22696VIC

Certificate II in Renewable Energy Technologies and Applications

Version 1: May 2025

This course has been accredited under Part 4.4 of the *Education and Training Act 2006*.

Accredited for the period: 1 January 2026 to 31 December 2030

Version History		Date
Version 1	Initial release	01 January 2026

Section A – Copyright and course classification information

1. Copyright owner of the course	Copyright of this material is reserved to the Crown in the right of the State of Victoria on behalf of the Department of Jobs, Skills, Industry and Regions (DJSIR) Victoria. © State of Victoria (DJSIR) 2025		
2. Address	**Executive Director** Deputy CEO Victorian Skills Authority Department of Jobs Skills, Industry and Regions (DJSIR) GPO Box 4509 Melbourne Vic 3001 **Organisational Contact:** Manager, Training and Learning Products Unit Engagement Branch Victorian Skills Authority Telephone: 131 823 Email: course.enquiry@djsir.vic.gov.au **Day-to-day contact:** Curriculum Maintenance Manager (CMM) Electrical/Electronics Engineering Industries Box Hill Institute Private Bag 2014 Box Hill Vic 3128 Telephone: (03) 9286 9231 Email: CMMEI@boxhill.edu.au		
3. Type of submission	☒	Accreditation	
	☐	Reaccreditation	Specify course code and title
4. Copyright acknowledgement	The following units of competency: AHCCFP301 Identify the effects of climate change as a factor in land management AHCSAW202 Recognise landforms and soil types have been imported from the AHC Agriculture, Horticulture and Conservation and Land Management training package administered by the Commonwealth of Australia. © Commonwealth of Australia		

The following unit of competency:

AURETR048 Construct and test basic electronic circuits

has been imported from the AUR Automotive Retail, Service and Repair training package administered by the Commonwealth of Australia.

The following unit of competency:

CPCWHS1001 Prepare to work safely in the construction industry

has been imported from the CPC Construction, Plumbing and Services training package administered by the Commonwealth of Australia.

The following unit of competency:

ICPPTD302 Set up and produce 3D prints

has been imported from the ICP Printing and Graphic Arts training package administered by the Commonwealth of Australia.

The following units of competency:

MEM12024 Perform computations

MEM13015 Work safely and effectively in manufacturing and engineering

MEM16006 Organise and communicate information

have been imported from the MEM Manufacturing and Engineering training package administered by the Commonwealth of Australia.

The following unit of competency:

NWPGEN018 Follow environmental and licensing procedures

has been imported from the NWP National Water training package administered by the Commonwealth of Australia.

The following units of competency:

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology

UEECD0025 Lay wiring/cabling and terminate accessories for extra-low voltage (ELV) circuits

UEECD0046 Solve problems in single path circuits

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEECS0003 Assemble, set up and test computing devices

UEECS0033 Use engineering applications software on personal computers

UEEDV0010 Select and arrange equipment for wireless communication networks

UEEDV0011 Set up and configure basic data communication systems

have been imported from the UEE Electrotechnology training package administered by the Commonwealth of Australia.

The following unit of competency:

UEPOPS046 Maintain battery banks and cells

has been imported from the UEP Electricity Supply Industry - Generation Sector training package administered by the Commonwealth of Australia.

The following units of competency:

VU23110 Use routine work practices in an integrated technologies environment

VU23111 Apply electrotechnology knowledge and skills in integrated technologies work

VU23113 Carry out an integrated technologies project

VU23120 Set up and operate a small scale stand-alone photovoltaic energy system with battery storage

have been imported from 22586VIC Certificate II in Integrated Technologies (Pre-vocational).

The following unit of competency:

VU23142 Investigate applications for smart cities technology

has been imported from 22589VIC Certificate III in Emerging Technologies.

The following unit of competency:

VU23158 Explore the Internet of Things (IoT) in industry

has been imported from 22588VIC Certificate III in Enabling Technologies.

The following units of competency:

VU23475 Safely use hand tools and handheld power tools for general engineering applications

VU23477 Interpret and prepare basic two- and three-dimensional engineering drawings

VU23479 Apply basic fabrication techniques

have been imported from 22632VIC Certificate II in Engineering Studies.

The following unit of competency:

VU23898 Participate in the design and build of a small-scale renewable energy system

has been imported from 22695VIC Certificate III in Renewable Energy Industry Pathways.

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6. Course accrediting body	Victorian Registration and Qualifications Authority	
7. AVETMISS information	ANZSCO code	099910 Student
	ASCED code	1299 Other Mixed Field Programmes
	National course code	22696VIC Certificate II in Renewable Energy Technologies and Applications
8. Period of accreditation	1st January 2026 to 31st December 2030	

Section B – Course information

1. Nomenclature	Standard 4.1 and 5.8 AQTF 2021 Standards for Accredited Courses
1.1 Name of the qualification	Certificate II in Renewable Energy Technologies and Applications
1.2 Nominal duration of the course	271-596 hours
2. Vocational or educational outcomes	**Standard 5.1 AQTF 2021 Standards for Accredited Courses**
2.1 Outcome(s) of the course	This course is designed to provide senior secondary school students with an awareness of the cross-sectoral nature of renewable energy through the exploration of renewable energy technologies and applications across a range of industry areas and contexts. It aims to build foundational skills and knowledge and prepare learners for further education and training. The course is intended to provide the following educational outcomes. • knowledge of the scope and structure of the renewable energy sector and its role in the transition to a clean economy • knowledge and skills in a range of renewable energy related technologies and applications, including the generation and storage of electricity from multiple renewable energy sources • knowledge of the relationship between energy, sustainable development and climate systems • knowledge and skills to apply electrical principles to the design and build of small-scale renewable energy systems in different industry contexts • basic technical skills required to work with renewable energy systems in different industry contexts • the ability to apply safe work practices in different renewable energy work contexts • development of transferrable skills including problem solving, teamwork and communication skills.
2.2 Course description	The Certificate II in Renewable Energy Technologies and Applications is designed to provide senior secondary school students with exposure to the technologies and applications of renewable energy across different industries and contexts. Electives are grouped into industry streams allowing learners to develop basic industry specific skills and knowledge to support their development

and pathways into further education and training in qualifications leading to primarily trade-based roles in renewable energy.

3. Development of the course	Standards 4.1, 5.1, 5.2, 5.3 and 5.4 AQTF 2021 Standards for Accredited Courses

3.1 Industry, education, legislative, enterprise or community needs

Background on course development

Australia's renewable energy industry, particularly in solar and wind, is experiencing a significant shortfall in qualified personnel. This is forecast to worsen in the next few years. At the same time there are increasing investments in renewable energy projects which are often reliant on imported expertise for technical knowledge and skills.

The nature of renewable energy is multidisciplinary and cross-sectoral in its applications. Many people, including younger people, are concerned about climate and the environment, but lack knowledge of the many career pathways into this field.

As a response to the Victorian Government's election commitment to develop a clean energy pathway for school students, the Victorian Department of Education introduced a 'Clean Energy and Engineering' pathway in its VET Delivered to School Students core offering in 2023 as one of its priority industry areas aligned to skills shortages and forecasted jobs growth. This was part of a broader strategic initiative for secondary schools delivering vocational education programs, following the recommendation from the Firth Review that students, families and providers should be provided with enhanced information and guidance about industry pathways that included indicative subject groupings for particular occupational fields.

In 2024, the VET Unit of the Victorian Curriculum and Assessment Authority (VCAA) was invited to work with the Department of Education to develop a Renewable Energy VCE VET Program to address the needs of industry and learners wanting to pursue a career in renewable energy.

Following extensive research and analysis, alongside broad consultation with industry and education stakeholders, it was decided that two courses were required to address the following considerations:

- The lack of a suitable Certificate II or Certificate III qualification in Renewable Energy meant there was no pathway into a Certificate IV level qualification apart from existing electrician apprenticeship pathways.
- Industry stakeholders wanted VETDSS courses that led to the variety of trade and non-trade roles available in the Renewable Energy sector. There were no suitable units in either trade or the non-trade qualifications, therefore it was an appropriate strategy to address these gaps by developing two courses.

Although the courses were developed to address the same project brief, each course has a distinct focus, set of outcomes and target cohort resulting in the following two courses for inclusion in the Renewable

Energy VCE VET program:

- Certificate II in Renewable Energy Technologies and Applications (this course)
- Certificate III in Renewable Energy Industry Pathways

The aim of this Certificate II level qualification is to provide an awareness of the cross-sectoral nature of renewable energy through enterprise units focussed on renewable energy coupled with relevant imported units that develop technical skills and knowledge in industry areas of interest. The course provides learners with an opportunity to commence a pathway into further education and training in existing technical and trade qualifications and apprenticeships.

Industry / educational need

State and Federal Governments have set targets to cut Australia's greenhouse gas emissions (GGEs) and achieve net zero. Reaching these targets requires a substantial workforce transformation. Australia needs to consider the full range of levers available, across education and training, migration, procurement and workplace relations systems to ensure a sustainable, equitable path towards net zero.[1]

Victoria has already cut emissions by more than any other Australian state, tripled the amount of renewable energy and created thousands of jobs with almost 30 per cent of Australia's renewable energy jobs Victorian based. As the industry expands, the demand for skilled energy workers will only increase. This presents huge opportunities for Victorians to reskill, upskill and move into new sectors where their qualifications are highly sought after.[2]

The Victorian Skills Plan states that conservative estimates expect around 10,000 additional Victorian jobs per year from now until 2030 as a result of investments in renewables. To work towards skilling for a net zero future, training products should aim to create more base skills for workers so they can transfer more easily across critical roles… and establish new qualifications and courses to rapidly build the necessary skills.[3]

Preliminary research and a review of broader school curriculum and programs across senior school identified a vocational education gap between climate change content (covered in the F-10 Curriculum) or the renewable energy programs offered in Tech Schools, and post-secondary Certificate IV and Diploma level qualifications in renewable energy and micro-credentials or short courses aimed at upskilling the existing trade

[1] The Clean Energy Generation: Workforce needs for a net zero economy, Jobs and Skills Australia, https://www.jobsandskills.gov.au/publications/the-clean-energy-generation
[2] The Clean Economy Workforce Development Strategy 2023-2033, Department of Jobs, Skills, Industry and Regions, https://www.vic.gov.au/clean-economy-workforce-development-strategy-2023-2033
[3] Victorian Skills Plan for 2023 into 2024, Victorian Skills Authority, https://www.vic.gov.au/victorian-skills-plan-2023-publication

workforce.

Entry-level courses must be able to optimise learners' ability to build practical, hands-on skills but also their ability to develop broad, transferable and technical skills that can be used in a range of occupations. This will ensure that learners gain an understanding of a breadth of industries and job roles, including the jobs of the future as technology advances.

Target group

The primary target group is learners undertaking VET Delivered to Secondary Students (VETDSS). A potential secondary target group may comprise post-school learners and early school leavers seeking to develop skills and knowledge in preparation for further study.

The course is expected to attract strong demand from young learners who are concerned about climate change and the environment, but do not have sufficient knowledge of the career pathways and training opportunities that lead into the renewable energy industry.

It is also expected to engage learners at an introductory level, providing industry insight and practical skills that will allow them to transition successfully into either trade-based apprenticeship pathways or further education and training.

This course has been developed by the VCAA, in partnership with the Victorian Department of Education as part of broader initiatives to improve vocational and applied learning pathways in senior secondary schools. It is expected that the increased role of VET in the Victorian Certificate of Education (VCE) and VCE Vocational Major (VCE VM), along with the Department's strategic prioritising of industry areas aligned to skills shortages and forecasted jobs growth, such as clean energy, will create additional course demand.

Course consultation and validation process

Course developers undertook preliminary research on renewable energy and its place within the broader Clean Economy to determine the industry and workforce needs, the skills and knowledge required for key small-scale and utility-scale occupations, and if there were any suitable existing training products to meet these needs at Certificate II or Certificate III level.

Research also reviewed the suitability of training products for school-age learners, possible pathway options for students completing their senior secondary certificate and opportunities for school-based apprenticeships and traineeships (SBATs).

Course developers also consulted broadly with a range of industry and education stakeholders in determining the above, including large-scale energy companies, government agencies and industry regulatory bodies, education representatives, training providers and VET sector stakeholders at both national and state levels.

The feedback from these initial consultations:

- reiterated the cross-sectoral nature and multiple applications of renewable energy skills and knowledge across virtually all sectors
- recommended qualifications should be broad in scope and encapsulate areas of advanced manufacturing, agriculture, automotive and transport, digital communications systems, electrotechnology, electricity supply and engineering
- reinforced the prevalence of post-secondary microcredentials and skill sets aimed at upskilling existing tradespeople, and conversely the absence of training products at a Certificate II and III level in fulfilling the needs of young learners (including in a VETDSS context) and providing clear vocational pathways into the renewable energy industry
- recommended substantial hands-on components should be paired with fundamental units around climate change and energy use, systems thinking, battery storage technology and the science that underpins renewable energy
- corroborated the industry workforce demand for traditional tradespeople and that the current trade pathways for students studying Certificate II 'pre-apprenticeship / pre-vocational' qualifications which lead to Certificate III apprenticeships are adequately fulfilling this demand
- reinforced the need for new units to be written to address gaps in existing training products and deliver the required outcomes.

Accreditation project steering committee

The development of the Certificate II in Renewable Energy Technologies and Applications was overseen by the Project Steering Committee (PSC).

A skills and knowledge profile was developed to guide the outcomes of the course following consultation, feedback and validation from PSC members.

The PSC met formally on four occasions and communicated via email throughout the project to consider and confirm the course skills and knowledge outcomes, course structure and final draft accreditation submission. Stakeholder feedback was incorporated to refine the technical content and assessment requirements of the enterprise units as appropriate.

Course development was guided by the following PSC members:

Michael Cullen	Executive Officer / Electrical Inspector, Future Energy Skills Australia + Executive Officer, Electrotechnology Industry Advisory Group (IAG)

Dominic Schipano	National Executive Officer, Communications and Information Technology Training Ltd (CITT)
Adrian Lea	Supervising Executive Officer, Curriculum Maintenance Manager for Electrical / Electronics Engineering, Box Hill Institute
Catherine Eymin	Regional Origination and Engineering Manager, Acciona
Caz Saunders	Training and Quality Manager, Solar Training Centre
Daniel Farrant	Head of Programs, Gippsland Tech School
Dr Glen Farivar	Head of Power Electronics Research, University of Melbourne / Melbourne Energy Institute
Dr Patricia Sauri Lavieri	Senior Lecturer in Transport Engineering, University of Melbourne / Melbourne Energy Institute
Greg Cowan	Jobs, Skills and Pathways Manager, Outer East Region, Department of Education
Matthew Natsis	Executive Manager, Northern College of Arts and Technology (NCAT)
Nicola Pero	Executive Manager, Engagement and Social License, Iberdrola Australia
Nicola Sabbadini	Senior Policy Officer, VET Unit, Victorian Curriculum and Assessment Authority (VCAA)
Simon Imrei	Senior Project Officer,VET Unit, Victorian Curriculum and Assessment Authority (VCAA).

In attendance:

Colleen Mandaliti	Accreditation expert, TLC Education Design Pty Ltd
Wendy Pederson	Project Officer, CMM for General Manufacturing, Chisholm Institute

This course:

	• does not duplicate, by title or coverage, the outcomes of an endorsed training package qualification • is not a subset of a single training package qualification that could be recognised through one or more statements of attainment or a skill set • does not include units of competency additional to those in a training package qualification that could be recognised through statements of attainment in addition to the qualification • does not comprise units that duplicate units of competency of a training package qualification
3.2 Review for re-accreditation	N/A

4. Course outcomes	**Standards 5.5, 5.6 and 5.7 AQTF 2021 Standards for Accredited Courses**
4.1 Qualification level	The 22696VIC Certificate II in Renewable Energy Technologies and Applications is consistent with the AQF Level 2 requirements of the Australian Qualifications Framework as follows: **Knowledge**: Graduates will have basic factual, technical and procedural knowledge of a defined area of work and learning within renewable energy industry areas. For example, basic electrical principles and safe work practices when working with renewable energy systems. **Skills**: Graduates will have: • cognitive skills to access, record and act on a defined range of information from a range of sources. For example, investigating and documenting basic information related to renewable energy sources, systems and storage methods • cognitive and communication skills to apply and communicate known solutions to a limited range of predictable problems. For example, reviewing and documenting renewable energy project brief designs in collaboration with others • technical skills to use a limited range of equipment to complete tasks involving known routines and procedures with a limited range of options. For example, participating in the production of small-scale renewable energy models under close supervision. **Application of knowledge and skills:** Graduates will be able to demonstrate the application of knowledge and skills:

	• with some accountability for the quality of own outcomes and some responsibility for own outputs in work and learning. For example, clarifying work requirements and completing tasks in a required timeframe • with limited autonomy and judgement in the completion of own defined and routine tasks in known and stable contexts. For example, completing allocated tasks under close supervision when participating in a team project to produce a small-scale renewable energy system • with limited autonomy and judgement to complete routine but variable tasks in collaboration with others in a team environment. For example, contributing to the outcomes of specified basic renewable energy projects as a member of a team. **Volume of learning** The volume of learning for this qualification is typically between 0.5 – 1 year which is consistent with the AQF Volume of Learning requirement for a Certificate II qualification.. The course allows for delivery as a VCE VET program which is typically delivered part-time over 2 years. The course incorporates structured training delivery and assessment and unstructured learning activities undertaken by the learner including research activities on renewable energy technologies and the applications of renewable energy in different sectors, and project work to reinforce and practice skills.
4.2 Foundation skills	The following table contains a summary of the foundation skills as identified by the industry for this qualification. The foundation skill facets described here are broad industry requirements that may vary depending on qualification packaging.
Foundation skill	**Industry/education/legislative/enterprise/community requirements for this qualification include the following facets:**
Reading skills to:	• review and interpret sources of information related to energy and climate, renewable energy sources, systems and technologies and the application of renewable energy in multiple contexts • review and interpret technical information and data related to specific task requirements • review licensing and regulatory guidelines as they apply to renewable energy • interpret and follow workplace procedures, safety procedures, equipment instructions, manufacturer specifications and technical data

Writing skills to:	• prepare and present information in a format suitable for diverse audiences • record information and complete documentation accurately
Oral communication skills to:	• communicate effectively with team members, supervisors and stakeholders and adjust to meet the needs of audience • ask questions and listen effectively when communicating with others and seeking feedback • present information using appropriate style, tone and vocabulary to meet requirements of audience, context and purpose • share information with others in a work team environment
Numeracy skills to:	• use basic formulas to complete calculations related to renewable energy systems • use and communicate basic numerical information relating to automotive electrical systems and components
Learning skills to:	• ask questions to gain information and to ensure understanding of own work requirements • adopt an open approach to emerging renewable energy technologies
Problem solving skills to:	• identify potential or actual hazards and take action to minimise risk • refer issues beyond scope of own role to supervisor
Initiative and enterprise skills to:	• source and interpret information related to renewable energy projects
Teamwork skills to:	• work effectively with team members • agree on project outcomes and team responsibilities
Planning and organising skills to:	• identify own work requirements in consultation with others to meet specified tasks and timeframes • complete allocated renewable energy project tasks within the required timeframe and budget

Self-management skills to:	• recognise own limitations in relation to the use of tools and equipment and seek support and advice • accept responsibility for given tasks • follow legislative requirements, protocols and procedures relating to own role • plan own work within given task parameters
Technology skills to:	• use technology related to work tasks including tools, equipment, devices and materials
Digital literacy skills to:	• access reliable sources of information related to renewable energy sources, systems, technologies and applications • use suitable software programs to produce working drawings and prepare reports and presentations
4.3 Recognition given to the course (if applicable)	N/A
4.4 Licensing/regulatory requirements (if applicable)	N/A
5. Course rules	**Standards 5.8 and 5.9 AQTF 2021 Standards for Accredited Courses**

5.1 Course structure	To achieve the qualification 22696VIC Certificate II in Renewable Energy Technologies and Applications, the learner must successfully complete a total of 12 units comprising:
	• 4 core units
	• 8 elective units comprising:
	  ○ 4 elective units selected from 1 elective stream listed below.
	  ○ each stream has 1 compulsory elective as set out below:
	  ▪ Agriculture Stream - VU23896 Produce a small-scale renewable energy system model for a dual land use agricultural enterprise
	  ▪ Data Communications Stream - UEEDV0011 Set up and configure basic data communication systems
	  ▪ Energy Supply Stream - VU23120 Set up and operate a small scale stand-alone photovoltaic

energy system with battery storage

- Engineering and Manufacturing Stream - VU23898 Participate in the design and build of a small-scale renewable energy system
- ICT and Integrated Technologies Stream - VU23113 Carry out an integrated technologies project
- Transport and Automotive Stream - VU23900 Participate in the design and build of a small-scale hydrogen fuel cell powered vehicle

- 4 elective units selected from any other stream. Units selected cannot include the units listed above.

Where the full course is not completed, a VET Statement of Attainment will be issued for each unit successfully completed.

Unit of competency code	Unit of competency title	Field of Education code (6-digit)	Pre-requisite	Nominal hours
Core units				
CPCWHS1001	Prepare to work safely in the construction industry		Nil	6
UEECD0007	Apply work health and safety regulations, codes and practices in the workplace		Nil	20
VU23894	Research and report on the relationship between energy, sustainability and climate	129999	Nil	30
VU23895	Apply electricity principles to construct basic electrical circuits used in renewable energy systems	031399	Nil	30
Agriculture Stream				
AHCCFP301	Identify the effects of climate change as a factor in land management		Nil	60

AHCSAW202	Recognise landforms and soil types		Nil	50
NWPGEN018	Follow environmental and licensing procedures		Nil	30
VU23896	Produce a small-scale renewable energy system model for a dual land use agricultural enterprise	059999	Nil	40

Data Communications Stream

UEECD0025	Lay wiring/cabling and terminate accessories for extra-low voltage (ELV) circuits		UEECD0007 UEECD0020 UEECD0051	40
UEECS0003	Assemble, set up and test computing devices		UEECD0007	80
UEEDV0010	Select and arrange equipment for wireless communication networks		UEECD0007	60
UEEDV0011	Set up and configure basic data communication systems		UEECS0003 UEECD0007	40

Energy Supply Stream

UEECD0019	Fabricate, assemble and dismantle utilities industry components		UEECD0007	40
UEECD0020	Fix and secure electrotechnology		UEECD0007	20
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications		UEECD0007	40
UEECD0046	Solve problems in single path circuits		UEECD0007	40
UEPOPS046	Maintain battery banks and cells		Nil	20

VU23897	Research and report on energy storage systems suitable for renewable energy	031399	Nil	30
VU23120	Set up and operate a small scale stand-alone photovoltaic energy system with battery storage		Nil	60

Engineering and Manufacturing Stream

MEM12024	Perform computations		MEM13015 MEM16006	30
MEM13015	Work safely and effectively in manufacturing and engineering		Nil	40
MEM16006	Organise and communicate information		MEM13015	20
UEECS0033	Use engineering applications software on personal computers		Nil	40
VU23475	Safely use hand tools and handheld power tools for general engineering applications		Nil	40
VU23477	Interpret and prepare basic two- and three-dimensional engineering drawings		Nil	30
VU23479	Apply basic fabrication techniques		Nil	40
VU23898	Participate in the design and build of a small-scale renewable energy system	031399	Nil	60
VU23899	Research and report on engineering occupations in renewable energy	120599	Nil	20

ICT and Integrated Technologies Stream

ICPPTD302	ICPPTD302 Set up and produce 3D prints		Nil	80

VU23110	Use routine work practices in an integrated technologies environment		UEECD0007	40
VU23111	Apply electrotechnology knowledge and skills in integrated technologies work		UEECD0007	80
VU23113	Carry out an integrated technologies project		UEECD0007 VU23110 VU23111	60
VU23142	Investigate applications for smart cities technology		Nil	30
VU23158	Explore the Internet of Things (IoT) in industry		Nil	30

Transport and Automotive Stream

AURETR048	Construct and test basic electronic circuits		Nil	40
VU23900	Participate in the design and build of a small-scale hydrogen fuel cell powered vehicle	030599	Nil	30
VU23901	Research and report on the role of renewable energy technologies in the transport sector	129999	Nil	25
VU23902	Identify and confirm electric vehicle systems and components	030599	Nil	20
VU23903	Research and report on the impacts of electric vehicles	030599	Nil	20

Total nominal hours	271-596

5. Course rules Standard 5.11 AQTF 2021 Standards for Accredited Courses

5.2 Entry requirements	There are no specific entry requirements for this course. Learners are best equipped to achieve the course outcomes if they have as a minimum, language, literacy and numeracy skills that are equivalent to Level 2 of the Australian Core Skill Framework. Learners with language, literacy and numeracy skills at lower levels than those suggested will require additional support to successfully undertake the qualifications.

6. Assessment	**Standard 5.12 and 5.14 AQTF 2021 Standards for Accredited Courses**
6.1 Assessment strategy	All assessment, including Recognition of Prior Learning (RPL), must be compliant with the requirements of: • Standard 1 of the AQTF: Essential Conditions and Standards for Initial/Continuing Registration and Guidelines 4.1 and 4.2 of the VRQA Guidelines for VET Providers, or • the Standards for Registered Training Organisations 2015 (SRTOs), or • the relevant standards and Guidelines for RTOs at the time of assessment.
	A holistic process to assessment that integrates several units in practical tasks or projects is encouraged. Assessment must focus on renewable energy technologies and applications within the context of each unit. Units of competency may be assessed in a simulated environment that reflects a realistic workplace setting. Assessment strategies must therefore ensure that: • all assessments are valid, reliable, flexible and fair • learners are informed of the context and purpose of the assessment and the assessment process • feedback is provided to learners about the outcomes of the assessment process and guidance given for future options • time allowance to complete a task is reasonable and reflect industry expectations. Assessment strategies should be designed to: • cover a range of skills and knowledge required to demonstrate achievement of the intended outcomes • collect evidence on a number of occasions to suit a variety of

	contexts and situations • be appropriate to the skills, knowledge, methods of delivery and needs and characteristics of learners • assist assessors to interpret evidence consistently • be equitable to all groups of learners. • inform learners of the context and purpose of the assessment The following assessment methods are appropriate for units of competency in this accredited course: • written and/or oral questioning to assess required knowledge • direct observation of practical tasks, processes and procedures • simulated activities • problem solving activities • practical projects • reports and portfolios. Assessment strategies for the imported units should be consistent with the Assessment Requirements for the relevant training packages or accredited courses.
6.2 Assessor competencies	Assessment must be undertaken by a person or persons in accordance with: • Standard 1.4 of the AQTF: Essential Conditions and Standards for Initial/Continuing Registration and Guidelines 3 of the VRQA Guidelines for VET Providers, or • the Standards for Registered Training Organisations 2015 (SRTOs), or • the relevant standards and Guidelines for RTOs at the time of assessment.
	Units of competency imported from training packages or accredited courses must reflect the requirements for assessors specified in that training package or accredited course.

7. Delivery	**Standards 5.12, 5.13 and 5.14 AQTF 2021 Standards for Accredited Courses**
7.1 Delivery modes	The 22696VIC Certificate II in Renewable Energy Technologies and Applications may be delivered either on a full time or part time basis using

a combination of delivery modes, including:

- face-to-face, classroom-based delivery
- practical demonstration
- blended or flexible online delivery
- delivery in a simulated workplace.

Some learning activities may be relevant to more than one unit and therefore integration may be appropriate. All delivery should actively involve the learner and learning should be experiential, relevant and age appropriate. Suitable learning activities may include:

- classroom and workshop instruction, practical exercises and tasks
- team based or individual projects
- research assignments
- use of case studies and scenarios
- enterprise visits and guest speakers.

Contextualisation of imported units is strongly recommended to ensure a focus on renewable energy technologies and applications within the guidelines provided in the relevant training package or delivery advice provided in the accredited course.

7.2 Resources

Training must be undertaken by a person or persons in accordance with:

- Standard 1.4 of the AQTF: Essential Conditions and Standards for Initial/Continuing Registration and Guideline 3 of the VRQA Guidelines for VET Providers,

or

- the Standards for Registered Training Organisations 2015 (SRTOs),

or

- the relevant standards and Guidelines for RTOs at the time of assessment.

Units of competency imported from training packages or accredited courses must reflect the requirements for assessors specified in that training package or accredited course.

General facilities, equipment and other resources required to deliver the Certificate II in Renewable Energy Technologies and Applications include:

- training facilities and equipment
- access to computers or digital devices and internet
- industry standard software and equipment
- sources of current and reliable information related to renewable energy

	• health and safety resources including safe work procedures and personal protective equipment • real or simulated workplace environment. Mandated assessment resources apply to the enterprise units included in this course. Refer to the Assessment Conditions of the individual units. The units of competency imported from training packages or accredited courses must reflect the requirements for resources and trainers specified in that training package or accredited course.

8. Pathways and articulation	**Standard 5.10 AQTF 2021 Standards for Accredited Courses**
	Currently, there are no formal arrangements for articulation to other accredited courses or higher education qualifications. Learners who complete units of competency from endorsed training packages or accredited courses will be eligible for credit into other qualifications that contain those units.

9. Ongoing monitoring and evaluation	**Standard 5.15 AQTF 2021 Standards for Accredited Courses**
9.1 Monitoring and evaluation	Ongoing monitoring and evaluation of the 22696VIC Certificate II in Renewable Energy Technologies and Applications is the responsibility of the Curriculum Maintenance Manager for Electrical/Electronics Engineering Industries. A review will be undertaken during the accreditation period and will be informed by feedback from course participants and graduates, teaching staff, and industry stakeholders. The Victorian Registration and Qualifications Authority (VRQA) will be notified of any changes to the course.

Section C – Units of competency

Units of competency contained in the course

Units of competency developed for the course

Code	Title
VU23894	Research and report on the relationship between energy, sustainability and climate
VU23895	Apply electricity principles to construct basic electrical circuits used in renewable energy systems
VU23896	Produce a small-scale renewable energy system model for a dual land use agricultural enterprise
VU23897	Research and report on energy storage systems suitable for renewable energy
VU23900	Participate in the design and build of a small-scale hydrogen fuel cell powered vehicle
VU23901	Research and report on the role of renewable energy technologies in the transport sector
VU23899	Research and report on engineering occupations in renewable energy
VU23902	Identify and confirm electric vehicle systems and components
VU23903	Research and report on the impacts of electric vehicles

Units of competency imported from other accredited courses

Code	Title
VU23110	Use routine work practices in an integrated technologies environment

VU23111	Apply electrotechnology knowledge and skills in integrated technologies work
VU23113	Carry out an integrated technologies project
VU23120	Set up and operate a small scale stand-alone photovoltaic energy system with battery storage
VU23142	Investigate applications for smart cities technology
VU23158	Explore the Internet of Things (IoT) in industry
VU23475	Safely use hand tools and handheld power tools for general engineering applications
VU23477	Interpret and prepare basic two- and three-dimensional engineering drawings
VU23479	Apply basic fabrication techniques
VU23898	Participate in the design and build of a small-scale renewable energy system

Units of competency imported from training packages

Code	Title
AHCCFP301	Identify the effects of climate change as a factor in land management
AHCSAW202	Recognise landforms and soil types
AURETR048	Construct and test basic electronic circuits
CPCWHS1001	Prepare to work safely in the construction industry
ICPPTD302	Set up and produce 3D prints

MEM12024	Perform computations
MEM13015	Work safely and effectively in manufacturing and engineering
MEM16006	Organise and communicate information
NWPGEN018	Follow environmental and licensing procedures
UEECD0007	Apply work health and safety regulations, codes and practices in the workplace
UEECD0019	Fabricate, assemble and dismantle utilities industry components
UEECD0020	Fix and secure electrotechnology
UEECD0025	Lay wiring/cabling and terminate accessories for extra-low voltage (ELV) circuits
UEECD0046	Solve problems in single path circuits
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications
UEECS0003	Assemble, set up and test computing devices
UEECS0033	Use engineering applications software on personal computers
UEEDV0010	Select and arrange equipment for wireless communication networks
UEEDV0011	Set up and configure basic data communication systems
UEPOPS046	Maintain battery banks and cells

Section C – Units of competency

Unit code	VU23894
Unit title	Research and report on the relationship between energy, sustainability and climate
Application	This unit describes the performance outcomes, skills and knowledge required to source information and investigate and report on the relationship between energy use, sustainability and climate. It requires the ability to source information and identify the causes and effects of human-induced climate change, the role of energy use and strategies to reduce impacts. It includes an examination of new renewable energy technologies for their potential use in Australia. The unit applies to individuals wishing to understand the impact of energy use and unsustainable production and consumption on the climate. No occupational licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.
Pre-requisite Unit(s)	Nil

Element		**Performance Criteria**	
Elements describe the essential outcomes of a unit of competency.		Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the assessment requirements.	
1	Investigate the relationship between energy, sustainability and climate	1.1	Access credible sources of information to support climate investigations
		1.2	Identify the contribution of different types of greenhouse gases to the greenhouse effect
		1.3	Determine how greenhouse gas emissions are disrupting the carbon cycle and contributing to climate impact
		1.4	Identify the contribution of increased global energy use to the production of greenhouse gases
		1.5	Identify the patterns, practices and impacts of unsustainable production and consumption on the environment and on climate
		1.6	Document the extent of major industry contributors to human induced climate change and unsustainable production and consumption

		1.7	Identify the consequences of global warming
2	Identify strategies for reducing human induced climate change	2.1	Access global climate agreements to address the impacts of human induced climate change and review agreed strategies to address the issue
		2.2	Examine the role of circular economy practices in addressing and reducing climate impacts
		2.3	Identify the role of renewable energy sources in replacing traditional energy sources and reducing carbon emissions
		2.4	Identify the strategies available to industry and consumers to reduce the impacts of human induced climate change
3	Examine developments in and applications for new renewable energy technologies	3.1	Explore the potential of global developments in renewable energy technologies to mitigate the impacts of climate change
		3.2	Identify government policies, incentives and regulations supporting the development of renewable energy technologies
		3.3	Examine the potential for development and implementation of new renewable energy technologies in Australia
4	Prepare a report on findings	4.1	Collate and summarise research findings
		4.2	Present findings in a report clearly referencing sources of information

Range of Conditions

N/A

Foundation Skills

Foundation skills essential to performance and not explicit in the performance criteria are listed in the table below and must be assessed.

Skill	Description
Reading skills to:	• Review and interpret sources of information related to energy, climate impact and renewable energy technologies
Writing skills to:	• Prepare information in a suitable format for audience

Digital literacy skills to:	• Access reliable sources of information and prepare a report

Unit Mapping Information	New unit, no equivalent unit.

Assessment Requirements Template	
Title	Assessment Requirements for VU23894 Research and report on the relationship between energy, sustainability and climate

Performance Evidence	The learner must demonstrate the ability to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit and:
	• produce a report on the relationship between energy, sustainability and climate, including an outline of:
	  ○ patterns and practices of unsustainable production and consumption
	  ○ causes and consequences of human induced climate change
	  ○ strategies used to mitigate human induced climate change
	  ○ how industry and consumer use of renewable energy in at least three different industry areas may reduce greenhouse gas emissions
	  ○ the future of technologies in at least three different sources of renewable energy and their potential impact on the climate and environment
	  ○ the potential for use within Australia of new renewable energy technologies in use globally
	• reference source material appropriately.

Knowledge Evidence	The learner must be able to demonstrate essential knowledge required to effectively do the task outlined in elements and performance criteria of this unit.
	This includes knowledge of:
	• the concept of global warming and its relationship to broader climate impacts
	• basic concepts relating to:
	  ○ types of greenhouse gases and how they contribute to the greenhouse effect
	  ○ disruption of the carbon cycle and the role of carbon sinks
	  ○ the drivers of greenhouse gas emissions and the relationship between greenhouse gas emissions and human induced climate change
	  ○ key differences between renewable and non-renewable energy sources
	  ○ the role of renewable energy and energy efficiency in decarbonising energy systems and reducing reliance on fossil fuels
	  ○ sustainability principles including:
	  ▪ sustainable production and consumption
	  ▪ circular economy practices

	▪ energy efficiency ▪ stages of a product life-cycle • patterns and practices that contribute to human induced climate change including: o petrol and diesel vehicles in transport, travel, manufacturing and mining o agricultural and forestry management practices o fast food, fast fashion and planned obsolescence o building and construction materials and practices o supply chain inefficiencies o waste in landfill • consequences of human induced climate change for: o ecosystems o economies o food security o water security • basic principles of systems thinking and the importance of its approach in understanding and addressing climate issues • strategies available to industry and consumers to mitigate climate impacts • basic features and functions of currently available renewable energy sources • basic features and potential uses of emerging renewable energy technologies • global trends and policies to combat climate impacts including: o the increasing development and deployment of new renewable energy systems and technologies o government policies promoting renewable energy o international climate agreements including the Paris agreement and the United Nations Sustainable Development Goals o government responses to carbon emissions targets • Australian government policies, incentives and regulations supporting renewable development to reduce climate impact.
Assessment Conditions	Assessment must ensure access to: • internet • computer or digital device • credible sources of information including government reports, published articles and case studies related to:

	○ energy use, unsustainable practices and climate impacts ○ current and emerging renewable energy technologies ○ examples of new renewable energy technologies in use globally • report template. Assessor requirements No specialist vocational competency requirements for assessors apply to this unit.

Unit code	VU23895
Unit title	Apply electricity principles to construct basic electrical circuits used in renewable energy systems
Application	This unit describes the performance outcomes, skills and knowledge required to apply knowledge of basic principles to safely construct functioning electrical circuits. It requires the ability to investigate renewable energy systems and the principles and processes used to produce energy from renewable sources and illustrate the energy conversion processes of renewable energy systems. This unit applies to individuals seeking to work with renewable energy systems. No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.
Pre-requisite Unit(s)	Nil

Element		**Performance Criteria**	
Elements describe the essential outcomes of a unit of competency.		Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the assessment requirements.	
1	Investigate and document the basic operation of renewable energy systems	1.1	Identify and compare available renewable energy sources and their potential uses
		1.2	Identify suitable locations and applications for each type of renewable energy system
		1.3	Identify and compare energy input and output in renewable energy systems
		1.4	Identify the necessity for, and ways of storing energy in renewable energy systems
		1.5	Identify safety issues for renewable energy systems
		1.6	Document all findings related to renewable energy systems
2	Identify the energy conversion principles and processes used in renewable energy systems	2.1	Identify the principles and processes of energy conversion and production in renewable energy systems
		2.2	Differentiate between static, direct current (DC) and alternating current (AC) electricity
		2.3	Identify the role of magnetism in electricity production
		2.4	Identify the role and limitations of DC-AC power converters in renewable energy systems

3	Apply electricity principles to construct functioning electrical circuits	3.1	Identify health and safety requirements for working with electricity
		3.2	Create schematics to illustrate the mechanisms of functioning electrical circuits using standard electronic components and symbols
		3.3	Calculate circuit input and output using correct units
		3.4	Construct functioning extra low voltage (ELV) electrical circuits in line with health and safety requirements

Range of Conditions

N/A

Foundation Skills

Foundation skills essential to performance and not explicit in the performance criteria are listed in the table below and must be assessed.

Skill	Description
Reading skills to:	• Review and interpret technical information related to renewable energy systems and energy production
Numeracy skills to:	• Complete basic formulas for electrical calculations
Digital literacy skills to:	• Access relevant websites and sources of information

Unit Mapping Information	New unit, no equivalent unit.

Assessment Requirements Template	
Title	Assessment Requirements for VU23895 Apply electricity principles to construct basic electrical circuits used in renewable energy systems
Performance Evidence	The learner must demonstrate the ability to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit and: • create a schematic and construct at least one functioning ELV circuit • provide schematics to illustrate at least 3 commonly used renewable energy systems and the principles and processes used in their operation.

Knowledge Evidence	The learner must be able to demonstrate essential knowledge required to effectively do the task outlined in elements and performance criteria of this unit, manage the task and manage contingencies in the context of the work role.
	This includes knowledge of:
	• types, applications and suitability of renewable energy sources and systems
	• variations in energy output in renewable energy systems including where energy can be lost
	• foundation electricity principles:
	  ○ atomic structure
	  ○ static versus current electricity
	  ○ electron flow and energy transfer
	• Ohm's Law and resistance
	  ○ voltage sources and effects of an electric current
	  ○ electrical power
	  ○ difference between power and energy, and when is each used
	  ○ relationship between voltage, current and resistance (conductors versus insulators)
	• health and safety requirements when working with electricity
	• basic ELV electrical circuits including:
	  ○ elements of a simple electric circuit (supply, control switch, meters, protection device and load)
	  ○ electron flow in an electric circuit
	  ○ relationship between voltage and current from measured values in a simple circuit
	  ○ functioning series, parallel and series-parallel circuits
	• electric power converters including:
	  ○ power transformers

	○ conversion between DC and AC systems ○ power electronic converters including types and output waveforms ○ battery function (Lead-acid and Lithium) and electron flow in electrolytic reactions • basic features and functions of renewable energy systems including: ○ solar ○ wind ○ hydropower ○ geothermal ○ bioenergy • methods used to illustrate electrical circuits including standard electronic components and symbols • methods for calculating circuit input and output.
Assessment Conditions	Skills can be demonstrated in a simulated environment that reflects real workplace conditions with access to suitable equipment and resources. Assessment must ensure access to: • internet and computer or digital device • sources of information related to renewable energy systems • relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) for electrical circuit construction • a supervisor. Assessor requirements No specialist vocational competency requirements for assessors apply to this unit.

Unit code	VU23896
Unit title	Produce a small-scale renewable energy system model for a dual land use agricultural enterprise
Application	This unit describes the performance outcomes, skills and knowledge required to produce small-scale renewable energy system model drawings and build a small-scale model to represent a specific renewable energy system design. It requires the ability to review and interpret the design of a basic renewable energy system project brief for a dual land use agricultural enterprise. The unit applies to individuals wishing to understand how renewable energy can be used in agricultural operations. No occupational licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.
Pre-requisite Unit(s)	Nil

Element		**Performance Criteria**	
Elements describe the essential outcomes of a unit of competency.		Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the assessment requirements.	
1	Identify and document project brief requirements for a basic renewable energy system for an agricultural enterprise	1.1	Review the project brief to confirm the energy and storage requirements and the type of basic renewable energy system suitable for the enterprise
		1.2	Document the characteristics of the farm impacting on the design of the basic renewable energy system
		1.3	Confirm the purpose, scale and siting of the renewable energy system
		1.4	Identify the components required for the renewable energy system
		1.5	Identify challenges to the installation of the proposed system and discuss solutions with supervisor
		1.6	Document all project requirements for basic renewable energy system and confirm with supervisor
2	Review and interpret renewable energy system design to produce small-	2.1	Review working design drawings of the basic renewable energy system and confirm understanding with supervisor

	scale model drawings	2.2	Use the working design drawings to produce sketches and drawings of a small-scale model of the renewable energy system
		2.3	Document resource requirements for small-scale model of the renewable energy system based on drawings
		2.4	Seek supervisor feedback on small-scale model drawings and resource requirements
		2.5	Update documentation based on feedback and seek approval to build small-scale model
3	Build a small-scale model of the renewable energy system	3.1	Source and prepare components, parts, tools and resources in line with the small-scale model design drawings
		3.2	Test individual components before final assembly
		3.3	Assemble components to complete the build of the small-scale renewable energy system model
		3.4	Present the small-scale renewable energy system model with original drawings to showcase design idea

Range of Conditions

N/A

Foundation Skills

Foundation skills essential to performance and not explicit in the performance criteria are listed in the table below and must be assessed.

Skill	Description
Reading skills to:	• Interpret information related to renewable energy systems and use within an agricultural context
Writing skills to:	• Prepare documentation in a format suitable for audience
Oral communication skills to:	• Ask questions and listen effectively when seeking feedback
Planning and organising skills to:	• Complete tasks within the required timeframe
Digital literacy skills to:	• Access sources of information related to renewable energy systems and use within agriculture • Use a suitable software program to produce working drawings

Unit Mapping Information	New unit, no equivalent unit.

Assessment Requirements Template	
Title	Assessment Requirements for VU23896 Produce a small-scale renewable energy system model for a dual land use agricultural enterprise
Performance Evidence	The learner must demonstrate the ability to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit and: • produce small-scale model drawings for a basic renewable energy system to meet a specific project brief. The small-scale model must use at least one source of renewable energy. • assemble components to build a small-scale model of the renewable energy system.

Knowledge Evidence	The learner must be able to demonstrate essential knowledge required to effectively do the task outlined in elements and performance criteria of this unit, manage the task and manage contingencies in the context of the work role.
	This includes knowledge of:
	• types of farming, examples and benefits of dual land use agriculture in Australia
	• factors affecting the successful installation and operation of dual land use farming including:
	  ○ climate including seasonal and daily variations in solar radiation and wind flow speed and constancy
	  ○ topography including hills, water features, vegetation and the built environment
	  ○ physical factors including available land area, availability of water, grid capacity and connection, transmission infrastructure and storage needs
	  ○ environmental factors including deforestation, air pollution, loss of biodiversity and production of greenhouse gases
	  ○ economic factors including cost, availability of grants and financial incentives, pay-back time, energy efficiency, lifespan of storage systems, ease of replacement and maintenance, access to required skills and competing farm and land use priorities
	  ○ social factors including community differences and social license
	• types of renewable energy systems and technologies, and their suitability for different agricultural operations including:
	  ○ solar installations
	  ▪ ground mounted, water mounted or highly elevated
	  ▪ bifacial panels
	  ▪ transparent panels

	▪ tracking panels o wind turbines o bioenergy systems o geothermal systems o hydropower systems • basic design options and factors to be considered in establishing an: o agrivoltaic system o wind energy system o bioenergy system o geothermal system o hydropower system • types of suitable storage systems including: o battery (Nickle-Cadmium, Sodium-sulphur, Lithium Ion, Zinc-air, Lead-acid, flow batteries) o thermal o mechanical o pumped hydro o compressed air energy storage (CAES) o hydrogen.
Assessment Conditions	Assessment must ensure access to: • case study examples of renewable energy systems in agricultural contexts • detailed farm site briefs including characteristics: o total land size and productive area o location, topography, weather and climate conditions o existing farm equipment used in production of crops or maintenance of stock o number of buildings o all farming activities on the site o distance from the grid o proximity to transmission lines o available water sources o amount of cleared and vegetated land • project briefs detailing renewable energy system design parameters and design drawings that will enable energy to be produced in the following scenarios: o a 5-hectare berry farm on sloping land

	○ a 4-hectare sheep farm on the coast ○ a 4000 square metre hydroponic greenhouse growing tomatoes • internet • computer or digital device • sources of information related to renewable energy systems • software applications suitable for producing technical drawings • relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) for renewable energy system model production • a supervisor. Assessor requirements No specialist vocational competency requirements for assessors apply to this unit.

Unit code	VU23897
Unit title	Research and report on energy storage systems suitable for renewable energy
Application	This unit involves the skills and knowledge required to research and report on energy storage systems suitable for renewable energy contexts. It requires the ability to investigate the variety of energy storage systems available, storage technology and energy storage standards and safety. It includes a comparison and ranking of energy storage system technologies and preparation of a report documenting findings. This unit applies to individuals seeking to work with energy storage technologies for renewable energy in domestic or commercial environments. No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.
Pre-requisite Unit(s)	Nil

Element		**Performance Criteria**	
Elements describe the essential outcomes of a unit of competency.		Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the assessment requirements.	
1	Investigate energy storage technologies for renewable energy	1.1	Access sources of information relevant to implementation of energy storage technologies
		1.2	Prepare high-level drawings to illustrate how energy storage technologies work
		1.3	Examine the suitability of energy storage technologies for different sources of renewable energy
2	Compare and rank energy storage technologies for renewable energy sources	2.1	Compare the advantages and disadvantages of mechanical, electrochemical, thermal, electrical and hydrogen-based energy storage technologies
		2.2	Examine Australian energy storage standards, safety risks and the impacts on the environment and climate of energy storage solutions for renewable energy sources
		2.3	Source and document information on government policies, schemes and incentives available for implementation of renewable energy

		2.4	Use a simple tool to rank energy storage methods for renewable energy on sustainability
3	Report on energy storage solutions to meet a defined project brief	3.1	Review renewable energy project brief to confirm the energy storage solution requirements
		3.2	Use energy storage comparison and ranking information to identify a suitable energy storage method to meet the requirements of the renewable energy project brief
		3.3	Document the energy storage solution proposed to meet the brief
		3.4	Collate all findings and prepare a report on findings of investigation into energy storage technologies

Range of Conditions

N/A

Foundation Skills

Foundation skills essential to performance and not explicit in the performance criteria are listed in the table below and must be assessed.

Skill	Description
Reading skills to:	• Review and interpret technical data including graphs and tables
Writing skills to:	• Produce documentation in a format suitable for audience
Numeracy skills to:	• Use simple calculations to rank energy systems
Digital literacy skills to:	• Access information and data related to energy storage characteristics and performance

Unit Mapping Information	New unit, no equivalent unit.

Assessment Requirements Template	
Title	Assessment Requirements for VU23897 Research and report on energy storage systems suitable for renewable energy

Performance Evidence	The learner must demonstrate the ability to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit and:
	• produce a report on energy storage system solutions including:
	  ○ illustrations showing an overview of how different types of energy storage technologies work
	  ○ comparison and ranking of the performance, safety, sustainability and applications of energy storage methods used in renewable energy systems
	  ○ an energy storage solution that meets a project brief for two of the following contexts:
	  ▪ an off-grid home that uses pumped hydro and micro-wind turbines
	  ▪ a city office installing a small-scale renewable energy system using solar and geothermal energy
	  ▪ a busy metropolitan freeway construction site.

Knowledge Evidence	The learner must be able to demonstrate essential knowledge required to effectively do the task outlined in elements and performance criteria of this unit.
	This includes knowledge of:
	• the purpose of energy storage in energy systems
	• comparison of the types, methods and working principles of energy storage including:
	  ○ mechanical
	  ○ thermal
	  ○ electrical
	  ○ hydrogen-based
	  ○ electrochemical
	• suitability of storage methods for renewable energy sources including:
	  ○ solar
	  ○ wind
	  ○ geothermal
	  ○ bioenergy
	  ○ hydrogen

	• government policies, regulatory authorities, incentives and schemes available for the implementation of renewable energy distribution and storage in domestic and commercial contexts
	• energy storage standards and safety risks
	• advantages and disadvantages of typical energy storage systems
	• sustainability considerations for energy storage systems, including
	  ○ durability
	  ○ longevity
	  ○ cost
	  ○ safety
	  ○ accessibility
	  ○ clean disposal
	• energy storage definitions, measures and units
	• basic technologies for renewable energy storage in contexts including:
	  ○ residential
	  ○ commercial
	  ○ transport
	  ○ grid-tied
	  ○ off-grid
	  ○ micro-grid (grid-connected and stand-alone).

Assessment Conditions	Assessment must ensure access to:
	• internet
	• computer or digital device
	• sources of information related to energy storage systems
	• case studies or scenarios of energy storage system requirements for different contexts
	• simple sustainability ranking tool template
	• project briefs including parameters to meet storage solution requirements for contexts including:
	  ○ an off-grid home that uses pumped hydro and micro-wind turbines
	  ○ a city office installing a small-scale renewable energy system using solar and geothermal energy
	  ○ a busy metropolitan freeway construction site.
	Assessor requirements
	No specialist vocational competency requirements for assessors apply to this unit.

Unit code	VU23900
Unit title	Participate in the design and build of a small-scale hydrogen fuel cell powered vehicle
Application	This unit involves the skills and knowledge to participate in a team to design and build a small-scale hydrogen fuel cell powered vehicle. It requires the ability to work in a team to develop a project proposal and action plan, design and build a vehicle to meet the agreed brief, and review and document results. This unit applies to individuals seeking to develop skills to work with hydrogen fuel cell renewable energy systems. The unit is designed for use in a highly supervised context. No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.
Pre-requisite Unit(s)	Nil

Element		**Performance Criteria**	
Elements describe the essential outcomes of a unit of competency.		Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the assessment requirements.	
1	Prepare a team project proposal to design and build a working small-scale hydrogen fuel cell powered vehicle	1.1	Work with team members to review the project brief and document the project scope and outcomes
		1.2	Identify potential strategies to meet project outcomes
		1.3	Review advantages and disadvantages of identified strategies with team to reach consensus on project proposal
		1.4	Prepare a project proposal and seek supervisor approval
2	Determine and document project requirements in a team project action plan	2.1	Confirm project outcomes with supervisor
		2.2	Complete draft action plan template with agreed project timelines
		2.3	Identify and record safety risks and hazards and control measures
		2.4	Identify and record the electrical, chemical, mechanical and physical project components and quantities required
		2.5	Prepare working sketches for overall vehicle design including component parts

		2.6	Determine tools, equipment, safety provisions and other resources required for the project
		2.7	Confirm team roles and work with team to allocate project tasks to team members
		2.8	Document all project requirements on action plan and seek approval from supervisor
3	Produce basic design drawings for the small-scale hydrogen fuel cell powered vehicle to meet team project outcomes	3.1	Review and document safe work practices for working with hydrogen
		3.2	Confirm hydrogen generation and storage processes for design
		3.3	Produce working sketches and drawings to confirm the small-scale vehicle design
		3.4	Seek build approval from supervisor
4	Build, the small-scale hydrogen fuel cell powered vehicle in line with approved plan	4.1	Source and prepare components, resources, tools and equipment for use in line with the action plan
		4.2	Apply personal protective equipment (PPE) and use safe work practices at all times during vehicle build process
		4.3	Undertake vehicle build addressing challenges as a team and under close supervision in accordance with the project action plan
		4.4	Check project progress against agreed timelines in collaboration with team members
		4.5	Trial and test individual components before final assembly
		4.6	Construct or assemble vehicle parts and test vehicle works as expected
		4.7	Check tools and equipment for damage and return safely to storage
5	Demonstrate and document team project outcomes	5.1	Demonstrate the operation of the vehicle to supervisor and seek feedback
		5.2	Review project outcomes against the project plan and document feedback received

Range of Conditions

N/A

Foundation Skills	
Foundation skills essential to performance and not explicit in the performance criteria are listed in the table below and must be assessed.	
Skill	**Description**
Reading skills to:	• Interpret basic technical information related to hydrogen fuel cell powered vehicles
Writing skills to:	• Prepare documentation in a format suitable for audience
Oral communication skills to:	• Communicate effectively with team members and others
Technology skills to:	• Use suitable software to produce design
Digital literacy skills to:	• Access technical project information on the internet

Unit Mapping Information	New unit, no equivalent unit.

Assessment Requirements Template	
Title	Assessment Requirements for VU23900 Participate in the design and build of a specified small-scale hydrogen fuel cell powered vehicle
Performance Evidence	The learner must demonstrate the ability to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit and: • work collaboratively under close supervision in a small team to design, build and demonstrate a small-scale hydrogen fuel cell powered vehicle to meet a specified project brief • review and document project outcomes.

Knowledge Evidence	The learner must be able to demonstrate essential knowledge required to effectively do the task outlined in elements and performance criteria of this unit, manage the task and manage contingencies in the context of the work role.
	This includes knowledge of:
	• effective communication and teamwork principles
	• basic project planning and monitoring techniques
	• basic elements of a project proposal and action plan including:
	  ○ stages or steps of the project
	  ○ milestones to be achieved
	  ○ team member responsibilities
	  ○ timelines
	  ○ resources required for stages or steps
	• types of fuel cells
	• function of a fuel cell including:
	  ○ electrolytic production of hydrogen from water
	  ○ components of a fuel cell
	  ○ supplementary components of a fuel cell stack
	• properties and potential of hydrogen as a clean energy carrier
	• conventional and renewable methods of hydrogen production methods
	• storage of hydrogen for use in a small-scale vehicle
	• advantages and disadvantages of strategies used to design and build a small-scale hydrogen fuel cell powered vehicle including:
	  ○ time
	  ○ practicality
	  ○ cost
	  ○ feasibility

	• methods for calculating requirements for a small-scale hydrogen fuel cell powered vehicle including:
	  ○ power output size
	  ○ energy source collectors: size and area of solar cells
	  ○ materials and components including ordering and production time
	  ○ chemicals and time to produce hydrogen
	  ○ safety measures including distance around storage batteries and clear space from other heat sources
	• basic features and functions of software applications suitable for producing drawings for vehicle design
	• safe work practices in renewable energy and manufacturing environments
	• health and safety considerations and protocols relevant to the task being performed when working with hydrogen fuel cell powered vehicles including:
	  ○ use of appropriate personal protective equipment (PPE)
	  ○ chemical safety guidelines including working with acids
	  ○ hydrogen gas flammability
	  ○ safe use of a small-scale vehicle
	  ○ use of tools and equipment.

Assessment Conditions	Skills can be demonstrated in a simulated environment that reflects real workplace conditions with access to suitable equipment and resources. Assessment must ensure access to: • internet and computer or digital device • sources of information related to design and build of hydrogen fuel cell powered vehicles • hydrogen fuel cell vehicle project brief including scale of the build, distance to be travelled, project timing, and limitations • project proposal and action plan templates • software applications suitable for producing drawings • relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry • resources and components suitable for constructing vehicle (small-scale hydrogen fuel cell powered vehicle kit or similar) • team members and supervisor. Assessor requirements No specialist vocational competency requirements for assessors apply to this unit.

Unit code	VU23901
Unit title	Research and report on the role of renewable energy technologies in the transport sector
Application	This unit describes the performance outcomes, skills and knowledge required to investigate and report on the need for and the potential role of renewable energy technologies in the transport sector and transportation. It requires the ability to compare the energy consumption and energy efficiency of various transport modes using available data, determine the carbon footprint of various transport modes and consider the role of renewable energy in reducing emissions in the transport sector. The unit applies to individuals wishing to develop their understanding of ways to reduce greenhouse gas emissions (GGE) in transport. No occupational licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.
Pre-requisite Unit(s)	Nil

Element		**Performance Criteria**	
Elements describe the essential outcomes of a unit of competency.		Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the assessment requirements.	
1	Research energy consumption and greenhouse gas emissions (GGE) across sectors using available data	1.1	Access relevant sources of information to distinguish between energy efficiency and energy consumption
		1.2	Access and use available data to compare global energy consumption, GGEs and use of fossil fuels by sector and end-use
		1.3	Compare the energy efficiency of different types of propulsion technology and transport modes using available data
		1.4	Save and store comparison data using a visual screen capture tool
2	Examine the decarbonisation of transport	2.1	Determine the carbon footprint of recreational water vessels
		2.2	Determine the carbon footprint of food transport, nationally and internationally
		2.3	Access and use available data to compare life-cycle GGEs of internal combustion engines and electric passenger cars

		2.4	Examine carbon reduction measures in aviation and shipping
		2.5	Identify strategies and measures to decarbonise short- and long-haul road and rail freight
		2.6	Use a digital tool to calculate the transport carbon footprint of an individual
		2.7	Determine and document renewable energy opportunities to reduce the individual's transport carbon footprint
3	Explore the use of renewable energy technologies across the transport sector	3.1	Investigate the current use of renewable energy technologies in aviation, shipping, rail and road-using vehicles
		3.2	Identify emerging energy propulsion technologies suitable for aviation, shipping, rail and road transport
		3.3	Identify emerging trends and opportunities in renewable energy for transport users in Australia
4	Prepare a report on findings	4.1	Collate and summarise findings of investigations into renewable energy technologies and transport
		4.2	Present findings in a report using text and visual elements to display information

Range of Conditions

Foundation Skills

Foundation skills essential to performance and not explicit in the performance criteria are listed in the table below and must be assessed.

Skill	Description
Reading skills to:	• Review and interpret data related to energy consumption and GGEs
Writing skills to:	• Produce information in a format suitable for audience
Digital literacy skills to:	• Access and source information from relevant websites • Use digital tools and software to present information

Unit Mapping Information	New unit, no equivalent unit.

Assessment Requirements Template	
Title	Assessment Requirements for VU23901 Research and report on the role of renewable energy technologies in the transport sector

Performance Evidence	The learner must demonstrate the ability to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit and:
	• produce a report that includes:
	  ○ a visual representation of data comparisons and findings on current use of renewable energy technologies in aviation, shipping, rail and road-using vehicles
	  ○ an individual's transport carbon footprint calculated over at least a two-week period and opportunities to reduce the carbon footprint for the individual
	  ○ an outline of the need for renewable energy technologies in the transport sector including current and potential uses for technologies as well as emerging trends and opportunities.

Knowledge Evidence	The learner must be able to demonstrate essential knowledge required to effectively do the task outlined in elements and performance criteria of this unit.
	This includes knowledge of:
	• data sources comparing total global energy consumption of sectors, including end-uses associated with each:
	  ○ energy – end-use electricity and heating, transportation, buildings, manufacturing and construction, fugitive emissions.
	  ○ agriculture – end-use livestock and manure, agriculture and soils, rice cultivation and burning
	  ○ industrial processes – end-use cement, chemical and petrochemical, electronics, electric power systems, non-ferrous metals
	  ○ waste – end-use landfill, waste water
	  ○ land use, land-use change and forestry – end-use drained organic soil, forest land, forest fires in organic soils
	• data sources comparing total global energy consumption and GGEs from the transport sector including:
	  ○ aviation
	  ○ international shipping
	  ○ road – passenger, commercial vehicles, and buses
	  ○ short- and long-haul freight (road, rail, shipping and aviation)
	  ○ passenger rail and tram
	  ○ recreational water vessels
	• data sources providing total global percentage use of fossil fuels and renewable energy by transport mode including:

	○ aviation ○ international shipping ○ road – passenger, commercial vehicles and buses ○ short- and long-haul freight (road, rail, shipping and aviation) ○ passenger rail and tram ○ recreational water vessels • energy efficiency principles and basic methods of calculating energy efficiency • uses and energy efficiency of different types of propulsion technology in transport including: ○ internal combustion engines ○ gas turbine engines ○ electric propulsion systems ○ jet propulsion systems ○ nuclear propulsion ○ hydrogen fuel cells • factors influencing the energy efficiency of different transport modes including: ○ walking ○ cycling ○ petrol and diesel cars and motorcycles ○ electric and hybrid vehicles ○ public transport ○ ships ○ aeroplane and helicopter ○ yachts, speedboats, small fishing vessels and jet skis • common methods used to determine carbon footprints including digital tools • decarbonisation and carbon reduction measures in transport • data sources comparing the life-cycle GGEs of internal combustion engine and electric passenger cars • current and emerging renewable energy technologies related to transportation.
Assessment Conditions	Assessment must ensure access to: • internet • computer or digital device

	• sources of information including websites providing data related to energy consumption, GGEs and renewable energy technologies across the transport sector • digital tool or app suitable for measuring carbon footprint • software application suitable for visual presentation of information. Assessor requirements No specialist vocational competency requirements for assessors apply to this unit.

Unit code	VU23899
Unit title	Research and report on engineering occupations in renewable energy
Application	This unit describes the performance outcomes, skills and knowledge required to investigate and report on the diversity of engineering occupations related to renewable energy. It requires the ability to gather information to develop an understanding of engineering and its applications in renewable energy, as well as the occupations, job roles, tasks, skills and education required to work as an engineer in renewable energy contexts. The unit applies to individuals seeking an understanding of the diverse range of renewable energy engineering occupations and the education and training pathways to those occupations. No occupational licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.
Pre-requisite Unit(s)	Nil

Element		**Performance Criteria**	
Elements describe the essential outcomes of a unit of competency.		Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the assessment requirements.	
1	Investigate the role of engineering in renewable energy contexts	1.1	Identify the basic objectives of engineering and its application in renewable energy contexts
		1.2	Identify types of engineering relevant to all stages of renewable energy production
		1.3	Explore the roles of engineering in the generation, transportation and use of renewable energy
2	Investigate the diverse nature of engineering occupations in renewable energy contexts	2.1	Identify renewable energy industries that employ engineers
		2.2	Consult with industry stakeholders to identify engineering occupations and employment opportunities for engineers in renewable energy contexts
		2.3	Identify and compare job roles, tasks and skills required by engineers in diverse renewable energy contexts
		2.4	Identify the education and training pathways available to become an engineer in renewable energy
3	Prepare a report on	3.1	Collate and assemble information for report

	findings	3.2	Prepare report using appropriate visual presentation software
		3.3	Ensure sources of information are clearly referenced in the report

Range of Conditions

N/A

Foundation Skills

Foundation skills essential to performance and not explicit in the performance criteria are listed in the table below and must be assessed.

Skill	Description
Reading skills to:	• Review and interpret sources of information related to engineering occupations and pathways in renewable energy
Writing skills to:	• Prepare information in a suitable format for audience
Oral communication skills to:	• Ask open-ended questions and listen effectively
Digital literacy skills to:	• Access reliable sources of information • Use software suitable for producing visual information

Unit Mapping Information	New unit, no equivalent unit.

Assessment Requirements Template	
Title	Assessment Requirements for VU23899 Research and report on engineering occupations in renewable energy

Performance Evidence	The learner must demonstrate the ability to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit and:
	• Research and assemble information to report on engineering occupations in renewable energy enterprises including training and education pathways. In doing so, the learner must:
	  ○ select 3 engineering occupations relevant to renewable energy and outline the job role, tasks and skills required as well as the education and training pathways for the identified occupations
	  ○ present information in a visual format
	  ○ reference sources appropriately.

Knowledge Evidence	The learner must be able to demonstrate essential knowledge required to effectively do the task outlined in elements and performance criteria of this unit.
	This includes knowledge of:
	• basic objectives of engineering in renewable energy contexts including:
	  ○ researching and designing new technologies or infrastructure
	  ○ overseeing implementation and maintenance of infrastructure
	  ○ optimising efficiency and costs
	  ○ specialising in:
	  ▪ particular sources of renewable energy
	  ▪ transportation and storage infrastructure
	  ○ project management
	• production stages for renewable energy and diversity of engineering relevant including:
	  ○ aeronautical
	  ○ aerospace
	  ○ agricultural
	  ○ automotive
	  ○ biomedical
	  ○ chemical
	  ○ civil
	  ○ computer
	  ○ electrical
	  ○ electronic

	○ environmental ○ geotechnical ○ industrial ○ manufacturing ○ marine ○ mechanical ○ mining ○ systems • job roles and employment opportunities for engineers in renewable energy contexts including location and salary • skills required for engineering occupations in renewable energy • training and education pathway options available for engineering occupations in renewable energy
Assessment Conditions	Assessment must ensure access to: • internet • computer or digital device • software application suitable for producing information in a visual format • sources of information related to engineering occupations in renewable energy contexts • industry stakeholders for consultation • presentation report template. Assessor requirements No specialist vocational competency requirements for assessors apply to this unit.

Unit code	VU23902
Unit title	Identify and confirm electric vehicle systems and components
Application	This unit describes the skills and knowledge required to identify the function and basic operation of electric vehicle (EV) systems and components. It requires the ability to locate information and identify systems and components. It includes confirming the operation of EV systems from technical information. The unit applies to individuals seeking to develop skills to work with EV systems. The unit is designed for use in a highly supervised context. No occupational licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.
Pre-requisite Unit(s)	Nil

Element		**Performance Criteria**	
Elements describe the essential outcomes of a unit of competency.		Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the assessment requirements.	
1	Identify and locate EV systems and components	1.1	Review task instructions and identify EV type
		1.2	Obtain manufacturer specifications and technical system information regarding the identified EV
		1.3	Identify and locate major components of the EV system
2	Confirm EV system functions from technical information	2.1	Review health and safety requirements for working with EVs and apply personal protective equipment (PPE)
		2.2	Consult with stakeholders to clarify the workplace conditions required for effective servicing of EVs
		2.3	Check and document onboard vehicle data in line with task instructions
		2.4	Confirm system function from technical information
		2.5	Confirm system major component function and basic operation from technical information
		2.6	Complete all EV checks under supervision and in accordance with workplace health and safety requirements

Range of Conditions

N/A

Foundation Skills

Foundation skills essential to performance and not explicit in the performance criteria are listed in the table below.

Skill	Description
Reading skills to:	• review and interpret technical information related to EVs
Oral communication skills to:	• use questioning and active listening when consulting with stakeholders
Numeracy skills to:	• use and communicate basic numerical information relating to automotive electrical systems and components
Technology skills to:	• use diagnostic equipment to review onboard vehicle data
Digital literacy skills to:	• access sources of information related to EVs

Unit Mapping Information	New unit, no equivalent unit.

Assessment Requirements Template	
Title	Assessment Requirements for VU23902 Identify and confirm electric vehicle systems and components
Performance Evidence	The learner must demonstrate the ability to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit and: • locate and confirm the component parts and system functions of one EV using technical information.

Knowledge Evidence	The learner must be able to demonstrate essential knowledge required to effectively do the task outlined in elements and performance criteria of this unit, manage the task and manage contingencies in the context of the work role.
	This includes knowledge of:
	• workplace health and safety (WHS) requirements relating to the identification of EV electrical systems, including:
	  ○ selecting and using personal protective equipment (PPE)
	  ○ using tools and equipment
	  ○ following workplace safety procedures
	• basic theory and principles of electrical vehicle systems, including:
	  ○ key types and basic functioning of battery technologies
	  ○ technological advances in development of battery electric vehicles in relation to low carbon technologies
	  ○ components of battery electric vehicles and their functions
	  ○ general electrical requirements of EVs
	• different types of EVs
	• comparison of EV characteristics including:
	  ○ operating system
	  ○ battery technologies including life and range
	  ○ charging mechanisms
	  ○ lifecycle emissions
	• basic battery theory, including:
	  ○ terminal resistance
	  ○ terminal corrosion
	  ○ battery internal resistance
	• basic functions and operation of battery management system (BMS)
	• basic electrical motor theory and operation
	• charger characteristics
	• EV safety mechanisms and procedures including:

	○ safe waste disposal of batteries and electrical components ○ interlock functions ○ DC arc dangers ○ AC and DC arc control.
Assessment Conditions	Skills can be demonstrated in simulated environment that reflects real workplace conditions with access to suitable equipment and resources. Assessment must ensure access to: • internet • computer or digital device • workshop or task instructions • sources of information regarding EV systems, components and technological advancements • workplace safety equipment, including PPE • a real or simulated EV • EV data sheets and manufacturer specifications • tools and equipment relating to automotive workplace activities. Assessor requirements No specialist vocational competency requirements for assessors apply to this unit.

Unit code	VU23903
Unit title	Research and report on the impacts of electric vehicles
Application	This unit describes the skills and knowledge required to investigate and prepare a report on the current and potential impact of electric vehicles (EVs) in Australia. It requires the ability to research the current situation and the potential future uptake and impact of EVs including impact on the electrical grid. It applies to individuals seeking to develop understanding of EVs and their impact. No occupational licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.
Pre-requisite Unit(s)	Nil

Element		**Performance Criteria**	
Elements describe the essential outcomes of a unit of competency.		Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the assessment requirements.	
1	Investigate electric vehicles (EVs) and requirements for grid integration	1.1	Identify and compare types of electrical vehicles (EVs) currently in use
		1.2	Identify types and applications of electrical grid systems for EVs
		1.3	Source and document safety and environmental requirements for EVs and integration with electrical grid systems
2	Investigate the uptake and impact of EVs in Australia	2.1	Identify Australian government initiatives that encourage or discourage the uptake of EVs
		2.2	Identify economic, social and environmental benefits of EVs
		2.3	Identify challenges to the widespread uptake of EVs
		2.4	Examine current and potential issues with grid integration of EVs
		2.5	Draw conclusions about the likely impacts of EV uptake in Australia
3	Prepare a report on findings	3.1	Review and summarise findings of investigations into electrical vehicles and the grid

		3.2	Present findings in a report format clearly referencing sources of information

Range of Conditions

N/A

Foundation Skills

Foundation skills essential to performance and not explicit in the performance criteria are listed in the table below and must be assessed.

Skill	Description
Reading skills to:	• Review and interpret information related to EVs and electrical grid systems
Writing skills to:	• Document information in a format suitable for audience
Digital literacy skills to:	• Access information from relevant websites • Use a suitable software application to produce and present information for audience

Unit Mapping Information	New unit, no equivalent unit.

Assessment Requirements Template	
Title	Assessment Requirements for VU23903 Research and report on the impacts of electric vehicles
Performance Evidence	The learner must demonstrate the ability to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit and: • report on the uptake and impacts of EVs including grid integration in the Australian context.

Knowledge Evidence	The learner must be able to demonstrate essential knowledge required to effectively do the task outlined in elements and performance criteria of this unit.
	This includes knowledge of:
	• EV types, features and functions
	• basic features of electrical grids relevant to EVs including:
	  ○ types of vehicle-to-grid technology
	  ○ national grid structure and electricity generation
	  ○ home micro grid application and energy generation
	  ○ micro grid energy storage
	  ○ emergency and remote grid structure and application
	• safety and environmental requirements relevant to EVs including:
	  ○ relevant workplace procedures reflecting health and safety requirements
	  ○ material safety management systems
	  ○ hazardous substances and dangerous goods codes
	• benefits of EV uptake including:
	  ○ economic
	  ○ social
	  ○ environmental
	• challenges to the uptake of EVs in Australia including:
	  ○ infrastructure provision
	  ○ energy storage
	  ○ cost and payback periods
	  ○ cultural constraints
	• issues impacting grid integration of EVs including:
	  ○ safety
	  ○ regulation
	  ○ security and stability of the power grid.

Assessment Conditions	Assessment must ensure access to: • internet • computer or digital device • sources of information related to EVs and electrical grid integration • report template. Assessor requirements No specialist vocational competency requirements for assessors apply to this unit.