Title

Provide quotations for installation or service jobs

The learning and assessment activities in this unit standard will be applied in the selected field of Sustainable Energy from: Energy Efficiency; Micro-hydro; Solar, Biomass, Hybrid wind systems

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Purpose

This unit describes the skills and knowledge required to develop quotations for installation and service work in the energy sector. It encompasses following job specifications, using manufacturer catalogues, making telephone, internet or email enquiries, selecting compliance materials, pricing materials and labour costs and completing necessary quotation documentation and applying the necessary customer relations protocols. This unit standard is appropriate for people who are currently in the workforce in the energy sector.

Persons credited with this standard are able to provide quotations for installation and service jobs including:

- Establishing the extent of work on which the quotation is to be based
- Taking of material accurately
- Costing the job appropriately
- Checking the quotation
- Documenting the quotation clearly

Classification

Resources

Critical health and safety prerequisites

All training and assessment activities must be in accordance with health and safety legislation and related regulations of the relevant Pacific Island country.

Recommended skills and knowledge

- Technical literacy and communication skills sufficient to interpret and apply common industry terminology (energy sector) to apply to factors for quotations for installation or service jobs
- Skills in preparing quotations accurately
- Skills and knowledge in different costing methods
- Knowledge on appropriate methods of access to information required to prepare quotations
- Customer relations skills
- Methods for recording and maintaining work records
Quality assurance requirements

This unit standard may only be assessed and recommended for award by qualified Workplace Assessors.

Assessors must comply with the regional and national assessment and moderation requirements of quality frameworks. Details of specific registration and accreditation requirements and the national assessment arrangements are available from EQAP on EQAP@spc.int

Explanatory notes

- Customer relations protocols encompass: purpose of customer relations, procedures for dealing with customers, dealing with customers issues.
- Costing methods encompass: costing policy of an organisation, purchase prices and discounts for materials, labour charge out rates, margins.
- Costing small jobs encompass: resources to be quantified and costed, costing labour, plant and materials, service costs and margins.
- Communicating with personnel encompasses: oral communications, written procedures and work instructions, communicating with suppliers, communicating with customers.

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.

Outcomes and evidence requirements

Outcome 1

Establish the extent of the work

Evidence Requirements

1.1 OHS procedures for a given work area are identified, obtained and understood
1.2 Established OHS risk control measures and procedures are followed
1.3 The extent of installation or service work is determined from job specifications and discussions with customer and/or other appropriate person(s)
1.4 The extent of installation or service work on which a quotation is to be given is documented as a job specification and agreement sought with customer or other appropriate person(s)
1.5 OHS and other regulatory requirements are incorporated in the work on which the quotation is based
1.6 Requests for alterations to the job specification are negotiated with customer or other appropriate person(s) and within the constraints imposed by regulatory requirements
1.7 A date by which the quotation is to be submitted is agreed with the customer and/or other appropriate person(s)
Outcome 2
*Develop quotations*

**Evidence Requirements**

2.1 Material take-offs are performed accurately and checked against job specification(s)

2.2 Materials, labour and other costs are determined from industry standard labour rates, enterprise costing arrangements and/or material suppliers

2.3 Quotations are checked for accuracy in costing and against job specification

Outcome 3
*Document and submit quotation*

**Evidence requirements**

3.1 Quotation is documented in accordance with established policies and procedures

3.2 Quotation is submitted to customer within an agreed date

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Planned Review Date: September 2018

*Status information and last date for assessment for superseded versions*
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### Purpose

This unit describes skills and knowledge required to carry out simple project activities. This work is typically undertaken by person working as part of a project team. In practice, carrying out project work overlaps with other generalist and specialist work activities such as acting ethically, applying government/development partner processes, using resources, developing work plans, gathering information. This unit standard applies to individuals who work under the supervision of an experienced project manager.

Persons credited with this standard are able to:

- identify techniques for reviewing and confirming the components of the project design document
- monitor and maintain progress for a project
- review and measure outcomes for the project
- prepare clear and effective written communications for the project
- review and confirm project risk management and exit strategies

### Classification

**Participation and Governance**

### Critical health and safety prerequisites

All training and assessment activities must be in accordance with health and safety legislation and related regulations of the relevant Pacific Island country.
### Recommended skills and knowledge

- skills in accessing/preparing relevant project information electronically or in hard copy
- skills in using project management tools
- skills in recording information, writing recommendations, preparing reports using complex language structures
- time-management and organizational skills
- knowledge of legislation that may affect aspects of carrying out project activities
- knowledge and skills of project planning tools to suit the project being carried out
- knowledge of risk management strategies for carrying out single projects
- communication skills using a range of communication styles to suit different audiences and purposes for stakeholders
- skills to perform calculations necessary to carry out project activities
- preparing written communications using language structures, tone, format and logic that influence the interpretation of written communication,

### Quality assurance requirements

This unit standard may only be assessed and recommended for award by qualified Workplace Assessors.

Assessors must comply with the regional and national assessment and moderation requirements of quality frameworks. Details of specific registration and accreditation requirements and the national assessment arrangements are available from EQAP on EQAP@spc.int

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**Explanatory notes**

### Definitions

**Project design document** is an outline of expectations, tasks, deliverables, etc. that are to be achieved by the project officer.

**Project management tools** may include: project management software and other tools such as Gantt and bar charts, Program Evaluation and Review Technique (PERT) charts, spreadsheets, cost analysis.

**Stakeholders** may include: project sponsors/funding bodies/development partners, industry, government agencies, Ministers, general public, steering committee members, organisational management and team members.

**Project plan** will include some or all of the following: budget and cost estimates, expected outcomes which are measurable benefits of the project, inclusions and
exclusions from the project, milestones, objectives, purpose, performance criteria/indicators, human and physical resources, project implementation strategy, quality standards for the project, risk management strategy, schedule/timeline.

**Project data** may include: financial data including costs, expenditure, income generated, purchases, test results, records of time spent on the project and progress in completing project activities, correspondence, project outcomes.

**Solutions to problems** may include: reducing costs, researching and applying more efficient methods of completing project tasks, seeking further resources to meet deadlines, negotiating an extension of deadline or redefining completion or quantities of quality of outcomes, sharing of ideas to gain improvements to work undertaken within the project, outsourcing aspects of the project, changing roles and responsibilities within the project team.

### 2 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.

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**Outcomes and Evidence Requirements**

#### Outcome 1

*Review and confirm the project design document*

**Evidence Requirements**

1.1 Project information and supporting materials are obtained and the individual project design document is clarified in accordance with the project plan, schedule and organizational policy and procedures.

1.2 Project plan is analysed and requirements, timeframes, roles, responsibilities risk management, exit strategy and stakeholder involvement are confirmed.

1.3 Project management procedures and controls are confirmed in accordance with the project plan, and any required changes are negotiated according to the project plan change management strategy.

1.4 The project plan is updated with confirmed information for milestones, resources, other team members and steering committee details.

#### Outcome 2

*Undertake project activities*

**Evidence Requirements**

2.1 Professional or technical skills are provided to accomplish project tasks in accordance with the project objectives, indicators, outcomes and schedule.

2.2 Project data is captured and recorded in accordance with project requirements.

2.3 Specialist advice and support are provided to the project manager, steering committee and stakeholders as required to achieve project objectives.

#### Outcome 3

*Monitor and maintain progress of the project*
Evidence Requirements

3.1 Project management tools are used for integration and timing of project activities and achievement of project deliverables/indicators/key result areas

3.2 Risks to progress and achievement of project objectives are anticipated and related to the project manager for action in accordance with the risk management plan outlined in the project design document

3.3 Completion of project activities and progress against targets and milestones are monitored and corrective action is taken if needed, in accordance with project plans and in consultation with management/project governance personnel

3.4 Problem solving to find innovative solutions to project problems or unplanned-for contingencies is undertaken in consultation with project management.

3.5 Progress reports are provided as required to the required standard, using agreed style.

Outcome 4
Prepare clear and effective written project communications

Evidence Requirements

4.1 Clarify communication objectives, identify stakeholders and determine appropriate format

4.2 Use spelling, punctuation and grammar for workplace documents at level of workplace responsibility and project requirements

4.3 Identify key messages and plan written documents for communicating project information

4.4 Collect and organise subject matter, with structure and logical sequence

4.5 Seek feedback from others on document effectiveness for the purpose intended, assess outcomes, and use feedback to underpin future writing.

Planned Review Date
September 2018

Status information and last date for assessment for superseded versions

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Title | Comply with scheduled and preventative maintenance program processes  
---|---
The learning and assessment activities in this unit standard will applied in the elected field of Sustainable Energy from: Energy Efficiency; Micro-hydro; Solar, Biomass, Hybrid wind systems

| Code | CG3003 | Level | 3 | Credits | 5 |

Purpose

This unit describes the skills and knowledge required to ensure quality assurance and risk management compliance processes for maintenance of electrotechnology aspects of plant and equipment. It encompasses working safely and to technical, quality and risk management standards, work specifications and maintenance schedules, sample inspections, evaluating components and completing the necessary maintenance documentation. This unit standard is appropriate for people who are currently in the workforce in the energy sector.

Persons credited with this standard are able to provide quotations for installation and service jobs including:
- Interpret maintenance schedule requirements correctly
- Follow quality assurance and risk management compliance processes
- Follow maintenance schedules
- Inspect and evaluate apparatus for quality assurance and risk compliance
- Arrange for corrective action of non-compliant apparatus
- Document maintenance work

Classification | Resources

Critical health and safety prerequisites

All training and assessment activities must be in accordance with health and safety legislation and related regulations of the relevant Pacific Island country.

Recommended skills and knowledge

- Understanding of maintenance principles, functions, systems and processes
- Knowledge of OHS and safe working practices to comply with scheduled and preventative maintenance program processes
- Skills in acquiring data and data analysis to inform and assist in the maintenance process
Knowledge of maintenance planning, implementation and recording

**Quality assurance requirements**

This unit standard may only be assessed and recommended for award by qualified Workplace Assessors.

Assessors must comply with the regional and national assessment and moderation requirements of quality frameworks. Details of specific registration and accreditation requirements and the national assessment arrangements are available from EQAP on EQAP@spc.int

**Explanatory notes**

- **Maintenance principles** include: maintenance function, role of maintenance department, occupational health and safety requirements
- **Maintenance systems** include: maintenance terminology, preventative maintenance, corrective maintenance
- **Data** required for maintenance work includes: plant history cards/files, inspection techniques, predictive maintenance, remote visual inspection, non-destructive testing, thermography, vibration analysis, oil analysis
- **Maintenance plans** include: characteristics of plant operation, assessment of failure characteristics, link failure characteristics to maintenance systems, identify production windows, resources, labour, materials, establish plan, implementation procedures

**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.

**Outcomes and evidence requirements**

**Outcome 1**

*Prepare to comply with scheduled maintenance program processes*

**Evidence Requirements**

1.8 OHS procedures for a given work area are identified, obtained and understood.
1.9 Established OHS risk control measures and procedures are followed.
1.10 Safety hazards which have not been previously identified are noted and established risk control measures are implemented.
1.11 The maintenance schedule and process compliance requirements are confirmed and work appropriately sequenced in accordance with established procedures.
1.12 Appropriate person(s) are consulted to ensure the work is coordinated effectively with others involved on the work site.
1.13 Location equipment to be maintained is determined from maintenance schedule procedures and/or system specifications and diagrams.

1.14 Resources needed to conduct the maintenance is obtained in accordance with established procedures and checked against job requirements.

1.15 Tools, equipment and testing devices needed to conduct the maintenance are obtained in accordance with established procedures and checked for correct operation and safety.

### Outcome 2

*Comply with scheduled maintenance program processes.*

#### Evidence Requirements

2.1 OHS risk control measures and procedures for carrying out the work are followed.

2.2 Test of measure on a live and operating system in strict accordance with OHS requirements and within established safety procedures.

2.3 Circuits/machines/plant checked as being isolated where necessary in strict accordance OHS requirements and procedures.

2.4 Apparatus to be maintained is inspected and evaluated for compliance with requirements in accordance with maintenance schedule.

2.5 Non-compliant apparatus/components are documented and arrangements made for their rectification in accordance with established procedures.

2.6 Established methods for dealing with unexpected situations are discussed with appropriate person or persons and documented.

2.7 Ongoing checks on the quality of the maintenance are undertaken in accordance with established procedures.

2.8 Maintenance process compliance is performed efficiently without waste of materials or damage to apparatus and the surrounding environment or services using sustainable energy practices.

### Outcome 3

*Completion of maintenance compliance*

#### Evidence requirements

3.1 OHS work completion risk control measures and procedures are followed.

3.2 Work site and equipment is cleaned and made safe in accordance with established procedures.

3.3 Final checks are made to verify that the maintenance complies with requirements.

3.4 Maintenance completion is documented and appropriate person(s) notified in accordance with established procedures.

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**Planned Review Date**

September 2018

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Title: Evaluation, recommendation and selection of EE products

Code: SE3201  Level: 3  Credits: 7

Purpose:
This unit standard is for people who work, or intend to work in Energy and Energy Efficiency fields. Persons credited with this unit standard are able to:
- Identify the drivers to promoting energy efficiency in residential, commercial and industrial premises.
- Identify the kind of equipment/apparatus and electrical appliance used in residential, commercial and industrial premises;
- Select high efficient appliances and equipment for residential uses
- Evaluate and select Electrical appliances including Refrigeration, Heating, Ventilation and air-conditioning (RHVAC), industrial and commercial equipment and apparatus and other energy systems such as all kinds of power generators, automobile and other utility 2-stroke engines that are energy efficient;
- Evaluate and select building design and construction methods and materials for energy efficient

Classification: Core Skills

Critical health and safety prerequisites: All training and assessment activities must be in accordance with health and safety legislation and related regulations of the relevant Pacific Island Country

Recommended skills and knowledge: The following skills and knowledge are required:
- Knowledge of the basic geography of the Pacific region and local, including culture, norms and values
- Knowledge of basic functions of electrical appliance, industrial equipment
- Knowledge of RHVAC and importance of appropriate building designs for minimum energy consumption
- Understanding of the importance of appliance Minimum Energy Performance Standards (MEPS)
- Understanding of the importance of Appliance Labelling and Standards including efficient lightings
Knowledge of the environmental and social impacts of micro-hydropower development

Quality assurance requirements

This unit standard may only be assessed and recommended for award by Workplace Assessors.

Assessors must comply with the national assessment and moderation requirements as set down by the EQAP. Details of specific registration and accreditation requirements and the national assessment arrangements are available from the EQAP on EQAP@spc.int.

Explanatory notes

1 Definition

- Minimum Energy Performance Standards
- Appliance Labelling and Standards

2 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.

Outcomes and evidence requirements

Outcome 1
Identify the drivers to promoting energy efficiency in residential, commercial and industrial premises.

Evidence requirements

1.1. Identify explain reasons for imposing household energy efficiency and conservation when using electrical power
1.2. Identify and explain how various household electrical appliance differ from each other in terms of their energy consumptions
1.3. Identify and describe the kind of energy transformation and/or transfer with equipment/apparatus or appliance used in residential, commercial and industrial premises

Outcome 2
Identify and explain approaches in attaining high efficiency in electrical appliance/equipment used in homes, commercial and industrial premises

Evidence Requirements

2.1. Identify and explain standards for appliance efficiency and labelling
2.2. Design an effective regulatory framework for appliance performance standards and labelling
2.3 Interpret and implement energy efficiency regulations and legislations in one’s own institution or country
2.4 Interpret appliance test reports provided by testing facilities
2.5 Explain and implement compliance check-testing on appliances/equipment and enforcing penalties

**Outcome 3**
Evaluate and select high efficient appliances and equipment for residential, commercial and industrial uses

**Evidence requirements**
3.1 Explain RHVAC systems and most common EE opportunities such as Energy star rating, minimum energy performance and standards policy, appliance labelling and standards
3.2 Explain the load estimation within premises and the psychrometric analysis of the situation that is required for air-conditioning;
3.3 Explain Energy star rating labels/specifications as a quick assessment of an electrical appliance’s energy efficiency.
3.4 Define and explain how to implement Minimum Energy Performance and Standards (MEPS) and Appliance Labelling and Standards as means for identifying high energy efficiency appliances
3.5 Explain how Heating and Ventilation (HV), improved lighting technology improve Energy consumption in buildings
3.6 Explain importance of EE building standards for building and importance of double-glazing windows, building orientation, cross ventilations, green walls, green roof and façade)
3.7 Determine and explain the efficiency of other energy systems such as all kinds of power generators, automobile and other utility 2-stroke engines that are energy efficient

**Outcome 4**
Evaluate and select building design and construction methods and materials for energy efficiency.

**Evidence requirements**
4.1 Identify location and orientation of build to maximise for high energy efficiency according to environmental factors, climatic conditions and identified use of building.
4.2 Planned opportunities for heat, air and moisture flows throughout the building are identified and assessed against energy efficiency expectations.
4.3 Planned cavities in the building are identified and strategies for sealing or minimising unwanted air leakages are developed.
4.4 Evaluate and select HVAC systems for the site to use minimal energy while minimising risks of inadequate ventilation and poor indoor air quality for occupants.
4.5 Evaluate and select mechanical ventilation systems and equipment for appropriateness to the site and operational costs.
4.6 Evaluate and select materials for interior and exterior barriers for energy efficiency, durability and appropriateness for building site.
Planned review date | October 2018

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**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:
- Identify and evaluate efficiency of energy utilizing systems
- Identify and describe energy saving measures
- Identify and describe energy utilizing systems in residential, commercial and industrial premises

**Classification**
Core Skills

**Critical health and safety prerequisites**
All training and assessment activities must be in accordance with health and safety legislation and related regulations of the relevant Pacific Island Country

**Recommended skills and knowledge**
The following skills and knowledge are required:
- Knowledge of the basic geography of the Pacific region and local, including culture, norms and values
- Knowledge of basic operation of energy utilizing systems in residential, commercial and industrial buildings
- Understanding of drivers of energy efficiency and energy management
- Knowledge of the importance of financial analysis of EE saving opportunities and EE policies and regulatory frameworks and their implications.

**Quality assurance requirements**
This unit standard may only be assessed and recommended for award by workplace assessors.

Assessors must comply with the national assessment and moderation requirements as set down by the EQAP. Details of specific registration and accreditation requirements and the
Explanatory notes

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.

Outcomes and evidence requirements

Outcome 1
Identify and evaluate efficiency of energy utilizing systems

Evidence requirements
1.1. Identify and describe different energy utilising systems and their profile of usage in residential, commercial and industrial building
1.2. Identify and evaluate efficiency, employing different evaluation approaches
1.3. Identify and review requirements to maintain energy efficiency

Outcome 2
Identify and describe energy saving measures

Evidence Requirements
2.1. Identify and explain the types of Energy Conservation measures
2.2. Identify and describe the types of Energy efficiency measures
2.3 Explain the importance of energy efficiency and conservation policies and regulatory frameworks as measures to energy saving

Outcome 3
Identify and describe energy utilizing systems in residential, commercial and industrial premises

Evidence requirements
3.1. Describe energy consumption characteristics of different energy utilizing systems, including consumption rate and trends
3.2. Identify and evaluate energy efficiency and energy conservation opportunities for saving
3.3 Explain and implement identified savings opportunity, including financial analysis of such saving opportunities
3.4 Identify opportunities for innovation in energy efficiency and progress through established channels

national assessment arrangements are available from the EQAP on EQAP@spc.int.
### Planned review date

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**Purpose**

This unit standard is for people who work, or intend to work in Energy sector where the work revolves around energy savings and means to use efficient energy utilizing appliances. This unit of competency describes the outcomes required to maintain energy efficient work practices and contribute to systems improvement with regard to energy efficiency. The unit applies to a wide range of roles across all industry sectors.

Persons credited with this unit standard are able to:
- Identify means of contributing to systems improvement with regard to energy efficiency
- Identify ways promote and improve energy efficient work practices
- Identify requirements to maintain and contribute to energy efficiency
- Develop an energy efficiency plan

**Classification**

Core Skills

**Critical health and safety prerequisites**

All training and assessment activities must be in accordance with health and safety legislation and related regulations of the relevant Pacific Island Country.

**Recommended skills and knowledge**

The following skills and knowledge are required:
- Knowledge of the basic geography of the Pacific region and local, including culture, norms and values
- Knowledge of drivers of energy management and energy efficiency practices
- Understanding the nature of use of a particular energy utilizing systems
- Knowledge of the environmental and social impacts of RE system development

**Quality assurance requirements**

This unit standard may only be assessed and recommended for award by workplace assessors.
Explanatory notes

1 Definition

2 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.

Outcomes and evidence requirements

Outcome 1
Identify means of contributing to systems improvement with regard to energy efficiency

Evidence requirements
1.1 Identify and review requirements to maintain energy efficiency
1.2 Identify benefits relating to energy efficiency and the manufacturing and building industry, the residential and commercial sectors and the government sector in the PICs
1.3 Compare using a life-cycle analysis the benefits of using forest and wood products to other building materials

Outcome 2
Identify ways promote and improve energy efficient work practices

Evidence Requirements
2.1 Utilize site energy efficiency policy and procedures, including those related to recycling and waste management
2.2 Operate equipment to ensure maximum energy efficiency
2.3 Assess own work practices to maintain energy efficiency
2.4 Identify positive aspects of all manufacturing and building industries, commercial sector in relation to efforts in energy efficiency advocacy
2.5 Identify methods to improve energy efficiency based on analysis of energy use and related information

Outcome 3
Identify requirements to maintain and contribute to energy efficiency
Evidence requirements
3.1. Contribute to and support reviews of operations for improvements in energy efficiency
3.2 Identify opportunities for efficiencies in consumption or raw materials and progress through appropriate personnel
3.3 Identify opportunities for innovation in energy efficiency and progress through established channels.

Outcome 4
Develop an energy efficiency plan

Evidence requirements
4.1 Identify energy efficiency improvements that can be implemented immediately, and those which require further consideration or are longer-term goals
4.2 Identify and prioritise energy efficiency improvements considering EE opportunities and risks relating to managing energy use
4.3 Develop a plan to show what will be done, and how and when, and document it following business requirements

| Planned review date | October 2018 |

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**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:
- Devise a plan for assessing energy efficiency of energy systems
- Compile data and information on energy consumption from energy systems
- Analyse data on energy systems consumption characteristics, costs and emissions
- Identify and recommend measure to improve energy efficiency in energy consumption systems

**Classification**

Core Skills

**Critical health and safety prerequisites**

All training and assessment activities must be in accordance with health and safety legislation and related regulations of the relevant Pacific Island Country

**Recommended skills and knowledge**

The following skills and knowledge are required:
- Knowledge of the basic geography of the Pacific region and local, including culture, norms and values
- Knowledge of basic operation of energy utilizing systems in residential, commercial and industrial buildings
- Understanding of drivers of energy efficiency and energy management
- Knowledge of the importance of improved energy efficiency in energy systems

**Quality assurance requirements**

This unit standard may only be assessed and recommended for award by Workplace Assessors.

Assessors must comply with the national assessment and moderation requirements as set down by the EQAP. Details of
specific registration and accreditation requirements and the national assessment arrangements are available from the EQAP on EQAP@spc.int.

Explanatory notes

1 Definition

Energy (consumption) system refers to a body that takes in energy in different forms and transform that energy into another form to perform work. Example is an electric water heater or an urn. It is an energy system because it takes in energy in a form of electricity and converts or transform that electrical energy into heat energy that does work by heating water.

Minimum Energy Performance and Standards (MEPS) refer to a specification, containing a number of performance requirements for an energy-using device, that effectively limits the maximum amount of energy that may be consumed by a product in performing a specified task.

2 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.

Outcomes and evidence requirements

Outcome 1

Develop a plan for assessing energy efficiency of energy systems

Evidence requirements

1.4. Design a plan for assessing energy use in a particular setting/building is made according to the assessment needs
1.5. Identify potential hazards to ensure risks are suitably managed.
1.6. Identify and arrange tools, equipment and other requirements for assessment to ensure availability
1.7. Identify and describe different energy utilising systems and their profile of usage in residential, commercial and industrial building
1.8. Identify and evaluate efficiency, employing different evaluation approaches
1.9. Identify and review requirements to maintain energy efficiency

Outcome 2

Compile data and information on energy consumption from energy systems

Evidence Requirements

2.1. Identify information to be gathered on energy consumption systems.
2.2 Collate energy consumption system’s use and costs.
2.3 Identify and compile information on household water heating system, space
cooling, lighting and appliances from resident, and from measurements and observations made during inspection of the residence.

2.4 Identify information on behaviour and preferences of energy system users that impact on energy use and from observations made during inspection of the an energy system.

Outcome 3
Analyse data on energy systems consumption characteristics, costs and emissions

Evidence requirements
3.1. Describe energy consumption characteristics of different energy utilizing systems, including consumption rate and trends
3.2. Information is analysed to identify key characteristics of a particular energy system consumption, costs and emissions.
3.3 Identify Government rebates/incentives and other assistance programs related to improving efficiency of energy system, including building.
3.4 Evaluate options for improving efficiency of energy systems and reducing emissions
3.4 Estimate cost of options for improving energy efficiency in line with enterprise procedures.
3.5 Estimated energy, emissions and cost savings generated from improving energy system efficiency are estimated in line with enterprise procedures.

Outcome 4
Identify and recommend measures to improve energy efficiency in energy consumption systems

Evidence requirements
4.1. Identify and explain the importance of suitable EE Policies, including market transformation policies for appliances and equipment, as measure in improving EE in energy systems
4.2. Identify and improve energy efficiency data collection and indicator
4.3 Explain how MEPS Appliance Labelling and Standards help in improving EE
4.4 Explain energy-efficient lighting systems and phasing out of inefficient lighting products and systems
4.5. Explain mandatory vehicle fuel efficiency standards and measures in improving vehicle fuel efficiency

Planned review date | October 2018
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**Purpose**

This unit standard involves working with renewable energy systems tools and equipment used for biogas.

Persons credited with this unit standard are able to:
- Identify the different types and uses of tools, equipment and materials (including feedstock and digestate) used for operating, testing and maintenance of biogas systems
- Demonstrate the safe handling of tools, equipment and materials (including feedstock and digestate) for operating, testing and maintenance of biogas systems
- Demonstrate the operating practises for tools, equipment and materials (including feedstock and digestate) used for biogas systems
- Demonstrate the maintenance practises for tools, equipment and materials (including feedstock and digestate) used for biogas systems

**Classification**

Core Skills

**Critical health and safety prerequisites**

All training and assessment activities must be in accordance with health and safety legislation and related regulations of the relevant Pacific Island Country

**Recommended skills and knowledge**

The following skills and knowledge are required:
- Knowledge of basic tools and equipment
- Knowledge of basic operation of a biogas production system
- Knowledge of basic civil works and works involved in biogas production system/plant installation
- Understanding of the biomass/feedstock supply
- Knowledge of the environmental and social impacts of biogas production system/plant.
Quality assurance requirements

This unit standard may only be assessed and recommended for award by Workplace Assessors.

Assessors must comply with the national assessment and moderation requirements as set down by the EQAP. Details of specific registration and accreditation requirements and the national assessment arrangements are available from the EQAP on EQAP@spc.int.

Explanatory notes

1 Definition.
   - Biogas is a mixture of different gases produced by the breakdown of organic matter in the absence of oxygen. Biogas can be produced from raw materials (feedstock) such as agricultural waste, manure, municipal waste, plant material, sewage, green waste or food waste. Biogas is a renewable energy source and in many cases exerts a very small carbon footprint.
   - Civil Works refers to work that involves civil engineering and construction of concrete base and digester including ducting for the biogas system, construction of digestate collection tanks and livestock pens.
   - The term “biogas system” refers to the complete unit required for biogas production at a household level (apparatus and materials from feedstock collection through biogas production to storage/end use - including digestate collection/end use and may also include the use of a compressor for transfer and storage of gas).
   - A biogas plant is an anaerobic digester that produces biogas from feedstock.

2 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.

Outcomes and Evidence Requirements

Outcome 1
Identify the different types and uses of tools, equipment and materials (including feedstock and digestate) used for operating, testing and maintenance of biogas systems

Evidence requirements
   1.1 Identify the different types of basic tools, equipment and materials – including types of instruments and controls required for each type of plant.
   1.2 Outline the advantages and disadvantages of the main types of biogas plants in terms of the Pacific local context: balloon plants; fixed dome plants; floating drum plants; horizontal plants; earth-pit plants; ferrocement plants.
1.3 Identify the functions and limitations of each part of the equipment.
1.4 Understand the assembly and decommissioning of all parts of the biogas system – this includes selecting a suitable site for the digester with regard to location and availability of feedstock (e.g. livestock pens); groundwater; using suitable piping material, diameter and layout (e.g. allowing for water traps); slurry pump (if required); safety shutoff/isolating equipment such as ball or cock valves; appropriate agitator (if required).
1.5 Understand the safety of storing and preserving tools, equipment, materials (including feedstocks and digestate), and accessories.
1.6 Identify the uses, processes and treatment of materials (including feedstock and digestate) involved in the operations, system testing and maintenance of biogas systems

Outcome 2
Demonstrate the safe handling of tools, equipment and materials (including feedstock and digestate) for operating, testing and maintenance of biogas systems

Evidence Requirements
2.1. Demonstrate the safe handling of tools, equipment and materials during the operation of a biogas production system/plant by applying a job safety analysis which identifies job tasks, hazards, risks, control measures and the person responsible.
2.2. Demonstrate the safety handling of power tools, equipment and materials for testing the biogas production system/plant during operations and data gathering.
2.3. Demonstrate the safety operations of power tools, equipment and materials during maintenance and replacement of biogas production system/plant parts.
2.4. Demonstrate safety practises when processing and utilising materials for operations, testing and maintenance of biogas production system/plant - this will include the development of a Hazard operations plan to foresee potential safety issues arising from feedstock handling, biogas production and use, digestate disposal/use.
2.5. Outline the end-use applications of biogas and appropriateness and safety of different applications (for example: cookers/ burners/ lamps/ refrigerators and heat pumps/ engines and generators and the effects of gas demand and gas composition on end-uses).
2.6. Demonstrate the safe charging of the digester.

Outcome 3
Demonstrate the operating practises of tools, equipment and materials (including feedstock and digestate) used for biogas systems

Evidence requirements
3.1 Summarise procedures for operation of tools, equipment and materials.
3.2 Demonstrate safety practises and procedures in operating tools, equipment and materials by applying operation work plan (this will also select the appropriate type of digestate/sludge storage – liquid, dry or composting).
3.3 Demonstrate handling maintenance tools and testing equipment practises for
3.3 Testing and evaluation of power tools and equipment efficiency

Develop an operation work plan for tools, equipment and materials. For example, prepare an appropriate task list of daily (digester feeding, agitation, pressure check, check gas production, check overflow, digestate distribution), weekly/monthly (mixing swimming and sinking layers of fixed dome plant expansion chambers, check and re-fill water sealing lid of fixed dome plants, clean floating dome plants, check porosity of above ground pipes, check and empty digestate collectors), and annual (remove swimming layers, pressure test the plant) activities/tasks.

Outcome 4

Demonstrate the maintenance practices of tools, equipment and materials (including feedstock and digestate) used for biogas systems

Evidence requirements

3.1 Summarise procedures for identifying and documenting faults in power tools, equipment and materials.

3.2 Demonstrate safety practices and procedures in maintaining power tools, equipment and materials by applying a hazard operations plan.

3.3 Demonstrate handling maintenance tools and testing equipment practices for fixing the minor defects in tools, equipment and materials

3.4 Develop a maintenance work plan for tools, equipment and materials. For example, prepare an appropriate task list of daily (clean gall appliances, lubricate moving parts, check pressure release valves, service agitator, control gas applications on tightness and function, check aboveground piped – replace if required), and annual (check for any corrosion, pressure check and repair if necessary).

Planned review date

October 2018

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**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:
- Identify and describe the importance of social inclusion in energy and electrification
- Identify and describe basic processes of biogas digestion systems and their applications
- Calculate the energy demand and feedstock requirements for a domestic-scale biogas digester under different regimes (temperature, feedstock, digester size etc).
- Identify the environmental and social impacts of using biomass energy

**Classification**

Core Skills

**Critical health and safety prerequisites**

All training and assessment activities must be in accordance with health and safety legislation and related regulations of the relevant Pacific Island Country

**Recommended skills and knowledge**

The following skills and knowledge are required:
- Knowledge of the basic geography of the Pacific region and local cultural norms and values
- Knowledge of basic operation of a small-scale biogas digester systems

**Quality assurance requirements**

This unit standard may only be assessed and recommended for award by workplace assessors registered with the EQAP.

Assessors must comply with the national assessment and moderation requirements as set down by the EQAP. Details of specific registration and accreditation requirements and the national assessment arrangements are available from the EQAP - EQAP@spc.int.
Explanatory notes

1 Definition
- Gender refers to a range of characteristics pertaining to the state of being male or female (typically used with reference to social and cultural differences rather than biological ones).
- Sustainable Energy Development refers to the utilization of sustainable energy for economic development.
- Civil Works refers to work that involves civil engineering and construction of concrete base and digester including ducting for the biogas system, construction of digestate collection tanks and livestock pens.
- A basic economic analysis of a biogas system should consider the following (where appropriate): capital costs of the system tools, equipment and installation, expected running costs of the system, expected replacement costs and a timetable for replacement of all system components.
- The term “biogas system” refers to the complete unit required for biogas production at a household level (apparatus and materials from feedstock collection through biogas production to storage/end use - including digestate collection/end use and may also include the use of a compressor for transfer and storage of gas).

2 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.

Outcomes and evidence requirements

Outcome 1
Identify and describe the importance of social inclusion in energy and electrification

Evidence requirements
1.7 Explain why gender issues are relevant and important in sustainable energy development in Pacific Island Countries
1.8 Describe the differences in the ways men and women use domestic energy
1.9 Identify two barriers to the participation of women in decisions related to domestic energy choices
1.10 Identify and explain factors that could determine the success of any small-scale biogas digester system at the household or community level in the Pacific Island Countries (advantages of biogas on development)

Outcome 2
Identify and describe basic processes of biogas digestion systems and their applications

Evidence Requirements
2.1 Explain the significance and role of the processes involved in methane fermentation (hydrolysis, acidification and methane formation).
2.2 Describe the mixture of gases that constitute “biogas”.

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2.3. Develop a simple process flow diagram detailing the functions of the major components of a small-scale biomass digestion system from the feedstock source to the end-use (for example if applicable: feedstock; collecting tank; inlet and outlet; digester; gasholders; gas pipes, valves and accessories; stirring apparatus; heating systems; pumps; weak ring; pig-pen and fresh-water collection and storage; end-use appliance).

2.4. Explain the advantages and disadvantages of the following different feed methods for biogas plants in terms of the Pacific community context: batch conversion; continuous flow; plug flow; semi-batch conversion; continuously stirred reactors.

2.5. Explain the significance of the following factors and their effect on the biogas process in the Pacific community context: types of microbes; digestate temperature; nutrients; retention time; fluid dynamic/ mixing; pH level; nitrogen inhibition and C/N Ratio; substrate solid content and agitation; inhibitory factors such as salt water.

2.6. Outline the end-use applications of biogas

Outcome 3
Calculate the energy demand and feedstock requirements for a domestic-scale biogas digester under different regimes (temperature, feedstock, digester size etc).

Evidence requirements
3.1. Ensure the quantitative and qualitative energy requirements of the household are met by determining the following (where appropriate): Cooking requirements; Lighting requirements; Refrigeration requirements; Engine requirements; Miscellaneous requirements.

3.2. Ensure the digester meets energy demands by calculating the biogas generation potential based on the biomass production through such methods as: Measuring the biomass availability; Determining the biomass supply via pertinent literature/ data; Determining the biomass supply via regional reference data; Determining biomass supply via user survey.

3.3. Compare energy demand against potential energy generation and decide on size and viability of biogas plant.

3.4. Demonstrate an in-depth understanding of what local conditions (household/ farm/ community, governance and management, climate, soil conditions, substrate for digestion and building material availability, technology, use of digestate as fertilizer, etc) affect the operation of a system.

Outcome 4
Identify the environmental and social impacts of using biomass energy

Evidence requirements
4.1. Perform simple cost benefit analysis of the biogas system
4.2. Understand the composition of sludge and its fertilizing effect
4.3. Outline the advantages of biogas replacing fossil fuels and reducing methane released to atmosphere
4.4. Breakdown and explain the limitations of small-scale biogas systems and possible means to address such limitations in rural and outer-island communities in the Pacific Island Countries – with particular reference to social, cultural and governance issues
### Planned review date

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**Purpose**

This unit standard involves working with biogas. It encompasses the rudiments for communicating with schematic, wiring and mechanical diagrams and equipment and cable/piping connection schedules, manuals, site and architectural drawings and plans showing the location of services, apparatus, plant and machinery and understanding the use and format of compliance standards and job specifications.

The application of the skills and knowledge described in this unit does not require a license to practice in the workplace.

Persons credited with this unit standard are able to:

- Prepare to use drawings, diagrams, schedules and manuals for biogas system design and installation
- Use drawings, diagrams, schedules and manuals to obtain biogas system job information.
- Use biogas systems drawings, diagrams, schedules and manuals to convey information and ideas.
- Prepare to use compliance standards, codes and specifications.

**Classification**

Core Skills

**Critical health and safety prerequisites**

All training and assessment activities must be in accordance with health and safety legislation and related regulations of the relevant Pacific Island Country.

**Recommended skills and knowledge**

The following skills and knowledge are required:

- Knowledge of basic operation of a biogas system
- Knowledge of basic civil works involved in biogas system installation and operation
- Knowledge of reading and interpreting technical diagrams of biogas designs and layouts
- Knowledge of the environmental and social impacts of biogas development
### Quality assurance requirements

This unit standard may only be assessed and recommended for award by Workplace Assessors.

Assessors must comply with the national assessment and moderation requirements as set down by the EQAP. Details of specific registration and accreditation requirements and the national assessment arrangements are available from the EQAP on EQAP@spc.int.

### Explanatory notes

#### 1 Definition.
- Biogas is a mixture of different gases produced by the breakdown of organic matter in the absence of oxygen. Biogas can be produced from raw materials such as agricultural waste, manure, municipal waste, plant material, sewage, green waste or food waste. Biogas is a renewable energy source and in many cases exerts a very small carbon footprint.
- Civil Works refers to work that involves civil engineering and construction of concrete base and digester including ducting for the biogas system, construction of digestate collection tanks and livestock pens.
- The term “biogas system” refers to the complete unit required for biogas production at a household level (apparatus and materials from feedstock collection through biogas production to storage/end use - including digestate collection/end use and may also include the use of a compressor for transfer and storage of gas).

#### 2 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.

### Outcomes and Evidence Requirements

#### Outcome 1
Prepare to use drawings, diagrams, schedules and manuals for biogas system design and installation.

**Evidence requirements**

1. **Identify and adhere to established OHS risk control measures and procedures.**
2. **Determine the need for drawings, diagrams, schedules or manuals from biogas work to be undertaken.**
3. **Identify and adhere to established routines and procedures to obtain drawings, diagrams, schedules or manuals required for the biogas system work to be undertaken.**
1.4. Relate knowledge of planning and social influences (including customs and taboos) regarding the handling and treatment of organic waste materials to the feasibility of the biogas system design.

**Outcome 2**
Use drawings, diagrams, schedules and manuals to obtain biogas system job information.

**Evidence Requirements**
2.1. Select drawings, diagrams, schedules and/or manuals, appropriate to the biogas system work being undertaken.
2.2. Interpret biogas system drawings, diagrams and schedules using knowledge of drawing layouts, conventions and symbols.
2.3. Extract dimensions from drawings and diagrams for application to biogas system work undertaken.
2.4. Determine location of biogas system equipment from equipment schedules and location diagrams.
2.5. Review manuals to ascertain their format and where information relevant to the biogas system work to be undertaken is located.
2.6. Interpret information given in manuals in relation to the biogas system work to be undertaken.

**Outcome 3**
Use biogas system drawings, diagrams, schedules and manuals to convey information and ideas.

**Evidence requirements**
3.1 Utilize drawing conventions in neat freehand drawings to convey information and ideas to others involved in the biogas system work to be undertaken.
3.2. Utilize drawing conventions to neatly correct freehand original biogas system job drawing to show final 'as-installed' arrangement.
3.3. Submit corrected biogas system drawings to appropriate person(s) in accordance with established procedures.

**Outcome 4**
Prepare to use compliance standards, codes and specifications

**Evidence requirements**
4.1. Identify and obtain Compliance Standards and Codes that apply to biogas system works
4.2. Review and understand the format of compliance Standards and Codes that apply to biogas system disciplines.
4.3. Review and understand the purpose and format and typical content of job specifications within the biogas system.

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**Purpose**

This unit standard is for people who work, or intend to work in Bioenergy sector.

Persons credited with this unit standard are able to:
- Identify and prepare to diagnose technical faults in biogas systems.
- Identify and rectify/repair any technical faults within a biogas control system.
- Compile completed biogas systems fault finding and repair activities.

**Classification**

Core Skills

**Critical health and safety prerequisites**

All training and assessment activities must be in accordance with health and safety legislation and related regulations of the relevant Pacific Island Country

**Recommended skills and knowledge**

The following skills and knowledge are required:
- Knowledge of the basic geography of the Pacific region and local, including culture, norms and values
- Knowledge of basic operation of a biogas systems
- Skills in technical report writing
- Understanding the nature of use of a particular biogas system in a particular location
- Knowledge of the environmental and social impacts of biogas system development

**Quality assurance requirements**

This unit standard may only be assessed and recommended for award by Workplace Assessors.

Assessors must comply with the national assessment and moderation requirements as set down by the EQAP. Details of specific registration and accreditation requirements and the national assessment arrangements are available from the EQAP on EQAP@spc.int.
Explanatory notes

1 Definition.

- Biogas is a mixture of different gases produced by the breakdown of organic matter in the absence of oxygen. Biogas can be produced from raw materials (feedstock) such as agricultural waste, manure, municipal waste, plant material, sewage, green waste or food waste. Biogas is a renewable energy source and in many cases exerts a very small carbon footprint.
- Civil Works refers to work that involves civil engineering and construction of concrete base and digester including ducting for the biogas system, construction of digestate collection tanks and livestock pens.
- Job Safety Analysis identifies job tasks, hazards, risks, control measures and the person responsible. The job safety analysis should account for at least the following - the explosive nature of biogas, the dangers of breathing in biogas, initially charging the digester, cleaning the digester, falling into the digester, high operating temperatures and the pathogenic nature of the digestate if stored incorrectly.
- The term “biogas system” refers to the complete unit required for biogas production at a household level (apparatus and materials from feedstock collection through biogas production to storage/end use - including digestate collection/end use and may also include the use of a compressor for transfer and storage of gas).
- A biogas plant is an anaerobic digester that produces biogas from feedstock.

2 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.

Outcomes and evidence requirements

Outcome 1
Identify and prepare to diagnose and rectify technical faults in biogas control system.

Evidence requirements

1.1 Identify, obtain and understand OHS procedures for a given work area
1.2 Prepare to strictly adhere to OHS risk control measures and procedures for the work on biogas systems diagnoses and rectification
1.3 Assess and identify the likely extent of work to be undertaken from fault/breakdown reports and/or discussions with appropriate person(s)
1.4 Organise with others involved directly or indirectly to ensure the work is coordinated effectively
1.5 Identify sources of materials that may be required for the work and make them available in accordance with established procedures.
1.6 Select and obtain tools, equipment and testing devices needed to locate faults in accordance with established procedures and checked for correct operation and safety
Outcome 2
Identify and rectify/repair any technical faults within a biogas control systems

Evidence Requirements
2.1 Identify and strictly adhere to OHS risk control measures and procedures for carrying out the work on rectifying faults on biogas systems
2.2 Determine the need to test or measure live in strict accordance with OHS requirements and when necessary conducted within established safety procedures
2.3 Isolate and check biogas system where necessary in strict accordance OHS requirements and procedures
2.4 Identify and document hazards resulting from the fault or breakdown and devise risk control measures and implement in consultation with appropriate personnel using a job safety analysis.
2.5 Identify fault methodically, drawing on knowledge of biogas systems and interconnecting pipes/tubes and vessels using measured and calculated values of components/apparatus parameters
2.6 Disassemble components/apparatus components where necessary and parts stored to protect them against loss or damage
2.7 Identify again faulty apparatus/components and their fault status for confirmation purposes
2.8 Arrange for procurement of materials/replacement parts required to rectify faults in accordance with established procedures
2.9 Appraise effectiveness of the repair in accordance with established procedures
2.10 Reassemble apparatus, conduct final test and prepare for return to service
2.11 Assess and handle unexpected situations safely and with the approval of an authorised person
2.12 Repair fault without damage to apparatus, component, the surrounding environment or services and using sustainable energy practices

Outcome 3
Compile report on completed biogas systems’ fault finding and repair activities

Evidence requirements
3.1. Employ OHS work completion risk control measures and procedures.
3.2 Clean and make safe work area in accordance with established procedures
3.3 Justify through written statement the rationale for repairs done on components
3.4 Compile a written report on work completed and appropriate person(s) notified in accordance with established procedures

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**Purpose**

This unit covers basic maintenance of remote area biogas system infrastructure and facilities. It encompasses working safely, to maintenance standards and following maintenance routines, identifying deterioration and damage to facilities using routine procedures, and completing the necessary maintenance reporting. This unit is intended primarily for Pacific Islanders living in rural and remote communities. Persons credited with this unit standard are able to:

- Prepare to maintain and repair biogas facilities.
- Maintain and repair biogas facilities.
- Complete maintenance and repair work reports

**Classification**

Core Skills

**Critical health and safety prerequisites**

All training and assessment activities must be in accordance with health and safety legislation and related regulations of the relevant Pacific Island Country

**Recommended skills and knowledge**

The following skills and knowledge are required:

- Knowledge of basic operation of a rural and remote lifestyle in the Pacific Island communities
- Knowledge of basic civil and engineering works involved in biogas system operation
- Understanding of the basic need for biogas for cooking in the PICs
- Knowledge of the environmental and social impacts of biogas system implementation

**Quality assurance requirements**

This unit standard may only be assessed and recommended for award by Workplace Assessors.

Assessors must comply with the national assessment and moderation requirements as set down by the EQAP. Details of
specific registration and accreditation requirements and the national assessment arrangements are available from the EQAP on EQAP@spc.int.

Explanatory notes

1 Definition.
   • Biogas is a mixture of different gases produced by the breakdown of organic matter in the absence of oxygen. Biogas can be produced from raw materials (feedstock) such as agricultural waste, manure, municipal waste, plant material, sewage, green waste or food waste. Biogas is a renewable energy source and in many cases exerts a very small carbon footprint.
   • Civil Works refers to work that involves civil engineering and construction of concrete base and digester including ducting for the biogas system, construction of digestate collection tanks and livestock pens.
   • The term “biogas system” refers to the complete unit required for biogas production at a household level (apparatus and materials from feedstock collection through biogas production to storage/end use - including digestate collection/end use and may also include the use of a compressor for transfer and storage of gas).
   • A biogas plant is an anaerobic digester that produces biogas from feedstock.

2 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.

Outcomes and Evidence Requirements

Outcome 1
Identify and prepare to maintain and repair biogas systems.

Evidence requirements
1.1. Identify and obtain the relevant OHS procedures
1.2. Identify and follow established OHS risk control measures and procedures in preparation for the biogas system/plant repair work
1.3. Identify and report safety hazards in the biogas system which have not previously been identified and seek advice on risk control measures from the work supervisor
1.4. Obtain the nature and location of biogas system from documentation or from work supervisor to establish the scope of biogas system repair work to be undertaken
1.5. Identify and seek advice from the work supervisor to ensure the biogas system repair work is coordinated effectively with fellow workers and the local community
1.6. Identify sources of materials that may be required for the biogas system repair work and access materials in accordance with established routines and procedures

1.7. Identify and obtain tools, equipment and testing devices needed to carry out the biogas system repair work and check for correct operation and safety

**Outcome 2**
Maintain and repair biogas systems

**Evidence Requirements**

2.1. Established OHS risk control measures and procedures for carrying out the biogas work are followed

2.2. Identify and check biogas system components are decommissioned where necessary in strict accordance OHS requirements and procedures

2.3. Identify and prescribe procedures to check and identify deterioration and damage to biogas systems

2.4. Repair faulty and damaged biogas systems using routine procedures

2.5. Identify and carry out safely maintenance and repairs within the prescribed limits, routines and procedures

2.6. Identify and adhere to procedures for referring non-routine events to immediate supervisor for directions

2.7. Identify and carry out maintenance and repair work efficiently without waste of materials and energy and without damage to biogas apparatus/ components/ plant, the surrounding environment or services

2.8. Identify and carry routine quality checks in accordance with biogas system repair instructions

**Outcome 3**
Complete maintenance and repair work report

**Evidence requirements**

3.1 Identify and follow OHS work completion risk control measures and procedures

3.2. Comply to work site cleanliness and safety in accordance with routine procedures

3.3. Identify and follow procedures for referring maintenance issues beyond the scope of prescribed work to persons of higher authority

3.4. Identify and report work carried out to the work supervisor through established maintenance reporting procedures

| Planned review date | October 2018 |

**Status information and last date for assessment for superseded versions**

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Title: Assist in the Installation, Operation And Maintenance of Systems For RE & EE (Small-scale Biogas)

Code: SE3306B  Level: 3  Credits: 6

Purpose

This unit standard involves installation, operation and maintenance of biogas systems.

Persons credited with this unit standard are able to:
- Prepare to install, operate and maintain biogas systems.
- Demonstrate installation of biogas systems equipment.
- Demonstrate the safe handling and operation of biogas systems equipment.
- Demonstrate the maintenance practices of biogas systems and equipment.
- Write completion report on installation and maintenance activities.

Classification: Core Skills

Critical health and safety prerequisites

All training and assessment activities must be in accordance with health and safety legislation and related regulations of the relevant Pacific Island Country.

Recommended skills and knowledge

The following skills and knowledge are required:
- Knowledge of basic tools and equipment.
- Knowledge of basic functions and components of biogas systems.
- Knowledge of basic civil works involved in biogas set ups.
- Knowledge of the environmental and social impacts of biogas system development.

Quality assurance requirements

This unit standard may only be assessed and recommended for award by Workplace Assessors.

Assessors must comply with the national assessment and moderation requirements as set down by the EQAP. Details of specific registration and accreditation requirements and the
national assessment arrangements are available from the EQAP on EQAP@spc.int.

Explanatory notes

1 Definition.

- Sustainable Energy Development here refers to an energy system that contributes to sustainable development via the provision of energy services which meet the needs of the present without compromising the ability of future generations to meet their needs – biogas systems fit within the definition of sustainable energy.
- Biogas is a mixture of different gases produced by the breakdown of organic matter in the absence of oxygen. Biogas can be produced from raw materials (feedstock) such as agricultural waste, manure, municipal waste, plant material, sewage, green waste or food waste. Biogas is a renewable energy source and in many cases exerts a very small carbon footprint.
- Civil Works refers to work that involves civil engineering and construction of concrete base and digester including ducting for the biogas system, construction of digestate collection tanks and livestock pens.
- The term “biogas system” refers to the complete unit required for biogas production at a household level (apparatus and materials from feedstock collection through biogas production to storage/end use - including digestate collection/end use and may also include the use of a compressor for transfer and storage of gas).
- A biogas plant is an anaerobic digester that produces biogas from feedstock.
- The term “tool” refers to tools such as written toolkits for biomass assessment, surveys, hand tools or machines used to assist in the installation (including site selection), operation and maintenance of biogas systems.

2 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.

Outcomes and Evidence Requirements

Outcome 1
Prepare to install, operate and maintain biogas systems

Evidence requirements

1.1. Identify OHS procedures for a given work area.
1.2. Identify health and safety risks and established risk control measures and procedures in preparation for the work.
1.3. Identify safety hazards that have not previously been identified, ensure that they are noted and that established risk control measures are implemented.
1.4. Prepare installation/maintenance operations/activities in consultation with others affected by the work and ensure that they are sequenced appropriately.
1.5. Determine the nature and location of the work from documentation (examples may include plans, feasibility study and/or a biomass resource assessment, survey or biomass resource assessment tool) or an appropriate person to establish the scope of work to be undertaken.
1.6. Plan the location of apparatus within the constraints of the building structure, land use issues, biomass resource availability and local regulations.
1.7. Seek advice from appropriate persons to ensure the work is coordinated effectively with others.
1.8. Identify and obtain the material needed for the installation work in accordance with established procedures and checked against job requirements.
1.9. Identify and obtain tools, equipment and testing devices needed to for the installation work in accordance with established procedures and checked for correct operation and safety.
1.10. Check preparatory work to ensure no damage has occurred to any materials, equipment, testing devices or any part of the biogas plant and ensure it and complies with requirements.

Outcome 2
Demonstrate installation of biogas systems equipment.

Evidence requirements

2.1. Identify the various kinds of biogas system configurations.
2.2. Identify the functions and limitations of each part and components of biogas systems and equipment
2.3. Demonstrate the assembly and disassembly of system components
2.4. Identify and carry out apparatus installation efficiently without unnecessary waste of materials or damage to apparatus and the surrounding environment or services in compliance with sustainable energy principles
2.5. Identify and carry out ongoing checks on the quality of the installed apparatus in accordance with established procedures.
2.6. Identify and check apparatus and components as being isolated where necessary in strict accordance OHS requirements and procedures.
2.7. Demonstrate the testing and commissioning procedures involved in the installation of biogas systems and equipment

Outcome 3
Demonstrate the safe handling and operations of biogas systems equipment.

Evidence Requirements
3.1. Demonstrate the safe handling and operational procedures of biogas systems
3.2. Demonstrate the safety procedures required for operational system checks on biogas systems
3.3 Check that apparatus and associated equipment are installed and maintained to comply with technical standards and job specifications and requirements.

3.4 Demonstrate safety practises and procedures in maintaining biogas systems, components and materials – including gas storage and digestate use.

3.5 Demonstrate fault finding procedures and defects in biogas systems components and materials.

3.6 Demonstrate safety monitoring techniques on biogas systems and equipment.

3.7 Implement maintenance work plan for biogas system components and materials.

**Outcome 4**

Write completion report on installation and maintenance activities.

**Evidence requirements**

4.1 Perform final checks to the installed and maintained biogas systems so that they conform to requirements.

4.2 Document ‘As-installed’ emergency systems apparatus and associated equipment and an appropriate person or persons notified in accordance with established procedures.

4.3 Demonstrate the reporting and document practises of biogas system operations and analysis.

4.4 Explain procedures of identify and document faults in biogas systems.

| Planned review date | October 2018 |

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