REGISTERED
NATIONAL STANDARD

UNIT OF COMPETENCY

Title:	**Perform Workplace Calculations for the Energy Sector**				
TQF Level:	1	**Credits:**	8	**Version:**	2[1]
National standard code:	**NS046-01**				
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 appropriate for people who are currently in the workforce or intend to engage in employment in the field of energy sector. In this unit, standard calculators may be used to assist in calculations. Persons credited with this unit standard are able to: 1. Perform calculations as an integral part of routine work in the energy sector 2. Carry out required simple mathematical operations using manual and electronic processes 3. Prepare basic statistics such as means, mediums, averages, standard deviations 4. Interpret basic graphical representations of mathematical information				

[1] This Tonga unit standard was adapted from the regional unit standard SE1004 (version 1) with the same title which is a component of the *Regional Certificate 1 in Sustainable Energy (SE)*.

Learning Outcome 1 (LO1)	**Carry out calculations**
Performance standards	1.1 Items are counted singularly and in batches, and sorted numerically as required 1.2 Calculations needed to complete work tasks are performed using the four basic processes of addition, subtraction, multiplication and division. 1.3 Calculations involving fractions, percentages, mixed numbers along with using the four basic processes are performed as required 1.4 Calculator, numeric keypad or computer are used to perform workplace tasks 1.5 Numerical information is self-checked and corrected for accuracy
Learning Outcome 2 (LO2)	**Describe energy and power concepts and apply calculations**
Performance Standards	2.1 Identify units of measurement for power and energy and describe how to convert one unit to the another 2.2 Demonstrate the use of the prefixes k (kilo) and M (mega) when converting units 2.3 Describe the differences between AC and DC power 2.4 Identify the power rating of AC and DC electrical appliances in different formats 2.5 Identify and describe all factors that contribute to the overall power rating of an appliance 2.6 Calculate energy consumption from power ratings and operating times including programmable thermostatically-controlled appliances such as washing machines, refrigerators, computers.
Learning Outcome 3 (LO3)	**Prepare estimates**
Performance standards	3.1 Quantities of materials and resources required to complete a work task are estimated 3.2 Time needed to complete a work activity is estimated 3.3 Obtain costs of needed resources 3.4 Accurate estimates for work completion are made 3.5 Recognize uncertainties when making estimates

Learning Outcome 4 (LO4)	**Interpret graphical representations of mathematical information**
Performance standards	4.1 Information represented in symbols, diagrams and pictorial representations is recognized 4.2 Information represented in symbols, diagrams and pictorial representations is applied in work tasks related to energy assessments, calculations and reporting 4.3 Correctly articulate graphs and mathematical information 4.4 Identify errors and uncertainties depicted through graphs and calculations 4.5 Discuss approach to reduce errors and uncertainties
Pre-requisites	N/A
Co-requisites	N/A
Underpinning skills and knowledge	The following knowledge and skills underpin this unit standard: • Carry out basic calculations as they relate to the job role • Interpret graphical representations of mathematical information • Operating and adapting to differences in equipment in accordance with standard operating procedures • Reading and interpreting instructions, procedures and information relevant to basic workplace calculations • Procedures for identifying and using relevant workplace technology when carrying out workplace calculations • Ways of representing basic mathematical information • Knowledge of factors which contribute to the overall power rating of an appliance • Knowledge of the differences between AC and DC power • 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:
   i. Units of measurement for power and energy and methods of conversion using calculations
   ii. Power ratings for AC & DC electrical appliances
   iii. Interpretation of graphs and calculated information
   iv. Comparing, contrasting and estimating quantities
   v. Identification of power ratings for AC & DC electrical appliances based on specifications
   vi. Identifying errors and uncertainties
2. Apply their knowledge in the workplace (or in an environment that closely resembles the workplace), by:
   i. Performing calculations to convert units of power and energy
   ii. Performing calculations to determine energy efficiency
   iii. Distinguishing between DC and AC energy and power requirements
   iv. Estimating quantities of electrical appliances and provide justification for power and energy estimates

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 conducting calculations, describing energy and power concepts, preparing estimated and interpreting graphical representation)
ii. Written or oral questions to test relevant skills and knowledge during observation

	iii. Written reports with sample calculations, graphical representation to depict relationship between different parameters and an interpretation of the graphs iv. Written calculations using AC and DC power requirements with attached electrical load specification sheets to justify calculation v. Student Portfolio vi. Review of workplace attachment reports (e.g. Supervisor/third party reports)
Resource requirements	i. Text Books or printed resources for Conducting Workplace Calculations 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. Calculators and Charts on Conversions of Renewable resources through electrical, mechanical and biochemical processes v. Students can work with excel spreadsheets to ease calculations if need be.
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 four (4) Learning Outcomes and twenty one (21) Performance Standards that measures competence. To demonstrate competence, the person studying this unit is: 1. Required to achieve an *Achieved* [2] 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 for the same Unit.

[2] 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.

Important notes and definitions	**Notes:** 1. 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. **AC power** refers to the predominantly used standard electricity format that comes out of the power outlet and takes on the waveform of the alternating current. It supplies alternating voltage to its load. 2. **Alternating current** (AC) refers to a type of electric current that periodically reverses its direction. 3. **Apparent Power (S)** refers to the product of the current and voltage if the phase angle between the current and voltage are ignored. Also, the combination of real power and reactive power is called apparent power. 4. **DC power** refers to another standard electricity format that takes on the form of direct current. This type of electricity is supplied by DC batteries in homes and businesses to operate electronic devices such as torches, mobile phones, computers connected to UPS, and radios. 5. **Direct current** (DC) refers to a type of electric current that only flows steadily in a single direction. 6. **Electrical power (**or **Power)** refers to the rate, per unit time, at which electrical energy is transferred by an electric circuit. In other words, it is the rate at which the work is being done in an electrical circuit. 7. **Power rating** refers to the total electrical power required for normal operation of an electric appliance. 8. **Reactive power (Q)** refers to energy that is stored and released in the form of a magnetic field or electrostatic field in case of an inductor and capacitor respectively. 9. **Real Power (P)** refers to the useful power that is consumed by the resistive loads.
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.