REGISTERED
NATIONAL STANDARD

UNIT OF COMPETENCY

Title:	Describe and Explain Energy Sources				
TQF Level:	1	**Credits:**	5	**Version:**	2[1]
National standard code:	NS044-01				
Associated qualification (and code):	National Certificate in Sustainable Energy Level 1 (QR-01-NQ-018-01-0504-26-02)				
Approval date:	25th Mar. 2026	**Review date:**	25th Mar. 2031		
Purpose:	This unit standard is for people who work, or intend to work in Energy and Energy related fields. Persons credited with this unit standard are able to: 1. Explain the concept of *energy* 2. Identify and explain the origin of all the Earth's energy 3. Identify different forms and sources of energy on Earth 4. Explain *energy transformation/conversion* and *energy transfer* 5. Explain the importance of Energy in human societies				

[1] This Tonga unit standard was adapted from the regional unit standard SE1002 (version 1) with the same title which is a component of the *Regional Certificate 1 in Sustainable Energy (SE)*.

Learning Outcome 1 (LO1)	**Explain the concept of energy**
Performance standards	1.1 Define the term *Energy* in a scientific context 1.2 Explain the *law of conservation of energy* 1.3 Define the *S.I.* [2] unit of Energy and its corresponding imperial units 1.4 Explain the relationship between Energy and Power
Learning Outcome 2 (LO2)	**Identify and explain the main source of all the Earth's energy**
Performance Standards	2.1 Identify the Sun as the main source of the Earth's energy 2.2 Describe how the energy from the sun reaches the Earth 2.3 Describe how the energy from the sun is stored in different forms and sources by the Earth 2.4 Describe the variation in sunlight throughout the day
Learning Outcome 3 (LO3)	**Identify different forms and sources of energy on Earth**
Performance standards	3.1 Explain the difference between *energy forms* and *energy sources* 3.2 Identify and give examples of different forms and sources of energy 3.3 List and describe uses and benefits of different forms and sources of energy 3.4 Differentiate between *green* and *brown energy* sources on earth
Learning Outcome 4 (LO4)	**Explain Energy Transformation/conversion and Transfer**
Performance standards	4.1 Define the terms, *energy transformation or energy conversion* and '*energy transfer*' and explain how they differ from each other 4.2 Identify examples of *energy transformation* or *energy conversion* and *energy transfer* from everyday experiences 4.3 Identify the forms of energy which are in the following sources of energy: (i) diesel fuel; (ii) solar; (iii) biomass; (iv) hydropower and (v) wind-power

[2] *S.I.* stands for the *International System* of Units (SI, abbreviated from the French Système international (d'unités)) which is the modern form of the metric system. It is the only system of measurement with an official status in nearly every country in the world (Wikipedia).

	4.4 Define the term *energy conservation* and describe how energy used in everyday experiences could be conserved
Learning Outcome 5 (LO5)	**Explain the importance of energy in human societies**
Performance standards	5.1 State different uses of energy in human societies 5.2 Identify benefits of using different forms and sources of energy in a society 5.3 Identify from the energy sources, those that can be replenished (i.e. renewed) by nature within human life span and those that cannot be replenished in such a life span 5.4 Identify from everyday experience how energy and energy conservation benefit human beings
Pre-requisites	N/A
Co-requisites	N/A
Underpinning skills and knowledge	The following knowledge and skill underpin this unit standard; • Knowledge of the basic geography of Tonga and the Pacific region and local, including culture, norms and values • Knowledge of the general and physical science origin of energy, measurements, energy transformation and energy conservation • Basic knowledge on daily use of energy in the communities and its importance in society • Basic knowledge of renewable energy sources available in the nature that can be replenished • Skills in communication (verbally and non-verbally) with groups and individuals • Use internet, email, and mobile phones to communicate messages
Suggested assessment methods	**Context of assessment:** To support student assessment and to ensure they are valid, reliable, flexible, and fair, provider institutions are encouraged to make the necessary arrangements to involve the relevant key industry organisations such as *Tonga Energy Commission* (TEC), *Tonga Power Limited* (TPL) and other trusted licensed private energy and electricity entrepreneurs in the assessment of the required standards and competencies. Possible areas for collaboration between provider institutions and the industry include but not restricted to the following:

- Experts from the industry are engaged as trainers, assessors, or assessment moderators.
- Industry experts have input to the design and implementation of assessment activities
- Students are placed in the relevant industry organisations for workplace attachment
- Industry experts act as supervisors of students on workplace attachment
- Etc.

To show that students have the required competence they will need to:

1. Demonstrate knowledge in the workplace (or in an environment that closely resembles the workplace) in relation to:
   - Energy
     - Definition of Energy
     - Standard International (SI) Unit & Imperial Unit of Energy
     - Law of conservation of energy
     - Forms and sources of energy including examples
     - Power and energy
     - Source of Energy on Earth
     - Uses and benefits of different forms of energy
     - Forms of energy that exist in different sources of energy:
     - Energy transformation/conversion and energy transfer
     - Examples of every day energy transformation/conversion and transfer
     - Energy Conservation – Definition, example and benefits
     - *Renewable Energy Technologies* (RETs) – As different sources and form of energy and their respective advantages

2. Apply your knowledge in the workplace (or in an environment that closely resembles the workplace), by identifying and demonstrating the following:
   - Energy Forms and Sources in workplace and surrounding environment, including:
     - Kinetic energy
     - Potential Energy
     - Chemical Energy
     - Mechanical energy
     - Electrical Energy
     - Light Energy
     - Sound Energy
     - Nuclear Energy

- Technologies for conversion of one form of energy to another, including:
  - Light Energy to Electrical Energy – PV Cells
  - Chemical Energy to Mechanical Energy to Electrical Energy – IC power generator
  - Electrical energy to light energy – Light Bulb
  - Kinetic Energy to mechanical Energy to Electrical Energy – Wind Turbine
- Application of Energy Transfer in Societies
  - Water heating in a kettle – Heat energy from fire being transferred to water to increase its temperature
  - Cooling water in a refrigerator – heat from the water is taken out (transferred) by the refrigerator to lower the water temperature
- Renewable Energy Technology (RET):
  - Solar, Wind, Biomass, Biogas, Hydropower as different sources and forms for energy being practical examples in energy transformation
  - Type of technologies per RET and how one technology utilised one form of energy as its fuel to generate another form of energy useful for use by human beings
- Energy Conservation
  - Materials and practices utilised to improve Energy Efficiency in Buildings, Appliances, Vehicles and Power utilities.

Methods of assessment:

A range of assessment methods should be used to assess students' knowledge and application of skills, include but not restricted to the following:

i. Direct observation of students performing certain tasks (such as explaining concept/origin of energy on the earth, identify forms and sources of energy and explain transformation of energy into useful energy forms consumed by society)
ii. Written or oral questions to test relevant skills and knowledge during observation
iii. Student observation on energy resource availability at a specific location
iv. Written description of energy conversion into useful energy
v. Applicability of useful energy in human societies

	vi. Student Portfolio vii. Review of workplace attachment reports (e.g. Supervisor/third party reports)
Resource requirements	i. Printed resources for describing and explaining Energy sources at the discretion of the course/unit coordinator or trainer, ii. Computer, Printer, Internet Access, iii. Conventional classroom, classroom furniture and resources: White/blackboard, tables or benches, chairs, student notice boards, A3 coloured cards or wall charts. iv. Energy Transformation Charts of RET and *Internal combustion* (IC) generators v. This includes availability of equipment for the following; • Solar PV: Stand-alone, grid-tied, and hybrid Solar PV Systems • Wind Systems: Small and large scale *Horizontal Axis Wind Turbine* (HAWT) systems and Hybrid Wind Systems • Hydropower Systems: Small scale stand-alone hydro • Hydropower system Prototype: Tube/conduit-like penstock connected to a hydro-power turbine which is coupled to a generator and conductors connecting the generator to a simple electrical load such as a single light • Biomass Systems: Small Scale Biomass Plant • Energy Storage Systems: Lithium Ion Batteries, Lead Acid Batteries, etc. • Charge Controllers: *Pulse Width Modulation* (PWM) or *Maximum Power Point Tracking* (MPPT) • Measuring devices: Clinometer/Water filled tube and pressure gauge (for head measurements), Bucket and Stopwatch/Floating object and Stopwatch (for flow rate measurements), Anemometer, Pyranometer and Multimeter, Scale, Pressure Gauge, etc.
Moderation arrangements	Provider Institutions will be responsible for moderation arrangements to ensure consistency in assessments. Moderation process must be approved by TNQAB.
Requirements to complete this unit	There are five (5) Learning Outcomes and twenty (20) Performance Standards that measures competence. To demonstrate competence, the person studying this unit is:

	1. Required to achieve an *Achieved*[3] grade (Competent) to fulfil the requirements of the Unit Standard. 2. Eligible to three (3) attempts to achieve the required competency within 14 days of the first attempt. Failure to achieve the required competency level after three (3) attempts of the exam or specific part of the assessment will require the person studying this Unit to re-enrol.
Important notes and definitions	**Notes:** 1. Legislation: All activities associated with this unit standard must comply with the requirements of national codes of practice, regulations and legislation for workplace health, safety, and environmental protection and any subsequent amendments. **Definitions:** 1. **Brown energy** refers to **e**nergy that comes from fossil fuels, such as oil or coal 2. **Energy forms** refer to Energy as existing in different forms, such as kinetic energy, potential energy, thermal or heat energy, chemical energy, electrical energy. 3. **Energy** refers to the capacity to do work. It is a quantitative property that must be transferred to an object for work to be done.-Work done involves effects such as: 'moving' a body or an object; 'producing sounds'; 'generating heat'; 'producing light'. 4. **Energy sources** refer to materials such as coal, oil (diesel, petrol), gas and wood, water, sun, biomass used to generate electrical power. 5. **Green energy** refers to renewable Energy that comes from energy sources that are sustainable such as solar, hydro and wind, etc. 6. **Standard International (SI) Units** refers to the International System of Units (SI) commonly known as the metric system which is the international standard for measurement. 7. **System** refers to a group of inter-related components that function together to achieve a purpose
Public comments on unit	Please contact TNQAB National Qualifications Unit (email EnquireNQ@tnqab.to or Telephone 28136) if you like to discuss or suggest changes to the details of this unit.

[3] This unit is competency-based in which there are only two possible grades: Achieved and Not Achieved. An 'Achieved' grade is assigned to a candidate who has met the competency requirements of the unit.