



**Research Report:**  
**Skills Gap Analysis between the Hydrogen  
sector and the gas industry**

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## INTRODUCTION

Various federal and state-based initiatives are currently taking place to identify the job roles and skills required for the emerging Hydrogen industry. Due to Energy Skills Ltd's access to a database of over 40,000 gas workers, an opportunity existed to conduct an in-depth analysis of existing gas industry workers and in consultation with our gas stakeholder networks, identify whether these qualifications/skills would suffice for the needs of the Hydrogen sector.

This project identified the accredited gap training solutions available to the Gas industry to expand their job roles in support of the synergies between the Natural Gas and Hydrogen sectors. This approach will expedite the increased capacity and capabilities of the gas industry workers; enabling the development of a skilled, productive and safe workforce in a relative short time frame as the industry transitions to net zero. The Australian Gas Industry Trust (AGIT) provided the financial support for this research to be undertaken.

## SCOPE OF RESEARCH

The research primarily focussed on the current workforce within the CSG/LNG industry and the Hydrogen sector. This includes upstream and downstream operations such as drilling and pipeline technicians and excluded industries/sectors in the supply and value chains which do not directly relate to current gas operations or likely future hydrogen operations such as some retail or unrelated manufacturing sectors.

Generic job roles such as business support roles were also included in the research to ascertain whether the required qualifications and skills for these roles are relevant to those required to perform their duties within hydrogen projects.

## RESEARCH STAGES AND METHODOLOGY

The following stages formed the framework of the research project:

### STAGE 1 – JOB ROLE COLLATION

This stage consisted of the collation of identified job roles from a variety of open sources to draft a comprehensive list of job roles that would contribute to the hydrogen sector.

### STAGE 2 – CATEGORISATION OF JOB ROLES

A steering group of gas experts was established to review and amend the job roles identified in Stage 1 and confirm the relevant supply chain where these job roles would be operating within.

### STAGE 3 – IDENTIFICATION OF CURRENTLY AVAILABLE QUALIFICATIONS, SKILLS SETS, UNITS OF COMPETENCE AND ACCREDITED COURSES

This stage consisted of a desktop study to identify all currently available accredited training programs relating to the Hydrogen sector.

### STAGE 4 – CODING OF EACH JOB ROLE

The steering group reviewed each identified job role and allocated a colour code to each role to easily identify their status with the current CSG/LNG sector and relationship to the Hydrogen sector.

### STAGE 5 – CURRENT QUALIFICATION AND LICENSING ANALYSIS

The steering group established and reviewed the current qualifications and licenses required for each job role. The SkillPASS database was also used to collect information on this matter.

### STAGE 6 – RECOMMENDED BRIDGING TRAINING ASSIGNED

The steering group used the Qualifications, Skill Sets and Units identified in Stage 3, to recommend bridging training for each role.

## FINDINGS

### JOB ROLE COLLATION AND CATEGORISATION

To compile a comprehensive list of projected roles that would contribute to the Hydrogen sector, Energy Skills conducted a mix of extensive desktop research, stakeholder consultation and mining of the SkillPASS database.

Desktop research focused on publicly published research reports such as the *Hydrogen Skills Roadmap* released by the Swinburne University of Technology and the Victorian Hydrogen Hub. Job roles

identified within this report was combined with other similar reports developed by the Australian Hydrogen Council, Jobs Queensland's *Hydrogen Industry Workforce Foundational Scan*, Queensland Government's *Hydrogen Industry Workforce Development Roadmap 2022-2032* and *The hydrogen economy and jobs of the future* from Cavendish Energy. At the time of publication, results from the National Hydrogen Job Role and Skills analysis, conducted by PWC, was not yet available.

Through perusal of all the above-mentioned, a comprehensive projected job role list was compiled reflecting the following supply chains:

- Production/Generation;
- Processing;
- Engineering & Fabrication;
- Storage, Distribution and Transport;
- Installation;
- Export; and
- Business/Generic/Managers/Executives.

The following table reflect the combined job roles identified from the above-mentioned reports.

**Colour Codes are designated as follows:**

**Green roles** are roles currently being performed by gas workers and will, with only minor contextualised training, be performed in the hydrogen sector.

**Orange roles** are roles currently being performed by gas workers and will require contextualised training and some specialised training to be performed in the hydrogen sector.

**Red roles** are roles not currently being performed by gas workers and will require Hydrogen specific an/or other specialised training.

### Hydrogen Landscape - Job Role Identification

PRODUCTION/GENERATION	PROCESSING	ENGINEERING & FABRICATION	STORAGE	DISTRIBUTION AND TRANSPORT	INSTALLATION	EXPORT	BUSINESS/GENERIC/MANAGERS /EXECUTIVES
Power Plant Operators	Process Plant Technicians/Operators	Drafters	Metallurgists	Pipeline Operators/Technicians	Instrumentation and Electrical Technicians	Shore-to-ship-loadmaster	Project Managers
Hydrogen Development Manager	Process safety technicians	Fuel Cell Technicians	Corrosion technicians	Refuelling technicians/operators	High voltage electricians	Mooring and unloading operations personnel	Safety Managers/Officers
Water treatment plant operator	Quality assurance technicians	Mechanical engineer (HVDC)	Materials Scientist	Light Vehicle technician	Plumber	Shipping and Marine Logistics	Asset/Financial Manager/Budget Analyst
Hydrogen/fuel cell R&D director	Hydrogen energy systems designer	Electrical engineer		Heavy Vehicle technician	Maintenance technician		Attorney/Legal Counsel
Hydrogen fuel cell system technician	Hydrogen energy system operations engineer	Chemical engineer		Automotive Electrician	Gas fitter		Regulatory expert
Hydrogen power plant installation, operations, engineering. & mgt.	Hydrogen lab technician	Process engineer		Automotive Electric Vehicle technician	Electrical fitter		Technical sales representative
Fuel cell plant manager	Process Engineers	Civil engineer		Heavy vehicle and Tube trailer drivers	Integration specialists		Purchasing managers
Hydrogen plant operations manager	Chemical Engineer	Controls engineer		Corrosion technicians	Gas inspectors		Research managers
Control Room Technicians / Operators / Control Engineers		Commissioning engineer		Hydrogen fuelling station designer & project engineer	Hazardous materials management specialist		Process compliance managers
Asset Manager		Heavy duty fitters		Hydrogen fuel transporter – trucker	Controls System Technician		Technology manager
		Welder		Hydrogen fuelling station operator	Instrumentation Engineer		Relationship and community manager
		Fitter and turner		Hydrogen pipeline construction worker	Service / Main layer		Safety and Q&C
		Fuel cell fabrication and testing technician		Fuel cell retrofit installer			Hydrogen fuels policy analyst & business sales

		Fuel cell quality control manager		Hydrogen vehicle electrician			Emissions accounting & reporting consultant
		Fuel cell designer		Fuel cell vehicle development engineer			Hydrogen systems safety investigator - cause analyst
		Tool Pusher		Senior automotive fuel cell power electronics engineer			Emissions reduction credit portfolio manager
		Power Systems Transmission Engineer		Pipeline Welders			Emissions reduction project developer specialist
		Assembler/Fabricator		System Operations Fitter / High Pressure Technician			Emissions reduction project manager
		CNC Operator					Hydrogen systems sales consultant
		Software Engineer					Production Training Coordinator
							Logistics Team Leader
							Logistics Officer
							Cultural Heritage Coordinators
							Cultural Heritage Monitors
							Environmental Advisors
							Public Affairs Specialist
							Communications/Media Manager
							Gas Industry Trainers/Assessors

## GREEN ROLES

**Green roles** are roles currently being performed by gas workers and will, with only minor contextualised training, be performed in the hydrogen sector.

The following upskilling and training is recommended for **Green roles**:

Skill Sets:

Skill Set Code and Title	Registered Training Organisations approved to deliver this program
UEGSS00013 Basic hydrogen safety skill set	ATCO GAS AUSTRALIA PTY LTD  Civil Safety  Australian Institute of Resources Training Pty Ltd  DTE Enterprises Pty Ltd  TECTRA AUSTRALIA PTY LTD

Units of Competence

Unit Codes and Titles	Registered Training Organisations approved to deliver these Units
UEGNSG901 Apply safety practices, procedures, and compliance standards for handling hydrogen gas	ATCO GAS AUSTRALIA PTY LTD  Australian Institute of Resources Training Pty Ltd Civil Safety Cobra Contracting Pty Ltd  Downer Utilities Australia Pty Ltd DTE Enterprises Pty Ltd
UEGNSG902 Commission, operate and maintain electrolyzers	ENERTRAIN PTY LTD
UEGNSG903 Fault find and repair hydrogen storage equipment	Halo Nation Training Pty Ltd
UEGNSG904 Inject hydrogen gas into distribution networks	Kevesther Pty Ltd
UEGNSG905 Monitor and control hydrogen in gas distribution networks	TAFE Queensland
UEGNSG906 Undertake routine hydrogen storage operations	TECTRA AUSTRALIA PTY LTD



## ORANGE ROLES

**Orange roles** are roles currently being performed by gas workers and will require contextualised training and some specialised training to be performed in the hydrogen sector. The following upskilling and training is recommended for **Orange** roles:

### Skill Sets:

Skill Set Code and Title UEGSS00013 Basic hydrogen safety skill set	Registered Training Organisations approved to deliver this program ATCO GAS AUSTRALIA PTY LTD Civil Safety Australian Institute of Resources Training Pty Ltd DTE Enterprises Pty Ltd TECTRA AUSTRALIA PTY LTD
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Relevant operational specialist areas:	Qualifications relevant to the areas	Units of Competency
Installation of Hydrogen appliances	UEG20121 - Certificate II in Gas Supply Industry Operations	UEGNSG103 Install and commission stationary gas fuelled turbine engines
Storing of Hydrogen	UEG30121 - Certificate III in Gas Supply Industry Operations	UEGNSG102 Prepare safe design specifications of a gas system
Handling and loading Hydrogen	UEG40221 - Certificate IV in Gas Supply Industry Operations	UEGNSG214 Coordinate and conduct gas distribution pipeline repair and modifications
Maintenance, checking, testing Hydrogen in storage, transportation and distribution		UEPOPS098 Operate and monitor gas production plant
Fault find (diagnostic) and repairs		TLIF4065 Ensure compliance with Australian Dangerous Goods Code
Monitoring the production of Hydrogen		TLID0021 Store and handle dangerous goods and hazardous substances
Systems integration for Hydrogen		TLIF2012 Apply safe procedures when handling/transporting dangerous goods or explosives
Operations of distribution and transmission gas pipelines, plant and associated equipment		PUAFIR516 Assess and evaluate a facility's fire and incident safety management systems
		PUAFIR404 Inspect dangerous goods facilities
		PUAECO008 Receive and action notification of uncontrolled hazardous materials situations

Qualifications relevant to the areas	Units of Competency
UEG20121 - Certificate II in Gas Supply Industry Operations UEG30121 - Certificate III in Gas Supply Industry Operations UEG40221 - Certificate IV in Gas Supply Industry Operations	UEGNSG208 Construct and lay large copper gas distribution pipelines  UEGNSG211 Construct and lay steel gas distribution pipelines  UEGNSG206 Construct and lay copper and stainless steel gas distribution pipelines  UEGNSG215 Coordinate construction, laying and testing of gas distribution pipelines UEGNSG710 Read and record meter readings TLIF4065 Ensure compliance with Australian Dangerous Goods Code TLID0021 Store and handle dangerous goods and hazardous substances TLIF2012 Apply safe procedures when handling/transporting dangerous goods or explosives PUAFIR516 Assess and evaluate a facility's fire and incident safety management systems PUAFIR404 Inspect dangerous goods facilities PUAECO008 Receive and action notification of uncontrolled hazardous materials situations UEEIC0024 Plan the electrical installation of integrated systems UEGNSG205 Commission or decommission gas distribution pipelines UEGNSG209 Construct and lay polyethylene gas distribution mains UEGNSG214 Coordinate and conduct gas distribution pipeline repair and modifications UEGNSG303 Carry out transmission pipeline construction work activities UEGNSG304 Commission or decommission gas distribution pipelines

Qualifications relevant to the areas	Units of Competency
UEG20121 - Certificate II in Gas Supply Industry Operations UEG30121 - Certificate III in Gas Supply Industry Operations UEG40221 - Certificate IV in Gas Supply Industry Operations	UEGNSG303 Carry out transmission pipeline construction work activities  UEGNSG348 Supervise the operation of plant and equipment for the construction of gas transmission pipelines  UEGNSG307 Coordinate the operation of relevant plant and equipment for transmission pipeline construction  UEGNSG316 Work in proximity of transmission pipeline construction plant and equipment  UEGNSG309 Coordinate transmission pipeline construction operations

UEPOPS010 Conduct minor mechanical maintenance

UEGNSG313 Monitor and operate flow control, pressure measuring and regulating devices for gas transmission

UEGNSG509 Remotely monitor and operate gas transmission flow and pressure measuring and regulating devices

## RED ROLES

**Red roles** are roles not currently being performed by gas workers and will require Hydrogen specific an/or other specialised training. Because of the scope of this research, **Red** roles were not further analysed into required training needs.

## RECOMMENDED BRIDGING TRAINING

Upon categorisation and coding of the job roles, each job role was individually considered to establish their current required qualification and licensing needs and list their recommended bridging training gaps. It was recommended by the steering group that Green roles only require to do the Hydrogen Safety Skill Set, whilst Orange roles will require the Safety Skill Set plus an additional combination of Skill Sets/Units of Competence based on the operational area. It is important to note that these are only recommendations based on the knowledge and expertise of the steering group members. Furthermore, it is anticipated that a large component of current CSG/LNG workers may already possess the recommended bridging training. Therefore, Recognition of Prior Learning (RPL) should apply:

	Job role	Current Required Qualification/s, Licences and Tickets	Recommended bridging training from CSG/LNG to Hydrogen (RPL applies)
Example	Gas Pipeline Operator/Technician	Cert III Gas Industry Operations High school certificate	Skills Sets: UEGSS00013 Basic hydrogen safety skill set UEGSS00014 Inject hydrogen into distribution network skill set UEGSS00015 Monitor hydrogen using control systems skill set UEGNSG102 Prepare safe design specifications of a gas system
		Drivers Licence	
Production Generation	Power Plant Operators [Correct name - Power Generation Plant Operator]	High school certificate	<ul style="list-style-type: none"> <li>• UEGSS00013 Basic hydrogen safety skill set</li> <li>• UEPOPS098 Operate and monitor gas production plant</li> <li>• UEGNSG348 Supervise the operation of plant and equipment for the construction of gas transmission pipelines</li> </ul>
		Bachelor Degree Engineering or Physical Sciences	
		Drivers Licence C	

	[Hydro / Oil / Gas / Chemical]	<p>Current First Aid and CPR</p> <p>HLTAID009, HLTAID010, HLTAID011</p>	<ul style="list-style-type: none"> <li>• UEGNSG307 Coordinate the operation of relevant plant and equipment for transmission pipeline construction</li> <li>• UEGNSG316 Work in proximity of transmission pipeline construction plant and equipment</li> <li>• UEPOPS010 Conduct minor mechanical maintenance</li> </ul>	
	<p>Manual Handling</p> <p>HLTWHS005 – CONDUCT MANUAL TASKS SAFELY</p>			
	<p>Level 3 or 4 (Operations) ESI Generation Operations traineeship</p> <p>TR01810 ESI GENERATION (OPERATIONS) (LEVEL 4)   TR03620 ESI GENERATION (OPERATIONS) (LEVEL 3)   TR04390 ESI GENERATION (SYSTEMS OPERATIONS) (LEVEL 4)  </p>			
	<p>Or, Level 5 (Manager) ESI Generation Operations Manager traineeship</p> <p>TR08850 ESI GENERATION OPERATIONS MANAGER (LEVEL 5)</p>			
	<p>High Risk Work Licence</p> <p>High Risk Work Licence - BS High Risk Work Licence - BA High Risk Work Licence - TO High Risk Work Licence - ES</p>			
	<p>Industry Safety Induction [WA, QLD &amp; NT only]</p>			
	Gas plant operations manager	<p>High school certificate</p>		<ul style="list-style-type: none"> <li>• UEGSS00013 Basic hydrogen safety skill set</li> <li>• UEPOPS098 Operate and monitor gas production plant</li> <li>• UEGNSG348 Supervise the operation of plant and equipment for the construction of gas transmission pipelines</li> <li>• UEGNSG307 Coordinate the operation of relevant plant and equipment for transmission pipeline construction</li> <li>• UEGNSG316 Work in proximity of transmission pipeline construction plant and</li> </ul>
		<p>Bachelor Degree Engineering or Physical Sciences</p>		
		<p>Drivers Licence C</p>		
		<p>Current First Aid and CPR</p> <p>HLTAID009, HLTAID010, HLTAID011</p>		

<p>Manual Handling</p> <p>HLTWHS005 – CONDUCT MANUAL TASKS SAFELY</p>	<p>equipment</p> <ul style="list-style-type: none"> <li>• UEPOPS010 Conduct minor mechanical maintenance</li> <li>• TLIF4065 Ensure compliance with Australian Dangerous Goods Code</li> <li>• PUAFIR516 Assess and evaluate a facility's fire and incident safety management systems</li> <li>• UEGNSG304 Commission or decommission gas distribution pipelines</li> <li>• UEGNSG309 Coordinate transmission pipeline construction operations</li> </ul>
<p>PMA60116: Advanced Diploma of Process Plant Technology</p> <p>PMA50116: Diploma of Process Plant Technology</p> <p>MSM50316: Diploma of Production Management</p>	
<p>Level 3 or 4 (Operations) ESI Generation Operations traineeship</p> <p>TR01810 ESI GENERATION (OPERATIONS) (LEVEL 4)   TR03620 ESI GENERATION (OPERATIONS) (LEVEL 3)   TR04390 ESI GENERATION (SYSTEMS OPERATIONS) (LEVEL 4)  </p>	
<p>Or, Level 5 (Manager) ESI Generation Operations Manager traineeship</p> <p>TR08850 ESI GENERATION OPERATIONS MANAGER (LEVEL 5)</p>	
<p>BSBWHS411 - Implement and monitor WHS policies, procedures and programs [preferred]</p>	
<p>High Risk Work Licence</p> <p>High Risk Work Licence - BS High Risk Work Licence - BA High Risk Work Licence - TO High Risk Work Licence - ES</p>	
<p>Industry Safety Induction [WA, QLD &amp; NT only]</p>	

Control Room Technicians / Operators / Control Engineers	High school certificate	<ul style="list-style-type: none"> <li>• UEGSS00013 Basic hydrogen safety skill set</li> <li>• UEGSS00015 Monitor hydrogen using control systems skill set</li> <li>• UEPOPS098 Operate and monitor gas production plant</li> <li>• UEGNSG348 Supervise the operation of plant and equipment for the construction of gas transmission pipelines</li> <li>• UEGNSG307 Coordinate the operation of relevant plant and equipment for transmission pipeline construction</li> <li>• UEGNSG316 Work in proximity of transmission pipeline construction plant and equipment</li> <li>• UEGNSG304 Commission or decommission gas distribution pipelines</li> <li>• UEGNSG309 Coordinate transmission pipeline construction operations</li> <li>• UEGNSG313 Monitor and operate flow control, pressure measuring and regulating devices for gas transmission</li> <li>• UEGNSG509 Remotely monitor and operate gas transmission flow and pressure measuring and regulating devices</li> </ul>
	Current First Aid and CPR	
	HLTAID009, HLTAID010, HLTAID011	
	Technician/Operators: Diploma or Associate Degree in Engineering [Preferred]	
	Engineers: Bachelor of Science - Engineering degree in Mechanical, Electrical or Chemical	
	Manual Handling	
	HLTWHS005 – CONDUCT MANUAL TASKS SAFELY	
	Confined Space Training	
RIIWHS202E - ENTER AND WORK IN CONFINED SPACES, MSMPER200 - WORK IN ACCORDANCE WITH AN ISSUED PERMIT, MSMPER205 - ENTER CONFINED SPACE, MSMPER202 - OBSERVE PERMIT WORK		
BSBWHS411 - Implement and monitor WHS policies, procedures and programs [preferred]		
Certificate IV in ESI Generation Maintenance (Mechanical), or Certificate IV in ESI Generation Maintenance (Fabrication), or Diploma of ESI Generation (Maintenance)		
MEM18002 - Use power tools/hand-held operations		
Asset Manager Energy	High school certificate	

		Current First Aid and CPR	<ul style="list-style-type: none"> <li>• UEGSS00013 Basic hydrogen safety skill set</li> <li>• UEPOPS098 Operate and monitor gas production plant</li> <li>• UEGNSG348 Supervise the operation of plant and equipment for the construction of gas transmission pipelines</li> <li>• UEGNSG307 Coordinate the operation of relevant plant and equipment for transmission pipeline construction</li> <li>• UEGNSG316 Work in proximity of transmission pipeline construction plant and equipment</li> <li>• UEGNSG304 Commission or decommission gas distribution pipelines</li> <li>• UEGNSG309 Coordinate transmission pipeline construction operations</li> <li>• UEGNSG313 Monitor and operate flow control, pressure measuring and regulating devices for gas transmission</li> <li>• UEGNSG509 Remotely monitor and operate gas transmission flow and pressure measuring and regulating devices</li> </ul>
		HLTAID009, HLTAID010, HLTAID011	
		Bachelor Degree - finance, accounting, economics, business administration or related field (MBA preferred)	
		Bachelor of Science - Engineering degree in Mechanical, Electrical or Chemical [preferred due to nature of Assets]	
		CFA, CTP and CPA [preferred]	
		BSBWHS411 - Implement and monitor WHS policies, procedures and programs [preferred]	
Processing	Process Plant Technicians/Operators	High school certificate	<ul style="list-style-type: none"> <li>• UEGSS00013 Basic hydrogen safety skill set</li> <li>• UEPOPS098 Operate and monitor gas production plant</li> <li>• UEGNSG348 Supervise the operation of plant and equipment for the construction of gas transmission pipelines</li> <li>• UEGNSG307 Coordinate the operation of relevant plant and equipment for transmission pipeline construction</li> <li>• UEGNSG316 Work in proximity of transmission pipeline construction plant and equipment</li> <li>• UEPOPS010 Conduct minor mechanical maintenance</li> </ul>
		UEE42620 Certificate IV Hazardous Areas - Electrical	
	PMA30120 - Certificate III in Process Plant Operations		
		High school certificate	

<p>Process safety technicians</p>	<p>PMA30120 - Certificate III in Process Plant Operations</p>	<ul style="list-style-type: none"> <li>• UEGSS00013 Basic hydrogen safety skill set</li> <li>• UEGSS00015 Monitor hydrogen using control systems skill set</li> <li>• UEGNSG316 Work in proximity of transmission pipeline construction plant and equipment</li> <li>• UEPOPS010 Conduct minor mechanical maintenance</li> <li>• TLIF4065 Ensure compliance with Australian Dangerous Goods Code</li> <li>• TLID0021 Store and handle dangerous goods and hazardous substances</li> <li>• TLIF2012 Apply safe procedures when handling/transporting dangerous goods or explosives</li> <li>• PUAFIR516 Assess and evaluate a facility's fire and incident safety management systems</li> <li>• PUAFIR404 Inspect dangerous goods facilities</li> <li>• PUAECO008 Receive and action notification of uncontrolled hazardous materials situations</li> </ul>
<p>Quality assurance technicians</p>	<p>High school certificate</p> <p>PMA30120 - Certificate III in Process Plant Operations</p>	<ul style="list-style-type: none"> <li>• UEGNSG214 Coordinate and conduct gas distribution pipeline repair and modifications</li> <li>• UEPOPS098 Operate and monitor gas production plant</li> <li>• TLIF4065 Ensure compliance with Australian Dangerous Goods Code</li> <li>• TLID0021 Store and handle dangerous goods and hazardous substances</li> <li>• TLIF2012 Apply safe procedures when handling/transporting dangerous goods or explosives</li> <li>• PUAFIR516 Assess and evaluate a facility's fire and incident safety management systems</li> <li>• PUAFIR404 Inspect dangerous goods facilities</li> <li>• PUAECO008 Receive and action notification of uncontrolled hazardous materials situations</li> <li>• UEGNSG710 Read and record meter readings</li> <li>• TLIF4065 Ensure compliance with Australian Dangerous Goods Code</li> <li>• TLID0021 Store and handle dangerous goods and hazardous substances</li> <li>• TLIF2012 Apply safe procedures when handling/transporting dangerous goods or explosives</li> <li>• PUAFIR516 Assess and evaluate a facility's fire and incident safety management systems</li> <li>• PUAFIR404 Inspect dangerous goods facilities</li> <li>• PUAECO008 Receive and action notification of uncontrolled hazardous materials situations</li> <li>• UEGNSG304 Commission or decommission gas distribution pipelines</li> </ul>



		<ul style="list-style-type: none"> <li>• UEGNSG348 Supervise the operation of plant and equipment for the construction of gas transmission pipelines</li> </ul>	
	Lab technician	Bachelor of Engineering (Honours) Mechanical, Chemical or physical, or higher	UEGSS00013 Basic hydrogen safety skill set
		High school certificate	
		Certificate IV in Laboratory Techniques	
	Process Engineers	Bachelor's Degree in chemical engineering or equivalent	UEGSS00013 Basic hydrogen safety skill set
		UEE42620 Certificate IV Hazardous Areas - Electrical	
		PMA30120 - Certificate III in Process Plant Operations	
	Chemical Engineer	High school certificate	UEGSS00013 Basic hydrogen safety skill set
		Bachelor of Engineering (Honours) Mechanical, Manufacturing, Industrial, or higher	

		Bachelor of Engineering (Honours) (Chemical)	
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<b>ENGINEERING/FABRICATION</b>	Drafters	Trade certification for draftspersons	UEGSS00013 Basic hydrogen safety skill set
		Certification in engineering design and drafting technology	
		Computer Aided Design (CAD) Operator/Specialist	
	Electrical engineer	UET60221: Advanced Diploma of ESI - Power Systems	UEGSS00013 Basic hydrogen safety skill set
		UET60219: Advanced Diploma of ESI - Power Systems	
		UET50221: Diploma of ESI - Power Systems	
		UET50219: Diploma of ESI - Power Systems	
		UEE42620 Certificate IV Hazardous Areas - Electrical	
		Bachelor of Engineering (Honours) (Electrical)	
	Chemical engineer	High school certificate	UEGSS00013 Basic hydrogen safety skill set
Bachelor of Engineering (Honours) (Chemical)			
Civil engineer	High school certificate	UEGSS00013 Basic hydrogen safety skill set	
	Bachelor of Engineering (Honours) (Civil)		
Controls engineer	Bachelor of Engineering (Honours) Electrical, Mechanical, Manufacturing, or related field	UEGSS00013 Basic hydrogen safety skill set	
Commissioning engineer	Bachelor of Engineering (Honours) Electrical, Mechanical, Civil, or related field	UEGSS00013 Basic hydrogen safety skill set	
Heavy duty fitters	High school certificate	UEGSS00013 Basic hydrogen safety skill set	
	Drivers Licence C (Manual)		

		Certificate III in Heavy Commercial Vehicle Mechanical Technology, or Certificate III in Automotive Diesel Engine Technology	
	Welder	MEM30319 - Certificate III in Engineering - Fabrication Trade	UEGSS00013 Basic hydrogen safety skill set
		High school certificate	
	Fitter and turner	MEM30219 - Certificate III in Engineering - Mechanical Trade	UEGSS00013 Basic hydrogen safety skill set
	Assembler/Fabricator	MEM30319 - Certificate III in Engineering - Fabrication Trade	UEGSS00013 Basic hydrogen safety skill set
Software Engineer	Bachelor of Software Engineering (Honours)	UEGSS00013 Basic hydrogen safety skill set UEGNSG102 Prepare safe design specifications of a gas system	

STORAGE	Corrosion technicians	High school certificate	UEGSS00013 Basic hydrogen safety skill set
		Advanced Diploma of Manufacturing Technology	

DISTRIBUTION/TRANSPORT	Pipeline Operators/Technicians	Cert III Gas Industry Operations	<ul style="list-style-type: none"> <li>• UEGSS00013 Basic hydrogen safety skill set</li> <li>• UEGSS00014 Inject hydrogen into distribution network skill set</li> <li>• UEGNSG214 Coordinate and conduct gas distribution pipeline repair and modifications</li> <li>• TLIF2012 Apply safe procedures when handling/transporting dangerous goods or explosives</li> <li>• UEGNSG208 Construct and lay large copper gas distribution pipelines</li> <li>• UEGNSG211 Construct and lay steel gas distribution pipelines</li> <li>• UEGNSG206 Construct and lay copper and stainless steel gas distribution pipelines</li> <li>• UEGNSG215 Coordinate construction, laying and testing of gas distribution pipelines</li> </ul>
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	<p>UEE42620 Certificate IV Hazardous Areas - Electrical</p>	<ul style="list-style-type: none"> <li>• TLID0021 Store and handle dangerous goods and hazardous substances</li> <li>• TLIF2012 Apply safe procedures when handling/transporting dangerous goods or explosives</li> <li>• UEGNSG209 Construct and lay polyethylene gas distribution mains</li> <li>• UEGNSG214 Coordinate and conduct gas distribution pipeline repair and modifications</li> <li>• UEGNSG303 Carry out transmission pipeline construction work activities</li> <li>• UEGNSG309 Coordinate transmission pipeline construction operations</li> <li>• UEPOPS010 Conduct minor mechanical maintenance</li> <li>• UEGNSG313 Monitor and operate flow control, pressure measuring and regulating devices for gas transmission</li> <li>• UEGNSG509 Remotely monitor and operate gas transmission flow and pressure measuring and regulating devices</li> </ul>
<p>Corrosion technicians</p>	<p>Associate Degree Engineering or Earth Sciences, or higher</p>	<p>UEGSS00013 Basic hydrogen safety skill set</p>

	Pipeline Welders	Certificate III in Engineering - Fabrication Trade	<ul style="list-style-type: none"> <li>• UEGSS00013 Basic hydrogen safety skill set</li> <li>• UEGNSG214 Coordinate and conduct gas distribution pipeline repair and modifications</li> <li>• TLIF2012 Apply safe procedures when handling/transporting dangerous goods or explosives</li> <li>• UEGNSG208 Construct and lay large copper gas distribution pipelines</li> <li>• UEGNSG211 Construct and lay steel gas distribution pipelines</li> <li>• UEGNSG206 Construct and lay copper and stainless steel gas distribution pipelines</li> <li>• UEGNSG215 Coordinate construction, laying and testing of gas distribution pipelines</li> <li>• TLIF2012 Apply safe procedures when handling/transporting dangerous goods or explosives</li> <li>• UEGNSG214 Coordinate and conduct gas distribution pipeline repair and modifications</li> <li>• UEGNSG303 Carry out transmission pipeline construction work activities</li> <li>• UEGNSG309 Coordinate transmission pipeline construction operations</li> <li>• UEPOPS010 Conduct minor mechanical maintenance</li> <li>• UEGNSG208 Construct and lay large copper gas distribution pipelines</li> <li>• UEGNSG211 Construct and lay steel gas distribution pipelines</li> </ul>
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<b>INSTALLATION</b>	Instrumentation and Electrical Technicians	UEE42620 Certificate IV Hazardous Areas - Electrical	UEGSS00013 Basic hydrogen safety skill set
	Plumber	Certificate III in Plumbing (CPC32420), or Certificate IV in Plumbing and Services (CPC40920).	UEGSS00013 Basic hydrogen safety skill set
		UEE42620 Certificate IV Hazardous Areas - Electrical	
		White Card	
		Drivers Licence C	
Maintenance technician	Occupational Plumbing and drainage licence in State or Territory, along with relevant endorsement	UEGSS00013 Basic hydrogen safety skill set	
	First Aid and CPR		
	Maintenance technician	Certificate III in Air-conditioning and Refrigeration (UEE32211), or Certificate III in Electrotechnology Electrician (UEE30811), or	UEGSS00013 Basic hydrogen safety skill set

	Certificate III in Engineering - Mechanical Trade (MEM30205).	
	UEE42620 Certificate IV Hazardous Areas - Electrical	
Gas fitter	Certificate IV in Gas Supply Industry Operations (UEG40118)	UEGSS00013 Basic hydrogen safety skill set
	Gas work licence or authorisation in relevant State or Territory	
Electrical fitter	UEE33020 - Certificate III in Electrical Fitting	UEGSS00013 Basic hydrogen safety skill set
	Electrical fitter licence	
	UEE42620 Certificate IV Hazardous Areas - Electrical	
	First Aid and CPR	
	Drivers Licence C	
Integration specialists	Bachelor of Computer Science / Engineering IT, or related field	UEGSS00013 Basic hydrogen safety skill set
Gas inspectors	Certificate IV in Gas Supply Industry Operations (UEG40118)	UEGSS00013 Basic hydrogen safety skill set
	Gas work licence or authorisation in relevant State or Territory	
	First Aid and CPR	
	Drivers Licence C	
Hazardous materials management specialist	CPCCE4008 - Supervise asbestos removal, or CPC41020 - Certificate IV in Demolition	UEGSS00013 Basic hydrogen safety skill set
Controls System Technician	UEE42620 Certificate IV Hazardous Areas - Electrical	UEGSS00013 Basic hydrogen safety skill set
	Drivers Licence C	
Instrumentation Engineer	UEE42620 Certificate IV Hazardous Areas - Electrical	UEGSS00013 Basic hydrogen safety skill set

<b>BUSINESS/GENERIC/MANAGERS/EXECUTIVES</b>	Project Managers	Diploma Project Management, or Associate Diploma Project Management, or Degree Project Management, or Post-graduate Project Management, or Masters Project Management	UEGSS00013 Basic hydrogen safety skill set
	Safety Managers/Officers	BSB60619: Advanced Diploma of Work Health and Safety 11045NAT: Certificate IV in Safety Leadership 10894NAT: Course in Workplace Impairment Prevention RII40220: Certificate IV in Surface Coal Mining (Open Cut Examiner) RII40120: Certificate IV in Surface Extraction Operations PSP60116: Advanced Diploma of Government (Workplace inspection/ Investigations/Fraud control) PRM40704: Certificate IV in Asset Maintenance (Fire Safety Systems Inspection) MEM50119: Diploma of Engineering - Advanced Trade MEM50105: Diploma of Engineering - Advanced Trade DEF40520: Certificate IV in Simulator Maintenance BSB51319: Diploma of Work Health and Safety BSB41419: Certificate IV in Work Health and Safety BSB30719: Certificate III in Work Health and Safety 22324VIC: Certificate IV in Electrical Inspection	UEGSS00013 Basic hydrogen safety skill set

	Asset/Financial Manager/Budget Analyst	10980NAT: Graduate Certificate in Compliance and Risk Management 10978NAT: Graduate Diploma of Asset Management 10977NAT: Graduate Certificate in Asset Management	UEGSS00013 Basic hydrogen safety skill set
		Bachelor of Business (Finance), or related field	
	Attorney/Legal Counsel	22595VIC: Advanced Diploma of Justice 22565VIC: Advanced Diploma of Legal Practice Bachelor Degree Laws, or equivalent	UEGSS00013 Basic hydrogen safety skill set
	Regulatory expert	Not available	UEGSS00013 Basic hydrogen safety skill set
	Technical sales representative	Organisation specific	UEGSS00013 Basic hydrogen safety skill set
	Purchasing managers	Organisation specific	UEGSS00013 Basic hydrogen safety skill set
	Research managers	10980NAT: Graduate Certificate in Compliance and Risk Management, or 10978NAT: Graduate Diploma of Asset Management, or 10977NAT: Graduate Certificate in Asset Management, or 10964NAT: Certificate IV in Compliance and Risk Management	<ul style="list-style-type: none"> <li>• UEGSS00013 Basic hydrogen safety skill set</li> <li>• UEGNSG102 Prepare safe design specifications of a gas system</li> <li>• TLIF4065 Ensure compliance with Australian Dangerous Goods Code</li> <li>• PUAFIR516 Assess and evaluate a facility's fire and incident safety management systems</li> <li>• PUAFIR404 Inspect dangerous goods facilities</li> <li>• UEEIC0024 Plan the electrical installation of integrated systems</li> <li>• UEGNSG316 Work in proximity of transmission pipeline construction plant and equipment</li> </ul>
	Bachelor Degree Business / Computer Science / Information Technology / Marketing / Statistics / Economics/ Psychology, or related field.		
Process compliance managers	11059NAT: Diploma of Vocational Education and Training Compliance Management, or 10980NAT: Graduate Certificate in Compliance and Risk Management 10964NAT: Certificate IV in Compliance and Risk Management	UEGSS00013 Basic hydrogen safety skill set	



Technology manager	Bachelor Degree Information Technology / IT project management / Computer science, or related field	UEGSS00013 Basic hydrogen safety skill set	
	Relationship and community manager	Bachelor Degree Public Relations / Communications / Journalism, or related field	UEGSS00013 Basic hydrogen safety skill set
	Safety and Q&C	11059NAT: Diploma of Vocational Education and Training Compliance Management	UEGSS00013 Basic hydrogen safety skill set
		Bachelor Degree Business Administration / Communications / Human Resources / Economics / Quality Management Systems	UEGSS00013 Basic hydrogen safety skill set
	Emissions accounting & reporting consultant	Not available	UEGSS00013 Basic hydrogen safety skill set
	Emissions reduction credit portfolio manager	Not available	UEGSS00013 Basic hydrogen safety skill set
Emissions reduction project developer specialist	Not available	<ul style="list-style-type: none"> <li>• UEGSS00013 Basic hydrogen safety skill set</li> <li>• UEGNSG102 Prepare safe design specifications of a gas system</li> <li>• TLIF4065 Ensure compliance with Australian Dangerous Goods Code</li> <li>• PUAFIR516 Assess and evaluate a facility's fire and incident safety management systems</li> <li>• PUAFIR404 Inspect dangerous goods facilities</li> <li>• UEEIC0024 Plan the electrical installation of integrated systems</li> <li>• UEGNSG316 Work in proximity of transmission pipeline construction plant and equipment</li> </ul>	
	Emissions reduction project manager		Not available
	Production Training Coordinator	TAE40116 - Certificate IV in Training and Assessment	UEGSS00013 Basic hydrogen safety skill set
		UEG30121 - Certificate III in Gas Supply Industry Operations	
	Logistics Officer/Team Leader	Organisation specific	UEGSS00013 Basic hydrogen safety skill set
	Cultural Heritage Monitors/Coordinators	Not available	UEGSS00013 Basic hydrogen safety skill set

	Environmental Advisors		UEGSS00013 Basic hydrogen safety skill set
	Public Affairs Specialist	Bachelor Degree Communication Major Public Relations, or related field	UEGSS00013 Basic hydrogen safety skill set
	Communications/Media Manager	Bachelor Degree Communications, or Bachelor Degree Marketing, or Bachelor Degree Journalism	UEGSS00013 Basic hydrogen safety skill set
		BSB60520: Advanced Diploma of Marketing and Communication BSB50620: Diploma of Marketing and Communication 10904NAT: Diploma of Social Media Marketing	
Gas Industry Trainers/Assessors	TAE40116 - Certificate IV in Training and Assessment UEG30121 - Certificate III in Gas Supply Industry Operations	UEGSS00013 Basic hydrogen safety skill set Additional Units of Competence depending on relevant work environment	

## CONCLUSION

As the hydrogen sector grows, the respective job roles and their underpinning skills requirements will become more apparent. Recent reviews of the National Training Packages will make accredited training programs more relevant and accommodating for Hydrogen skills. There are however still many unknowns. The current skills base that exists in the CSG/LNG industry is perfectly placed to serve as the supply for skilled hydrogen workers. As can be deduced from the information in this report, many of the required skills and knowledge are already held by the current workforce. As the available supply of Hydrogen training programs grows, more applicable training can be assigned to the workforce.

Specific training programs for Hydrogen unique (Red roles) may still have to be developed with many of them at a Higher Education level as it involves specialised knowledge which is new to the industry and indeed to Australia.

Energy Skills wishes to thank ATCO Gas, Jemena and EnerTrain for their assistance in compiling this report for the Australian Gas Industry Trust.

## REFERENCES

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The hydrogen economy and jobs of the future. Bezdek, R. Cavendish Energy. November 2018.