

UTE NES061 A

Provide basic sustainable energy solutions for energy reduction in domestic premises

Descriptor: Monitor energy usage and provide basic sustainable energy options to reduce the energy consumption in domestic residences

Elements	Performance criteria
061.1 Prepare to monitor energy usage and provide basic solutions for energy reduction	<p>061.1.1 Monitoring activities are planned and prepared for to ensure <i>OH&S policies and procedures</i> are followed with the work appropriately sequenced in accordance with <i>requirements</i></p> <p>061.1.2 <i>Appropriate personnel</i> are consulted to ensure the work is co-ordinated effectively with others involved</p> <p>061.1.3 Materials are obtained and checked in accordance with <i>established procedures</i> and to comply with <i>requirements</i></p> <p>061.1.4 Location in which monitoring activities is determined from job <i>requirements</i></p> <p>061.1.5 Materials necessary to complete the work are obtained in accordance with <i>established procedures</i> and checked against job <i>requirements</i></p> <p>061.1.6 Materials needed to carry out the monitoring are obtained in accordance with <i>established procedures</i></p>
061.2 Undertake monitoring of energy usage and provide basic solutions for energy reduction	<p>061.2.1 <i>OH&S policies and procedures</i> for undertaking monitoring activities are followed</p> <p>061.2.2 Monitoring activities are undertaken in accordance with <i>requirements</i>, without damage or distortion to the surrounding environment or services</p> <p>061.2.3 Unplanned events or conditions are responded to in accordance with <i>established procedures</i></p> <p>061.2.4 Approval is obtained in accordance with <i>established procedures</i> from <i>appropriate personnel</i> before any contingencies are implemented</p>

Elements	Performance criteria
	061.2.5 On-going checks of the quality of the work are undertaken in accordance with <i>established procedures</i>
061.3 Complete monitoring activities and provide and provide reports where necessary	061.3.1 Documentation/reports are completed to ensure administrative <i>requirements</i> are met 061.3.2 Work completion is <i>notified</i> in accordance with <i>established procedures</i>

Range statement

General

Generic items in this unit are shown in italics, e.g. *established procedures*. The definition and intended scope covered by generic items is described in the Glossary that forms an integral part of this range statement.

Energy usage and basic sustainable energy options are monitored and provided to reduce the energy consumption in domestic residences and includes but is not limited to: using reflective curtains to control heat; using natural or artificial shade to control sunlight; double glazing and reflective films; using solar water heating; making sure trees do not shade solar hot water collectors; checking for leakage in hot water system pressure relief valves and elsewhere in plumbing systems; replacing incandescent lamps with compact fluorescent lamps; insulating dwellings, offices and workplaces; preventing draughts; installing timers or sensors on lighting and climate control systems; installing self-closing doors to minimise heat/cooling loss; using natural gas for heating rather than oil or coal based fuels; using devices to reduce water usage; using sunlight to replace artificial light; ventilating roof cavities to reduce ceiling heating; installing renewable energy systems e.g. photovoltaics.

Currency in unit of competence

In order to maintain currency in this Unit on-going competency development is to occur. This would include keeping abreast of any changes in legislation, regulations, procedures, technology and the like related to the scope and application of this unit.

Evidence guide

This Evidence guide is intended to include components defined within the Range Statement, of which the Glossary is an integral part. Terms in italics, e.g. *consistent performance*, with respect to the Evidence guide are also contained in the Glossary.

Critical aspects of evidence

Achieving competence

Achievement of this unit of competence is based on each of the following conditions being met:

- demonstrating *consistent performance* for each element of the unit exhibited across a *representative range* of applications; independently under direct supervision and to *requirements*.
- meeting the performance criteria associated with each element of competence by employing the techniques, procedures, information, and resources available in the workplace within the context of the Range Statement.
- demonstrating an understanding of the Underpinning knowledge and skills identified in the section, of this unit titled ‘Underpinning knowledge and Skills’.

Reporting requirements

The reporting of the judgements about competence must be in the context of the individual unit being assessed and the qualification to be issued. Where regulatory requirements in individual jurisdictions require recording of additional information such as underpinning knowledge and skills specified, as well as related work performance evidence relevant to this unit, it is to be reported in accordance with the Regulator’s requirements. For such requirements knowledge and skills that underpin this competency are to be recorded and issued as a part of the transcript of achievement.

Maintaining competence

Consideration should be given to periodic evaluations of skills and knowledge within this unit that are critical to safety, operation of plant and equipment and the like, particularly where relevant skills and knowledge are not frequently practiced.

Context of assessment

Competency in this unit will be determined on evidence of having *consistently performed* across a *representative range* of activities in the provision of sustainable energy solutions for energy reductions in domestic premises and/or allied industry areas.

Due regard must be given to Safety when developing assessment and delivery arrangements. Assessment is to be progressive reflecting an holistic approach. Competent performance with inherent safe working practices is expected in the Electrotechnology Industry. This requires that the specified underpinning knowledge and skills is developed and assessed in a structured environment which is primarily intended for learning and incorporates all necessary equipment and facilities for learners to develop the knowledge and skills described in this unit. Such environment must ensure appropriate controls, safety, and direct supervision is practiced.

The context must also embrace the requirements and characteristics for the applicable endorsed qualification, which references this unit, and, where required, support the outcomes of other units within the endorsed qualification structure.

Interdependent assessment of units

Assessment in this unit is related to the knowledge associated with other units within a qualification structure, where appropriate.

Underpinning knowledge and skills

This section provides the specification of underpinning knowledge and skills required to underpin the elements, performance criteria, and range statement of this unit. More detailed information related to the breadth and depth of underpinning knowledge and skills is included in the Knowledge and Skills Specification, which forms an integral part of this unit.

Note: The Electrotechnology Industry is a hazardous industry which is demonstrated by the need for regulation in respect of electrical safety and regulation, and therefore, due regard must be given to the environment in which the development of underpinning knowledge and skills and its application occurs. Thus development and assessment of underpinning knowledge and skills is to be arranged in manner, which ensures appropriate control measures of safety and regulatory requirements are in place and observed. In particular, special attention is to be given to ensuring a structured environment for learning and practice includes the use of equipment that is designed for instructional purposes, and which does not expose the learner to any unsafe conditions. The use of such equipment does not negate the duty of care responsibilities that apply.

This, with other aspects of evidence, will ensure that an individual has the appropriate underpinning knowledge and skills that support the ability to undertake activities as a competent person.

Underpinning knowledge and skills topics pertaining to this unit – *listed below are underpinning knowledge and skills topics, which are required to be exhibited by individuals for the purposes of attaining appropriate knowledge and skills underpinning performance in this unit. The relevant detail for each topic that must be exhibited by an individual is included under Knowledge and Skills Specification topics, which follows the list:*

Topics:

- **Occupational Health and Safety**
- **Applied Electricity 1**
- **Electrical Concepts and Applications**
- **Introduction to Renewable Energy Technologies**
- **Greenhouse Reduction Strategies**
- **Provide basic sustainable energy solutions for energy reduction in domestic premises – Work performance**

Knowledge and Skills Specification

This Knowledge and Skills Specification details the requisite knowledge and skills that is to be developed and achieved for each topic specified and listed within the Evidence Guide of this unit of competency under the heading Underpinning knowledge and skills. This section provides information regarding the depth and breadth of knowledge and skills to be developed and exhibited thus, forming an integral part of the respective Unit of Competency.

More detailed information regarding strategies for learning, development and assessment of content breadth and depth, delivery and resourcing issues is included in associated Training Package Support Materials and, where developed advice can be obtained from ANTA's website.

Occupational Health and Safety

Occupational health and safety act: aims; acts; representatives; inspectors; offences

Personal safety: injuries and diseases in the workplace; repetitive strain injuries; manual handling procedures; handling of ladders; adequate lighting in the workplace; industrial radiation; chemical hazards; protective equipment; electrical hazards; thermal stress; exposure to excessive vibration; high level industrial noise

Workplace hazards: identification of potential workplace hazards; preventative measures

Working with electrically operated tools and equipment: nature of electric shock; causes of electrical accidents; working safely with electricity; safety items used in electrical environments

Rescue from a live electrical situation

Emergency first aid/resuscitation: procedures for performing emergency first aid and resuscitation for an electric shock victim; CPR

Applied Electricity 1

Fundamental and derived units: basic units; SI derived units; multiples and sub-multiples

Power, work and energy: conservation of energy; torque; losses and efficiency; maximum efficiency of machines

Electrical characteristics of materials: conductors, insulators, semi-conductors; electric charge; electric current; electromotive force

The simple circuit: source, load, current path and control; open-circuit; short-circuit

Resistance: Ohm's law; determine V, I, R; power dissipation

Effects of current: physiological effects; principles of protection from physiological effects; conversion of electrical energy to other forms (heating, light, magnetic, chemical) Sources of electrical energy - conversion of other forms to electrical energy

Using measuring instruments: handling measuring instruments; selecting an instrument; setting-up and connecting into circuits; reading scales and read-outs; setting up a CRO

Electrical Concepts and Applications

DC resistive circuits: series; parallel; series parallel; measurement of V, I and R; calculation of R, V, I, and P

Capacitance: concept; unit; time constant; capacitors – basic construction and types

Magnetism: magnetic and non magnetic materials; magnetic field patterns; force between magnetic fields; applications

Electromagnetism: magnetic field around a current-carrying conductor and solenoid; force between current-carrying conductors; applications

Electromagnetic induction: induced EMF; inductance, concept, unit, time constant, applications

AC principles: sine waves; frequency; amplitude; peak voltage; peak to peak voltage; RMS voltage; single phase; three phase; generation of AC voltages; circuit measurement; earthing; electrical supply system

Transformers: construction; principles of operation; primary and secondary voltage and current; applications

Motors: motor action; generator action; DC motors; AC motors; applications

Electrical safety testing: regulations.

Introduction Renewable Energy Technologies

Non-technical issues: current economic, social, environmental and political issues, impact on a renewable energy technology; topic review

Energy services/demand: terminology; energy, temperature, power, symbols, units; energy conversion and efficiency; domestic dwelling - energy services, energy source selection; primary energy and end use energy

Solar radiation resource: terminology; units, symbols, conversions; sun position, sun path diagrams; solar radiation on fixed and tracking collectors

Wind energy resource and technology: terminology, units, symbols; wind patterns (Australia); local terrain, wind speed, direction, turbulence, wind power; maps, data sheets, measuring instruments, wind energy conversion systems (WECS); characteristics; applications; specifications, sizing

Micro-hydro resource and technology: terminology, units, symbols; flow rates, heads, assessment; turbines; operating characteristics; control requirements; specifications

Biomass resource and technology: terminology; common biofuels – types, energy contents, production, applications; resource assessment

Solar thermal systems: terminology; components; applications; types of hot water systems; system features, orientation, tilt angles, placement; system selection, size, cost

Energy efficient building design: terminology; climate and thermal comfort; thermal conductivity of building elements; solar heat gain; ventilation; glazing; thermal mass; insulation; shading devices; siting of buildings; active solar systems

RAPS system configuration: configuration; components – functions, efficiencies; regulators, inverters, battery chargers, generators

Photovoltaic arrays: terminology; modules (types, efficiency, applications); IV curve; irradiance and temperature effects; blocking and bypass diodes; wiring diagrams, configurations; specification and sizing

Energy storage: terminology; types and methods; battery life, temperature effects, charge and discharge rate; precautions, maintenance, safety; stratification; boosting and equalising charges; specification, capacity, configuration; operating characteristics; types, sizes

Greenhouse Reduction Strategies

Nature of greenhouse gases and other forms of pollution; atmospheric elements

Profiling Australia's greenhouse gas emissions: greenhouse inventories; access to inventory information; projecting future emissions

Understanding and communicating climate change and its impacts: improving our understanding of climate change; identifying climate change impacts; climate change communication and education

Partnerships for greenhouse action: governments, industry and community: government policy; working with the private sector; fostering community engagement; promoting international partnerships; emissions trading

Efficient and sustainable energy use and supply: reducing the greenhouse intensity of energy supply; harnessing renewable energy; improving end-use energy efficiency

Efficient transport and sustainable urban planning: integrating land use and transport planning; travel demand and traffic management; encouraging greater use of public transport, walking and cycling; improving vehicle fuel efficiency and fuel technologies; freight and logistics systems

Greenhouse sinks and sustainable land management: enhancing greenhouse sinks; encouraging sustainable forestry and vegetation management; reducing greenhouse gas emissions from agricultural production

Greenhouse best practice in industrial processes and waste management: reducing greenhouse gas emissions from industry; reducing methane emissions from waste treatment and disposal

Adaptation to climate change: a national framework for adaptation to climate change; adaptation strategies for key sectors

Provide basic sustainable energy solutions for energy reduction in domestic premises – Work performance

Providing basic sustainable energy solutions for energy reduction in domestic premises in the Sustainable and/or Renewable Energy sector across a *representative range* of apparatus and associated systems must be appropriately demonstrated on-the-job in real work activities or equivalent simulated environment