



REGISTERED NATIONAL QUALIFICATION

Title:	National Certificate in Sustainable Energy (Solar) Level 3 ¹		
Version :	1	Qualification type:	National qualification
TQF level:			3
Credits :	45	TQF Registration code:	QR-03-NQ-018-05-0504-23-01
Approval date:	31 August 2023	Next review:	31 August 2028
Qualification developer(s):	<ol style="list-style-type: none"> 1. Pacific Centre for Renewable Energy and Energy Efficiency (PCREEE) - Tonga Office, Ministry of Meteorology, Energy, Information, Disaster Management, Environment, Climate Change and Communications (MEIDECC), Nuku'alofa, Tonga. 2. Department of Energy, Ministry of Meteorology, Energy, Information, Disaster Management, Environment, Climate Change and Communications (MEIDECC), Nuku'alofa, Tonga. 		
Purpose:	<p>The <i>National Certificate in Sustainable Energy (Solar) Level 3 (NCSEL3(S))</i> is aimed at those:</p> <ul style="list-style-type: none"> • who may already be working in a field related to Energy or Sustainable energy or • with relevant work experience who wish to pursue a career in Sustainable energy. 		

¹ This Tonga national qualification, *National Certificate in Sustainable Energy (Solar) Level 3*, has been adapted from Pacific regional qualification *Regional Certificate 3 in Sustainable Energy (Solar 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 (Solar) Level 3* is therefore considered equivalent to the *Regional Certificate 3 in Sustainable Energy (Solar 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.

The learner will gain an understanding of how the qualities of solar design afford it great utility in Tonga as well as the rest of the Pacific region for the following reasons:

1. Our location on the Earth surface with optimal access to the sun's rays, would mean that solar systems can be relatively affordable and applicable to both homes and villages;
2. Within solar technologies, *passive solar design* principles could may well be the ultimate in renewable energy for buildings, and can be coupled with solar panels to achieve maximum sustainability.

This level 3 national qualification offers specialization in solar energy. Together with other national qualifications in Sustainable energy and Energy efficiency, they 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 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 Island 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(S) is one of a number of national qualifications in Sustainable Energy with specialisation in the field of Solar as a renewable source of energy.

It is part of an attempt to make quality assured training in energy/sustainable energy widely available to training institutions and the people of Tonga.

Outcome statements:

On completion of NCSEL3(S), graduates will be able to:

1. demonstrate some operational and theoretical knowledge in solar PV systems, such as:
 - a. applying basic concepts in solar energy generation and consumption;
 - b. using conventions for drawings, diagrams, schedules, standards, codes and specifications when working with solar energy;
2. assist in the installation, operation and maintenance of solar PV systems, by:
 - a. identifying *passive solar design* principles to promote energy efficiency;
 - b. applying appropriate tools, equipment, and materials in complex tasks for operations and maintenance;
 - c. diagnosing and rectifying faults in control systems;
 - d. maintaining and repairing facilities associated with remote area essential service operations;
3. provide technical skills to support the operations and maintenance of Solar PV components such as combustion engine, generators, battery storage and power conditioning equipment;
4. contribute to strengthening sustainable energy practices through the use of appropriate renewable energy sources and technologies which include solar, grid-connected, and standalone power systems;
5. apply a range of communication skills including appropriate cultural protocols, and adapting own behavior when interacting with others;
6. work under limited supervision, demonstrating major responsibility for own learning and performance;
7. work in a team, and contribute to project development:
 - a. writing proposals;
 - b. gathering relevant information and data for monitoring and reporting purposes;

- c. reporting and providing general communications and services to communities, government and development partners.
8. conduct resource assessment and apply methods and tools for siting solar energy projects as they relate to Tonga and the Pacific region.
 9. identify with local communities information on determining the viability of solar energy production for local areas.
 10. develop community awareness on matters related to renewable and non-renewable energy sources, renewable energy technologies, energy efficiency and energy management.
 11. provide information to local communities and stakeholders on benefits and environmental impact of solar power systems.

Qualification Components

This qualification consists of the following 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	NS087-03	Apply tools, equipment & materials in complex tasks for operation and maintenance of Solar PV systems	6
5	NS088-03	Apply basic concepts in Solar photovoltaic (PV) for energy generation and consumption	6
6	NS089-03	Use drawings, diagrams, schedules, standards, codes and specifications for solar PV systems	4
7	NS090-03	Diagnose and rectify faults in solar PV control systems	4
8	NS091-03	Maintain and repair solar PV system infrastructure and facilities associated with remote area essential service operations	4
9	NS092-03	Assist in the installation and operation of solar PV systems	6
Total credits:			45

Note:

- 1) The above units of competency can be delivered as short courses consisting of one or more units depending on the training needs of an interested training stakeholder;
- 2) Approval for short course delivery should be sought from TNQAB prior to delivery;
- 3) 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

The minimum entry requirements to this national certificate include the following:

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, English or Tongan Studies, PLUS 2 years of work experience in a field related to Sustainable Energy.

Learning Assumed to be in Place

- Mathematical literacy at TQF Level 1 (including using a Calculator and using basic maths operations – add, subtract, divide, and multiply);
- Communication literacy at TQF Level 1
- 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 certificate is equivalent to:

1. *Regional Certificate 3 in Sustainable Energy (with specialization in Solar Energy)* registered by Pacific Community (SPC)'s Educational Quality and Assessment Programme (EQAP)
2. Any other Pacific Island qualification in SE that has been formally recognized as equivalent to the regional qualification mentioned in 1 above.

Recognition of Prior Learning

This qualification may be achieved in whole or in part through Recognition of Prior Learning (RPL) which 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

	<p>Assessment for RPL must be undertaken by a qualified assessor. Evidence of skills and knowledge acquired must be shown before recognition can be given</p> <p>Recognition of prior learning (RPL) acknowledges the skills and knowledge gained from workplace, community experiences or informal training which includes courses or study previously undertaken.</p>
<p>Cross credits</p>	<p>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. Thus if a learner has obtained the relevant competency (within the past 3 three years) in:</p> <ol style="list-style-type: none"> 1) A qualification which has been identified as equivalent to this Tonga national qualification, he or she will receive credit for unit standards which have been successfully completed. Evidence of achievement will be required by relevant authorities before credit transfer is approved; 2) A TNQAB-approved short course that is made up of any of the component units of this national qualification, he or she will cross credit recognition. Evidence of achievement will be required by relevant authorities before credit transfer is approved.
<p>Learning Pathways</p>	<p><u>Pathway in:</u></p> <ol style="list-style-type: none"> 1) Successful graduates of the Tonga NCSEL2 2) High School leavers who meet the entry requirements 3) Mature students and current employees who meet the entry requirements 4) Completion of relevant short courses. <p><u>Pathway Out:</u></p> <ol style="list-style-type: none"> 1) <i>National Certificate in Sustainable Energy (Solar) L4</i> (to be developed after this national qualification); 2) Employment – in the energy industry or environment management in both Tonga and Overseas.
<p>Support for Qualification</p>	<p>This national qualification has gained the support of the following organizations:</p> <ol style="list-style-type: none"> 1. Ministry of Meteorology, Energy, Information, Disaster Management, Environment, Climate Change and Communications (MEIDECC), Tonga. 2. Department of Energy, Tonga. 3. The Pacific Community’s Pacific Centre for Renewable Energy and Energy Efficiency (PCREEE). 4. Ministry of Education and Training, Tonga.

	<ol style="list-style-type: none"> 5. Tonga Institute of Science and Technology (TIST), Tonga. 6. Pacific Community's Educational Quality and Assessment Programme (EQAP), Fiji. 7. Sustainable Energy Industry Association of the Pacific Islands (SEIAPI).
Accreditation Requirements	<p>Important accreditation requirements include:</p> <ol style="list-style-type: none"> 1. Teaching staff must have : <ol style="list-style-type: none"> a) At least a level 4 qualification in Energy/Sustainable Energy or 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. 2. Physical resources (satisfied with standard of computers and internet access, and other class room resources); 3. Specialised facilities and resources for each unit of competency; 4. General course outline ready for distribution to students with details of Purpose, Learning outcomes, Qualification components, Credit values, Entry requirements, Learning assumed to be in place, and Name(s) of teaching team; 5. Unit descriptors are ready for distribution to students with details of: <ol style="list-style-type: none"> a) Learning outcomes and performance standards b) Assessment details including assessment tasks and due dates, marking guidelines, moderation information, and other requirements about the completion of each unit c) Recommended readings for students, and d) Names and contact details of teaching staff