



Status of Vocational Hydrogen Training in Australia

A Snapshot

30th June 2021

- This document provides a snapshot of the status of nationally recognised vocational (VET) hydrogen training courses in Australia. This document is open source and will be updated on a quarterly basis.
- This document aims to provide an insight of where overlaps may occur in hydrogen-specific training between industries, where developed competencies or elements of competencies may be shared between industries or expanded upon, and will help to prevent training gaps that may result in skills shortages for hydrogen-related work.
- Additionally, it will assist industries, including RTOs and GTOs, to understand timelines for the development and delivery of hydrogen training courses in Australia.
- At the time of preparing this second edition, there were no approved VET training courses for hydrogen work in Australia. There was one VET training package at the Endorsement stage and one ready to be submitted for the Case for Change stage.
- **At the time of writing, one Skills Services Organisation (SSO) had been engaged by the Federal Government on a project that will be exploring what skills, knowledge and training is needed to support the National Hydrogen Strategy. This is the reason UEE hydrogen training is on hold (see Table 1, below).**

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Table 1) Snapshot of the stages that each industry is currently at, in relation to the development of VET hydrogen training in Australia. It is current as of 30th of June 2021.

Table 2) Industries and competencies or elements of competencies where skills requirements will likely overlap.

Table 3) Input for skills requirements from peak industry bodies, government and hydrogen industry participants.

Table 4) Undergraduate and postgraduate course developed by the Australian National University (ANU). The Hydrogen Economy, while not a VET course, it is an indication of the progress of hydrogen training in Australia.

Table 1) Hydrogen Training Snapshot in Australia – 30th June 2021

Key:

No significant discussions for training underway
Training development currently on hold
No VET training being developed
Case for Change has been submitted for approval to proceed to Development stage
Competencies have been developed and are at Case for Endorsement stage
Training packages approved and ready for delivery

INDUSTRY	IRC CODE	SSO	IS THERE A PRIORITY FOR SKILLS NOW? YES / NO / UNSURE REASONS	STATUS OF TRAINING
<ul style="list-style-type: none"> Automotive – Light vehicle and heavy vehicle 	AUM	PWC	YES <ul style="list-style-type: none"> Any training at this stage likely to be undertaken by OEMs 	<ul style="list-style-type: none"> Advised by SSO 6/7/2021 At this stage, we will not be progressing hydrogen training for the AUR training package to avoid duplication in developed training
<ul style="list-style-type: none"> Automotive - Allied industry, light vehicle, heavy vehicle and body repair 	AUR	PWC	YES <ul style="list-style-type: none"> Any training at this stage likely to be undertaken by OEMs 	<ul style="list-style-type: none"> Advised by SSO 6/7/2021 At this stage, we will not be progressing hydrogen training for the AUR training package to avoid duplication in developed training
<ul style="list-style-type: none"> Aviation 	AVI	AIS	UNSURE <ul style="list-style-type: none"> Advised by SSO 6/7/2021 Nothing requested by industry or IRC 	NIL <ul style="list-style-type: none"> Advised by SSO 6/7/2021

<ul style="list-style-type: none"> Construction, plumbing and services Downstream of the gas meter, domestic and commercial installation and appliances including LPG and LPG storage Marine and campers 	CPC	Artibus	<p>YES</p> <ul style="list-style-type: none"> Determined that 19 hydrogen competencies will be required (see Table 3, below) 	<ul style="list-style-type: none"> Advised by SSO 1/7/2021 Case for Change was reviewed by the Industry Reference Committee on 22 June 2021 and will be forwarded to the AISC for consideration on 21 July 2021 (see Table 3, below)
<ul style="list-style-type: none"> Maritime 	MAR	AIS	<p>NO</p> <ul style="list-style-type: none"> Advised by SSO 1/7/2021 There is no other current project(s) for the development of hydrogen skill standards 	<p>NIL</p> <ul style="list-style-type: none"> Advised by SSO 1/7/2021
<ul style="list-style-type: none"> Aerospace 	MEA	IBSA	<p>NO</p> <ul style="list-style-type: none"> Advised by SSO 6/7/2021 	<p>NIL</p> <ul style="list-style-type: none"> Advised by SSO 6/7/2021
<ul style="list-style-type: none"> Manufacturing and engineering 	MEM	IBSA	<p>NO</p> <ul style="list-style-type: none"> Advised by SSO 6/7/2021 Nothing has been requested by industry or IRC 	<p>NIL</p> <ul style="list-style-type: none"> Advised by SSO 6/7/2021
<ul style="list-style-type: none"> Resources and infrastructure 	RII	PWC	<p>NO</p> <ul style="list-style-type: none"> Advised by SSO 6/7/2021 Nothing has been requested by industry or IRC 	<p>NIL</p> <ul style="list-style-type: none"> Advised by SSO 6/7/2021
<ul style="list-style-type: none"> Transport logistics and rail 	TLI	AIS	<p>NO</p> <ul style="list-style-type: none"> Advised by SSO 1/7/2021 There is no other current project(s) for the development of hydrogen skill standards 	<p>NIL</p> <ul style="list-style-type: none"> Advised by SSO 1/7/2021
<ul style="list-style-type: none"> Electrotechnology* 	UEE11	AIS	<p>YES</p>	<ul style="list-style-type: none"> Advised by SSO 1/7/2021 Work is on hold and SSO has not yet commenced on a hydrogen

			<ul style="list-style-type: none"> Knowledge of electrical systems and components required to safely work with fuel cells and electrolysers 	Case for Change for the UEE training package
<ul style="list-style-type: none"> Gas Upstream of the gas meter – including distribution, transmission, storage and production 	UEG	AIS	<p>YES</p> <ul style="list-style-type: none"> Industry decided there was a current and long-term need (see Table 3, below) 	<ul style="list-style-type: none"> Advised by SSO 1/7/2021 Awaiting approval – endorsement stage 6 new units of competency 3 new skill sets 13 existing units of competency have been reviewed to include hydrogen (see Table 3, below)
<ul style="list-style-type: none"> Electrical supply generation 	UEP	AIS	<p>UNSURE</p> <ul style="list-style-type: none"> Advised by SSO 6/7/2021 ESI Generation IRC is currently discussing activities to scope the industry for hydrogen skills 	<p>NIL</p> <ul style="list-style-type: none"> Advised by SSO 6/7/2021
<ul style="list-style-type: none"> Electrical supply, distribution and rail industry 	UET12	AIS	<p>UNSURE</p> <ul style="list-style-type: none"> Advised by SSO 6/7/2021 ESI Generation IRC is currently discussing activities to scope the industry for hydrogen skills 	<p>NIL</p> <ul style="list-style-type: none"> Advised by SSO 6/7/2021

*The plumbing and gas fitting industry believes updates to the UEE11 Restricted Electrotechnology (REL) packages are required for electrical safety when working with fuel cells and electrolysers. This was discussed at the Artibus Case for Change meeting held on 26th March 2021 and MPANZ Hydrogen Committee 15th March 2021. As of 30th June 2021, there has been no advice that this has changed.

Table 2) Industries and competencies where skills requirements will likely overlap

The table below is indicative only. Actual competencies required by industries will not be known until they have progressed beyond the Case for Change stage to the Development stage, with additional changes possibly occurring in the Development stage.

Key:

	Competencies or elements of competencies required
	Some element overlaps already exist in these competences which are being proposed for UEG and CPC hydrogen work
	Competencies likely not required. This may change as the uptake of hydrogen increases
	Competencies have been developed and are at Case for Endorsement stage
	Case for Change has been submitted for approval to proceed to Development stage
	Development of training currently on hold for these competencies

	APPLICABLE UEG GAS COMPETENCIES AT ENDORESMENT STAGE	AUM	AUR	AVI	CPC	MAR	MEA	MEM	RII	TLI	UEE11	UEG	UEP	UET12
1	UEGNSG901 Apply safety practices, procedures, and compliance standards for handling hydrogen gas													
2	UEGNSG902 Commission, operate and maintain electrolyzers Some elements may overlap with CPCHYD3012, CPCHYD3013, CPCHYD4003													
3	UEGNSG903 Fault find and repair hydrogen storage equipment Some elements may overlap with CPCHYD3001, CPCHYD3010													
4	UEGNSG904 Inject hydrogen gas into distribution networks													

5	UEGNSG905 Monitor and control hydrogen in gas distribution networks													
6	UEGNSG906 Undertake routine hydrogen storage operations Some elements may overlap with CPCHYD3001, CPCHYD3010													
7	UEGSS00013 Basic hydrogen safety skill set													
8	UEGSS00014 Inject hydrogen into distribution networks skill set													
9	UEGSS00015 Monitor hydrogen using control systems skill set													
10	UEGNSG102 Prepare safe design specifications of a gas system Some elements may overlap with CPCHYD4002													
11	UEGNSG205 Commission or decommission gas distribution pipelines													
12	UEGNSG206 Construct and lay copper and stainless-steel gas distribution pipelines													
13	UEGNSG208 Construct and lay large copper gas distribution pipelines													
14	UEGNSG209 Construct and lay polyethylene gas distribution mains													
15	UEGNSG211 Construct and lay steel gas distribution pipelines													
16	UEGNSG214 Coordinate and conduct gas distribution pipeline repair and modifications													

17	UEGNSG215 Coordinate construction, laying and testing of gas distribution pipelines													
18	UEGNSG303 Carry out transmission pipeline construction work activities													
19	UEGNSG304 Commission or decommission gas transmission pipelines													
20	UEGNSG307 Coordinate the operation of relevant plant and equipment for transmission pipeline construction													
21	UEGNSG309 Coordinate transmission pipeline construction operations													
22	UEGNSG316 Work in proximity of transmission pipeline construction plant and equipment													
	APPLICABLE CPC WATER & GAS COMPETENCIES AT CASE FOR CHANGE STAGE	AUM	AUR	AVI	CPC	MAR	MEA	MEM	RII	TLI	UEE11	UEG	UEP	UET12
23	CPCHYD3001 Store and handle hydrogen Some elements may overlap with UEGNSG903, UEGNSG906													
24	CPCHYD3002 Install and commission for hydrogen Type A appliances													
25	CPCHYD3003 Maintain and service for hydrogen Type A appliances													
26	CPCHYD3004 Disconnect and reconnect for hydrogen Type A appliances													

27	CPCHYD3005 Calculate and install ventilation for hydrogen Type A appliances													
28	CPCHYD3006 Install and commission for hydrogen Type B appliances													
29	CPCHYD3007 Maintain and service for Type B appliances													
30	CPCHYD3008 Disconnect and reconnect for hydrogen Type B appliances													
30	CPCHYD3009 Safe termination of vent lines for hydrogen													
31	CPCHYD3010 Install hydrogen storage capacity up to xxxx (storage size to be determined) Some elements may overlap with UEGNSG903, UEGNSG906													
32	CPCHYD3011 Commission and decommission hydrogen combustion systems													
33	CPCHYD3012 Commission and decommission hydrogen fuel cell and electrolyzers Some elements may overlap with UEGNSG902													
34	CPCHYD3013 Inspect, service and maintain hydrogen fuel cell and electrolyzers Some elements may overlap with UEGNSG902													
35	CPCHYD4001 Undertake purging													

36	CPCHYD4002 Size and design consumer hydrogen systems Some elements may overlap with UEGNSG102													
37	CPCHYD4003 Water treatment and wastewater Some elements may overlap with UEGNSG902													
38	CPCHYD4004 Size and design flue systems for hydrogen appliances													
39	CPCHYD4005 Characteristic and chemistry of hydrogen													
40	CPCHYD4006 Compression and cooling/chilling of hydrogen													
	LIKELY ELECTRICAL COMPETENCIES	AUM	AUR	AVI	CPC	MAR	MEA	MEM	RII	TLI	UEE11	UEG	UEP	UET12
41	Prepare safe design specifications for the monitoring and control components of hydrogen systems													
42	Prepare safe design specifications for the electrical components of hydrogen fuel cell systems													
43	Prepare safe design specifications for the electrical components of water electrolysis systems													
44	Commission, decommission, operate and maintain (fault find and repair) the electrical components of water electrolysis systems													
45	Commission, decommission, operate and maintain (fault find and repair)													

	monitoring and control components of hydrogen systems													
46	Commission, decommission, operate and maintain (fault find and repair) the electrical components of hydrogen fuel cell systems													
	OTHER COMPETENCIES NOT INCLUDED ABOVE	AUM	AUR	AVI	CPC	MAR	MEA	MEM	RII	TLI	UEE11	UEG	UEP	UET12
47	Dispensing													
48	Piping systems above 20 bar (+ or -)?													
49	Electrical safety and hydrogen													
50	Other H2 production													

Table 3) Input for skills requirements from peak industry bodies, government and hydrogen industry participants

If you represent an industry association, government agency, RTO, GTO or hydrogen-related business and you have information to help ensure the accuracy of this document, please feel free to do so by commenting in Table 3 below. You can also call or email H2Networks. Find our contact details below. Table 1 in this document will give you an indication of the code for each industry. If the correct code is not in Table 1 please write the name of the industry.

NAME AND TITLE	
ORGANISATION	
EMAIL	PHONE
INDUSTRY	WHAT DATE TRAINING IS REQUIRED BY?
WHICH COMPETENCIES ARE REQUIRED?	
WHAT IS THE EXPECTED WORK OF THE LEARNER UPON COMPLETION OF TRAINING?	

Table 4) Hydrogen Economy (ANU) undergraduate and postgraduate

Undergraduate and postgraduate course developed by the Australian National University (ANU). The Hydrogen Economy, while not a VET course, it is an indication of the progress of hydrogen training in Australia.

LEARNING OUTCOMES
Describe and apply basic physics of hydrogen generation, storage, transportation and conversion; and underlying key energy transformations
Evaluate and compare the physics of existing and emerging technologies underpinning the hydrogen economy
Apply techno-economic analysis in selecting appropriate hydrogen technology for specific objectives
Critically analyse different hydrogen technologies (for example the construction of fuel cells and electrolyzers) supply chain models
Evaluate different hydrogen policy frameworks and analyse the relative merits of alternative policy scenarios
Develop and communicate key areas of governance, safety metrology systems needed for the development of the hydrogen economy
Develop a personal qualified, well-argued view of possible pathways for the hydrogen economy

Contributions

I would like to thank Artibus Innovation, Australian Industry Standards, Australian National University, IBSA Group and PricewaterhouseCoopers for responding to requests for information to complete this document.

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