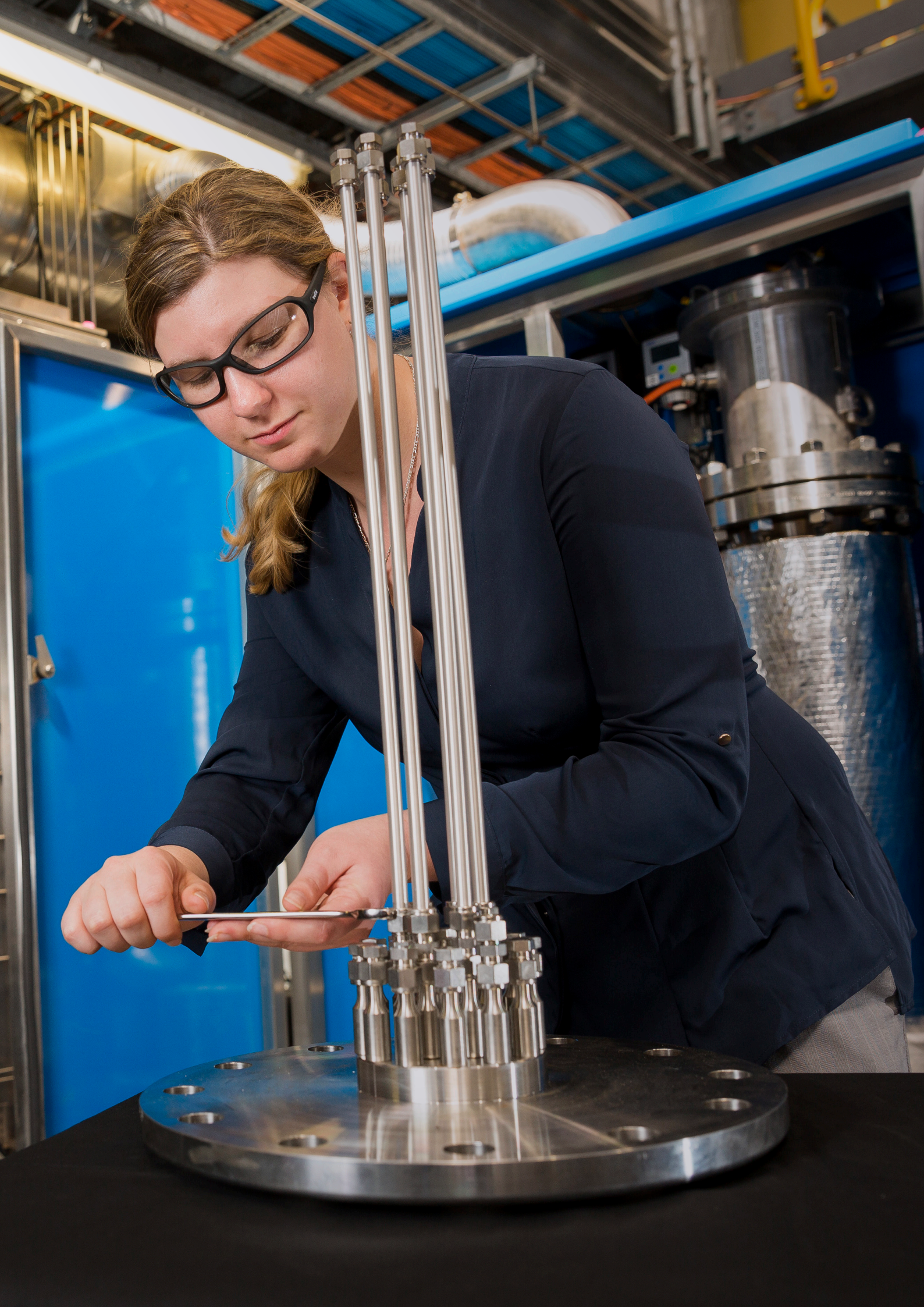
As Queensland's hydrogen industry continues to advance, so too will the industry's skills needs and workforce development priorities. Planning for and responding to these needs will require an ongoing partnership between Government, industry, employers and regional communities, with a focus on pursuing the actions in this Roadmap.

The Queensland Government will continue to engage with industry and skills and training stakeholders to identify hydrogen industry skills needs and occupations in high demand as they change over time. The implementation of this Roadmap will be monitored, with a check-in after 12 months to track progress and adjust as necessary.

Ensuring the developing hydrogen industry translates into workforce opportunities for Queenslanders across the state is fundamental to the industry's success.

For more information visit desbt.qld.gov.au





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