REGISTERED
NATIONAL QUALIFICATION

Title:	**National Certificate in Sustainable Energy (Biomass) Level 3**[1]				
Version :	1	**Qualification type:**	National qualification	**TQF level:**	3
Credits :	45	**TQF Registration code**:	QR-03-NQ-018-03-0504-23-01		
Approval date:	27 April 2023			**Next review:**	27 April 2028
Qualification developer(s):	1. Pacific Centre for Renewable Energy and Energy Efficiency (PCREEE), Tonga; 2. Department of Energy, Ministry of Meteorology, Energy, Information, Disaster Management, Environment, Climate Change and Communications (MEIDECC), Tonga				
Purpose:	The *National Certificate in Sustainable Energy (Biomass) Level 3* (or *NCSEL3(B)*) offers specialisation in *biomass energy*. *Biomass* refers to the organic material that comes from plants and animals. Thus in this course, learners will focus their learning on the energy that is generated by these organic materials. Learners will gain understanding of two main types of biomass energy: *traditional biomass* and *modern bioenergy* and how they are used in Tonga, the wider Pacific region and other parts of the world. Learners will understand the benefits as well as the environmental impacts of using biomass as an energy source. They will also understand how modern bioenergy can be used for the generation of electricity and transportation. In this training programme, learners will also appreciate the fact that all Pacific island countries including Tonga have the technical potential to develop biofuel from coconut oil and ethanol from coconut sap, because much of the land is covered with coconut trees.				

[1] This Tonga national qualification, *National Certificate in Sustainable Energy (Biomass) Level 3*, is adapted from Pacific regional qualification *Regional Certificate 3 in Sustainable Energy (Biomass strand)* which has been accredited by the Pacific Community's Educational Quality and Assessment Programme (EQAP) and registered on the Pacific Register of Qualifications and Standards (PQRS);

This Tonga national qualification, National Certificate in Sustainable Energy (Biomass) Level 3 is therefore considered equivalent to the Regional Certificate 3 in Sustainable Energy (Biomass strand) and to any other approved qualification which has been adapted from it.

This qualification adaptation is the outcome of a close collaboration between the Tonga National Qualifications and Accreditation Board (TNQAB) and the qualification developers (which is Tonga Department of Energy, MEIDECC, and the Pacific Centre for Renewable Energy and Energy Efficiency (PCREEE), and made possible through financial support from the EU-PacTVET Project.

	This national qualification, together with other national qualifications in Sustainable energy and Energy efficiency, will promote the use of the formal technical vocational education and training (TVET) sector to facilitate the building of both national and regional capacity to: 1. Raise the level of awareness and knowledge on alternative renewable energy sources and renewable energy technologies (RETs). 2. Develop technical skills and knowledge to support processes for installation, operation and maintenance of RETs, and 3. Undertake planning, development, monitoring and assessment and management of sustainable energy projects to promote energy efficiency which will mitigate loss and damages from the effects of climate change. This national qualification supports the organization outcomes of the *Tonga 2nd Strategic Development Framework 2015-2025 (TSDF II)*. It also contributes to developing a larger Pacific Community whose people are educated and healthy and are able to manage their energy resources in a sustainable way.
Rationale	The Pacific Islands states including Tonga are particularly vulnerable to the adverse effects of climate change. They are also countries that are leading the world in reducing their fossil fuel consumption and shifting to renewable energy sources of electricity generation. The increasing demand, usage and costs associated with fossil fuels to power the transportation and energy sectors of Pacific Island nations have led to an energy transformation in the region. Investment in clean and affordable energy, with a focus on renewable energy, energy efficiency and conservation is leading diversity in technologies, sources of energy and mitigating the environmental effects of using fossil fuels. In Tonga, the Tonga Energy Road Map (TERM) has gained wide recognition in these areas. These efforts highlight the levels of importance Tonga has given to its national energy security as well as the need to reduce national vulnerability to global fluctuations in fossil fuel prices through the use of sustainable energy. Around the Pacific Island region, the price of fuel and electricity tariffs rank among the highest in the world and there are significant inefficiencies in electricity generation and fuel consumption in the transport sector. While there are promising renewable energy opportunities, about 7 million people out of the region's 10 million still do not have access to electricity. Against this backdrop, Tonga and the rest of the Pacific island countries are prioritizing a shift to renewable electricity sources and increased access for all communities. In some cases, whole atolls are now 100 percent renewable, many more people have access to clean and reliable power, the amount of diesel imported for electricity generation has been reduced and some Pacific countries can now better manage the impacts of climate change. As a result of the shift and ongoing changes, there is a need for training in a wide range of skills associated with sustainable energy. Hence, the NCSEL3 (Biomass) is one of a number of national qualifications in Sustainable Energy with specialisation in the field of Biomass (Biogas) as a renewable source of energy. The *NCSEL3(B)*) is aimed at those who may already be working in fields related to Energy or Sustainable

	energy, or those with relevant work experience who wish to pursue a career in Sustainable Energy. *NCSEL3(B)* is part of an attempt to make quality assured training in energy/sustainable energy widely available to training institutions and the people of Tonga.
Outcomes Statement	Holders of this qualification will be able to: 1. Conduct a local (or regional) assessment and apply methods and tools for biomass projects as they relate to Tonga and the Pacific region. 2. Identify with local communities information on determining the viability of traditional biomass and bioenergy applications in Tonga. 3. Provide information to local communities and stakeholders (development partners, government agencies, NGO's) on benefits, and economic and environmental impact of biomass energy use for a particular location such as: health implications, use of waste by-products from other industries, environmental sustainability; 4. Provide technical skills to support the operations and maintenance of biomass power components such as cooking stoves, biogas digesters, gasification units, production of coconut oil biodiesel and coconut sap bioethanol. 5. Contribute to strengthening sustainable energy practices through the use of appropriate renewable energy sources and technologies.
Qualification Components	This qualification consists of the following nine (9) units of competency:

	Unit Code	*Unit Title*	*Credit value*
1.	NS080-03	Provide quotations for installation or services jobs	4
2.	NS081-03	Carry out simple project activities in SE	6
3.	NS082-03	Comply with scheduled and preventative maintenance program processes	5
4.	NS099-03	Apply tools, equipment and materials in complex tasks for operation and maintenance of Biogas systems	6
5.	NS100-03	Apply basic concepts in biogas energy for energy generation and consumption	6
6.	NS101-03	Use drawings, diagrams, schedules, standards, codes and specifications for biogas systems	4
7.	NS102-03	Diagnose and rectify faults in biogas energy control systems.	4
8.	NS103-03	Maintain and repair biogas system infrastructure and facilities associated with remote area essential service operations	4

9.	NS104-03	Assist in the installation and operation of biogas systems	6
		TOTAL CREDITS	45

Note:

a) The above units of competency can be delivered as short courses consisting of one or more units depending on the training needs of a training provider;

b) Approval for short course delivery should be sought from TNQAB prior to delivery;

c) Competency gained through short courses delivered in the past three years, can be considered for cross-credit.

[Refer to section below on cross-credits].

Entry Requirements

EITHER

1. Successful completion of the Tonga *National Certificate in Sustainable Energy Level 2* (or equivalent).

OR

2. Completion of Year 12 (Form 6) with pass marks in:
   i. Mathematics,
   ii. Physics (or Chemistry),
   iii. English (or Tongan Studies);

OR

3. Completion of Year 11 (Form 5) with pass marks in Science, Mathematics, and English (or Tongan Studies), PLUS 2 years of work experience in a field related to Sustainable Energy.

Learning Assumed to be in Place

- Can read, write, and speak both Tongan and English.
- Can use basic math operations (add, subtract, divide, and multiply) including using a calculator;
- Can learn, individually and with others
- ICT literacy at TQF Level 1 (including computer, internet, mobile technology, and instructional media);
- Tonga cultural literacy and awareness Level 1 (including Tongan language, protocol, etc.)
- Social skills and can work with others to accomplish a task;
- Basic geography of Tonga (and the Pacific Islands) including but not restricted to the location of places on a map, climate and weather.

International Comparability

This Tonga national qualification is equivalent to:

1. *Regional Certificate 3 in Sustainable Energy (SE) (Biomass strand)* registered by South Pacific Commission (SPC) Educational Quality and Assessment Programme (EQAP) on the Pacific Register of Qualifications and Standards(PQRS);

2. Any other Pacific Island qualification in SE that has been formally recognized as equivalent to the regional qualification mentioned in 1 above.

Further, the following Tongan units of competency (1st column) are comparable to registered Australian units of competency (2nd column) which are, in turn, components of Australian qualifications (3rd column):

Unit code in Tonga	Unit code in Australia	Australian qualification the unit is a component
NS080-03	UEEC0015	i. *UEE40420- Certificate IV in Electrical – Instrumentation;* ii. *UEE50722- Diploma of Renewable Energy Engineering;* iii. *UEE40520- Certificate IV in Electrical - Air Conditioning Split Systems* iv. *UEE41020- Certificate IV in Energy Management and Control*
NS082-03	UEECD0011	i. *UEE41920- Certificate IV in Electrical - Renewable Energy;* ii. *UEE53020- Diploma of Electrical Systems Engineering;* iii. *UEE40620- Certificate IV in Electro-technology - Systems Electrician;* iv. *UEE32120- Certificate III in Appliance Service*
NS101-03	UEECD0051	i. *UEE41620- Certificate IV in Renewable Energy;* ii. *UEE62122- Advanced Diploma of Engineering Technology – Electrical;* iii. *UEE32120- Certificate III in Appliance Service;* iv. *UEE30920- Certificate III in Electronics and Communications.*
NS102-03	UEERE0034	i. *UEE41920- Certificate IV in Electrical - Renewable Energy* ii. *UEE41620- Certificate IV in Renewable Energy* iii. *UEE60920- Advanced Diploma of Renewable Energy Engineering* iv. *UEE62020- Advanced Diploma of Engineering Technology - Renewable Energy*
NS103-03	UEEREE0017 or UEENEEK117A or UEENEEK017B	i. *UEP20222- Certificate II in Remote Area Essential Service* ii. *UEE21420 - Certificate II in Remote Area Power Supply Maintenance*

Successful completion of the above Australian units of competency may be considered for cross-credit when studying this Tonga national qualification. Approval of cross-credits is at the discretion of relevant training providers and TNQAB. (See section on *Cross credits* below).

Recognition of Prior Learning

This qualification may be achieved in whole or in part through *Recognition of Prior Learning* (RPL) that considers skills and knowledge gained in different settings including the community, workplace and educational institutions, and in accordance with relevant national and institutional policies and processes. Learners can achieve competence in ways most suited to their educational, work or cultural needs and aspirations.

Assessment for RPL must be undertaken by a qualified assessor. Evidence of skills and knowledge acquired must be shown before recognition can be given.

	Recognition of prior learning (RPL) acknowledges the skills and knowledge gained from both formal education as well as informal settings such as the workplace, community, and life experiences.
Credit transfer	Both the *Tonga Qualifications Framework* (TQF) and the *Pacific Qualifications Framework* allow for credit recognition and transfer from other regional or national qualifications through a process of mutual recognition. Credit transfer is a process whereby credits already achieved for one qualification are recognized towards a new qualification. An applicant to this Tonga national qualification, may be granted cross credits for unit standards which he/she had successfully completed within the past 3 years, if such unit standards were components of: 1. A qualification which has been identified as equivalent to this Tonga national qualification. Evidence of achievement will be required by relevant authorities before credit transfer is approved; 2. A TNQAB-approved short course. Evidence of achievement will be required by relevant authorities before credit transfer is approved. 3. Australian training programmes listed in the section for international comparability. Approval of cross-credits are at the discretion of relevant training providers and TNQAB.
Learning Pathways	**Pathways in:** 1. Successful graduates of National Certificate in Sustainable Energy Level 2; 2. High School leavers who meet entry requirements; 3. Mature students and current employees who meet the entry requirements; 4. Completion of relevant short-courses. **Pathways out:** 1. National Certificate in Sustainable Energy Level 4 (to be developed after this national qualification) 2. Employment – in the energy industry or environment management in both Tonga and overseas.
Support for Qualification	This national qualification has gained the support of the following organizations: 1. Pacific Community's *EU-PacTVET Project*, Fiji. 2. Ministry of Meteorology, Energy, Information, Disaster Management, Environment, Climate Change and Communications (MEIDECC), Tonga. 3. Ministry of Education and Training, Tonga. 4. Tonga Institute of Science and Technology (TIST), Tonga. 5. Pacific Centre for Renewable Energy and Energy Efficiency (PCREEE), Tonga, 6. Department of Energy, Tonga, 7. Pacific Community's Educational Quality and Assessment Programme (EQAP), Fiji.

	8. Sustainable Energy Industry Association of the Pacific Islands (SEIAPI), Fiji.
Accreditation Requirements	Important accreditation requirements include but not restricted to the following: 1. A Biogas plant: At least one of the following types: a. Balloon plant b. Fixed dome plant c. Floating drum plant d. Horizontal plant e. Earth-pit plant f. Ferro-cement plant 2. Teaching staff must have: a. At least a Level 4 qualification in Energy/Sustainable energy (or a related field) plus 3 years relevant industry experience b. A relevant qualification as a trainer or assessor in TVET; c. A valid first aid certificate. 3. Physical resources (satisfied with standard of computers and internet access, and other class room resources); 4. A computer–aided design software such as *AutoCAD* installed in all student computers 5. Saving devices such as USB flash drives or external hard drives for Supervisory Control and Data Acquisition (*SCADA*) 6. Electrician's Tool Kit includes a sturdy tool-case containing the following: a) Electric drill and bit sets b) Ratchet handle, universal joint, c) Sockets d) Coupler e) Extension bar f) Insulated screwdrivers (approved for electrical safety) g) Combination spanner (approved for electrical safety) h) Pliers (approved for electrical safety) i) Electric tester j) Hammer k) Measuring 7. Personal protective equipment (PPE) a) Hand gloves for electrical and mechanical lab work b) Safety helmets c) Safety glasses d) Ear mask for use in workshop environment e) Dust masks f) Body harness g) Safety tags – e.g., Lock and tag out tags such as out of service, do not operate, live wire) 8. Assessment and moderation system consisting of at least the following:

	a. Assessors and moderators; b. Documented processes and responsibilities of assessors and moderations; c. Assessment plan for each component unit of competency; d. Moderation plan for each component unit of competency. 9. General outline of training programme is ready for (or provided to) students, with course details including but not restricted to: a. Purpose statements b. Learning outcomes (or graduate attributes); c. Qualification components; d. Credit values; e. Entry requirements; f. Learning assumed to be in place, and g. Name(s) of teaching team – including work-office numbers and contact phones or emails 10. Outlines of component units of competency are provided to students with details of: a. Learning outcomes and performance standards, b. Assessment details including assessment tasks, marking guidelines, moderation information, and specific requirements about the completion of each unit. c. Recommended textbook or readings for students, and d. Names and contact details of teaching staff.