

1. Module details**Module name****Introduction to Sustainable Energy (Climate Control Context)****Module duration**

It is expected that students with the appropriate entry knowledge and skills will successfully complete this module in 18 - 20 hours.

Module code

NUE041

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. Prerequisites

NUE058 Electrical Concepts and Applications.

4. Relationship to competency standards

This module provides part of the underpinning knowledge and skills in the 'Evidence Guide' of specific units of competency in the National Electrotechnology Training Package and provides similar support, where mapped, to equivalent units in the National Metals and Engineering Competency Standards. For details refer to the module to unit maps, available from NUEITAB.

5. Content**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 CO₂

Opportunities for reducing greenhouse emissions: domestic, commercial and industrial strategies; trade related technologies and methods

An overview of sustainable energy technologies

Solar

Wind

Biomass

Co-generation

Economic benefits of sustainable energy initiatives

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

Selection of control devices

Components within a HVAC and refrigeration control system
 Energy efficient refrigerants
 Detection systems to control air flow
 Energy star ratings for coefficient of performance
 Energy control systems
 Advantages of evaporative air conditioners in dry climates
 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.

Learning outcome 2	Explain the types of renewable energy technology suitable for use in Australia.
Assessment criteria	<p>2.1 Describe the operation, benefits and limitation of each of the following renewable energy technologies:</p> <ul style="list-style-type: none">- photovoltaic- solar thermal- wind energy conversion- biomass- wind/tidal. <p>2.2 Describe the process of co-generation and state applications suitable for this type of technology.</p>
Learning outcome 3	Demonstrate basic knowledge of energy efficient building design.
Assessment criteria	<p>3.1 Explain how each of the following factors can be used to reduce the energy usage in a building:</p> <ul style="list-style-type: none">- building aspect- insulation- ventilation- glazing- passive solar design and shading.
Learning outcome 4	Describe methods of reducing energy usage in an installation.
Assessment criteria	<p>4.1 Name energy efficient refrigerants.</p> <p>4.2 Describe 'star ratings' as an indicator of energy efficiency in appliances.</p> <p>4.3 State where evaporative air conditioners can be best used.</p> <p>4.4 Describe the optimum maintenance programs that minimise energy usage in an installation.</p> <p>4.5 Explain how to optimise climate control systems in terms of energy minimisation.</p> <p>4.6 Describe control system techniques that can be used to minimise energy usage.</p>

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.

Occupational health and safety requirements

A safe and healthy environment will be provided for students and teachers as well as the particular safety procedures followed as part of the learning / teaching activity and content.