

**1. Module details**

**Module name**

**Introduction to Sustainable Energy (Electrical Context)**

**Suggested structured learning time**

A learner possessing the prerequisite skills and knowledge should achieve the module purpose in 18 to 20 hours.

**Module code**

NUE040

**Discipline code**

0701

**2. Module purpose**

This module describes basic knowledge supporting the notion of sustainable energy in reducing greenhouse gas emissions and provides some methods for energy reduction through work practice and other techniques.

**3. Learning Pathway**

**Intended use in the structured learning program**

This module is intended to support workplace experience in working with electrical systems that include sustainable components. In particular it provides an overview of sustainable energy at a systems level.

Therefore before undertaking this module a Learner should have a clear understanding of electrical circuits and the need to work safely.

**Recommended prerequisites**

For the most effective learning this module should be undertaken until module NUE056 has been completed.

**5. Content**

1. Notion of sustainable energy
  - The earth's atmosphere: composition, function
  - The greenhouse effect: causes, consequences
  - International and national greenhouse imperatives: the role of regulators and similar bodies
  - Energy usage in Australia: types and methods; contribution to the greenhouse effect; energy from gas, electricity, motor vehicles; greenhouse gases other than CO<sub>2</sub>
  - Opportunities for reducing greenhouse emissions: domestic, commercial and industrial strategies; trade related technologies and methods
2. An overview of sustainable energy technologies
  - Solar
  - Wind

3. Biomass
  - Co-generation
  - Economic benefits of sustainable energy initiatives
4. Building design/building retrofits
  - Principles of passive solar design
  - Use of natural light
  - Energy efficient retrofits (overview)
  - Insulation and ventilation
  - Energy management control systems
  - Assessment of requirements and selection of design/technologies
  - Use/application of different types of glazing
5. Selection of control devices
  - Components within a lighting system
  - Energy efficient lighting products, design and installation
  - Use of natural light
  - Automated lighting control systems
  - Assessment of requirements and selection of system
  - System maintenance

## 6. Assessment strategy

### Assessment methods

Assessment should be progressive reflecting a holistic approach to ensure the module purpose is met. To assist in ensuring validity, reliability and fairness assessment instruments should include practical exercises, assignments and written tests consisting of a number of item types, such as multiple choice, short answer and problem solving.

### Conditions of assessment

Learning and assessment will take place in an environment that is conducive to a learner's development.

## 7. Learning outcome details

### Learning outcome 1

Explain the notion of sustainable energy and the reasons for its promotion.

### Assessment criteria

- 1.1 Describe the 'greenhouse effect' and its consequences.

	1.2	Describe measures used to limit/reduce the effect of the 'greenhouse effect'.
	1.3	State the main contributing factors to the greenhouse gas problem.
<b>Learning outcome 2</b>		Explain the types of renewable energy technology suitable for use in Australia.
<b>Assessment criteria</b>	2.1	Describe the operation, benefits and limitation of each of the following renewable energy technologies: <ul style="list-style-type: none"><li>• photovoltaic</li><li>• solar thermal</li><li>• wind energy conversion</li><li>• biomass</li><li>• wind/tidal</li><li>• gas thermal</li></ul>
	2.2	Describe the process of co-generation and state applications suitable for this type of technology.
<b>Learning outcome 3</b>		Demonstrate basic knowledge of energy efficient building design.
<b>Assessment criteria</b>	3.1	Explain how each of the following factors can be used to reduce the energy usage in a building: <ul style="list-style-type: none"><li>• building aspect</li><li>• insulation</li><li>• ventilation</li><li>• glazing</li><li>• passive solar design and shading.</li></ul>
<b>Learning outcome 4</b>		Describe basic control systems that can reduce energy usage in an installation.
<b>Assessment criteria</b>	4.1	State the advantages and disadvantages of basic lighting systems and lamp types.
	4.2	Describe basic lighting control amounts used to minimise energy usage.
	4.3	Describe the benefits of human maintenance on energy efficient lighting.

**8. Delivery of the module**

**Delivery strategy**

Delivery strategies must be suitable for learning both theoretical and practical aspects described in the module purpose. It is considered that the most effective method to achieve this is by integration of theory and practice where students learn by experimentation, research and reports. It is recommended that learning and assessment be facilitated in a holistic manner that may require learning outcome sequence other than that indicated in the module.

**Resource requirements**

Resources should be sufficient for students to carry-out learning activities on an individual basis. This could include:

- Suitable workshops/laboratories
- Suitable tools and equipment.

Where this module is used in an approved Traineeship or Apprenticeship program learners should be advised to obtain, where available, respective EEQSBA<sup>1</sup> *User Guides* (*these outline in detail what training and work performance the Learner is required to undertake for the program*).

**Occupational health and safety requirements**

A safe and healthy environment will be provided for learners and teachers. Safety procedures for the particular learning facilities shall be followed as part of the learning / teaching activity and assessment.

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<sup>1</sup> EEQSBA – ElectroComms and EnergyUtilities Qualifications Standards Body of Australia Ltd.