



Australian Government

UEERE0005 Assess energy loads and uses for energy efficiency in residential, office and retail premises

Release: 1

UEERE0005 Assess energy loads and uses for energy efficiency in residential, office and retail premises

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to undertake energy audits to assess energy loads of residential, office and retail premises; evaluate the energy efficiency of the premises and to make recommendations on design implementations.

It includes working safely, applying extensive knowledge of electrical installations and components and their operating parameters, gathering and analysing data, applying problem-solving techniques, and developing and documenting engineering solutions.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEERE0014 Develop strategies to address sustainability issues for electrical installations

Competency Field

Renewable Energy

Unit Sector

Electrotechnology

Elements and Performance Criteria

PERFORMANCE CRITERIA	
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Prepare to assess residential, office and retail premises for energy efficiency	1.1 Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace processes and procedures for relevant work area are identified and applied

evaluation

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| | 1.2 | Hazards are assessed, risks are assessed and control measures implemented |
| | 1.3 | Extent of the energy assessment is determined from analysis of premises, including orientation and floor plans, building structure plans, energy accounts and situation reports in consultation with relevant person/s and in accordance with workplace procedures |
| | 1.4 | Energy assessment activities are planned to meet scheduled timelines in consultation with others involved in the work |
| | 1.5 | Strategies are determined to ensure energy efficient solutions are developed and implementation is carried out in accordance with workplace procedures |
| 2 | Assess residential, office and retail premises for energy efficiency evaluation | |
| | 2.1 | WHS/OHS risk control work measures and procedures are followed |
| | 2.2 | Energy loads are considered when developing energy efficient strategies to address and minimise energy use |
| | 2.3 | Parameters, specifications and performance requirements in relation to energy use are set in accordance with workplace procedures |
| | 2.4 | Approaches to resolving/minimising sustainability issues and energy use are analysed to provide the most effective solutions in accordance with workplace procedures |
| | 2.5 | Unplanned events are dealt with safely, efficiently and consistently in accordance with regulatory requirements and workplace procedures |
| | 2.6 | Quality and energy efficiency of the audit is monitored against performance agreement and/or workplace procedures and industry standards |
| 3 | Document assessment of residential, office and retail premises for energy efficiency | |
| | 3.1 | Proposed solutions/strategies to minimise energy use are tested to determine their effectiveness and modified, as required, in accordance with workplace procedures |

- 3.2 Adopted solutions are documented in accordance with workplace procedures, including instructions for implementation that incorporate the risk control measures to be followed
- 3.3 Authorised person/s required to implement solutions for energy use is coordinated in accordance with regulatory requirements and workplace procedures
- 3.4 Justification for strategies used to minimise energy use is documented for inclusion in work/project development records in accordance with professional industry standards and workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Carrying out energy assessments and documenting energy efficiency strategies must include at least the following:

- two residential, office and retail premises

Unit Mapping Information

This unit replaces and is equivalent to UEENEEK153A Assess energy loads and uses for energy efficiency in residential, office and retail premises.

Links

Companion Volume implementation guides are found in VETNet - -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6>

Assessment Requirements for UEERE0005 Assess energy loads and uses for energy efficiency in residential, office and retail premises

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- identifying and quantifying the extent of the energy use, loads and patterns of usage for electrical and energy installation energy problem/s
- identifying the operational patterns in control of the user that impact on energy use and the energy services supplied by the energy technology that allow the quantifying energy use
- performing an energy balance to model the current energy use to the existing energy bills
- identifying effective energy saving opportunities to reduce energy use
- understanding the extent of the scope of the electrical and energy installation design problems, constraints and likely cost of installation
- obtaining energy system/component parameters, specifications and performance requirements appropriate to each problem
- testing and commissioning energy saving opportunity solutions to energy problems
- documenting instruction for implementation of solutions that incorporate risk control measure to be followed
- documenting and reporting financial and technical justification of solutions implemented in accordance with professional standards
- dealing with unplanned events
- analysing approaches to resolve/minimise energy usage
- analysing facilities orientation and floor plans, building structure plans, energy accounts and situation reports to determine extent of the energy assessment
- applying sustainable energy principles and practices
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including applying safe working practices and using risk control measures
- assessing residential, office and retail premises for energy efficiency evaluation
- carrying out energy assessments to address energy efficiency issues in residential, office and retail premises, including:
 - dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment

- collecting and analysing information on household water use and on ways to improve water efficiency in the home
- communicating effectively with relevant stakeholders
- conducting a thermal performance assessment of a domestic residence
- conducting an energy and water audit for the domestic and the small business sector
- considering energy loads when determining strategies
- determining strategies to ensure energy efficient solutions are developed and implemented
- performing a residential water meter reading
- performing energy and power calculations
- performing energy balance calculations
- performing financial analysis in terms of simple payback and simple payback period and return on investment or rate of return
- performing greenhouse emission calculations, emissions factors, carbon intensity of electricity vs. natural gas and liquefied petroleum gas (LPG) and global warming potential and CO₂ equivalents
- performing solar photovoltaic (PV) energy calculations and calculate renewable energy certificate (REC) entitlement for a small solar PV system
- planning assessment activities/audits to meet scheduled timelines.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- residential, office and retail premises energy efficiency assessments, including:
 - energy management, legislation and regulations relevant to residential, office and retail premises encompassing:
 - national Building Code of Australia (BCA)
 - state/territory building codes
 - Standards Australia for energy auditing
 - mandatory disclosure
 - state/territory-based legislation for energy management in business
 - National Australian Built Environment Rating System (NABERS) tenancy
 - NABERS Basix
 - minimum renewable energy (RE)
 - Nationwide House Energy Rating Scheme (natHERS) ratings
 - RE credits
 - small technology credits
 - water supply and use encompassing:
 - collection and analysis of information on household water use and on ways to improve water efficiency in the home
 - ability to analyse the water consumption index for different sectors

- ability to analyse domestic water use and ways to minimise the use of water
- understanding of the methodology applied to water savings
- performing water star rating calculations
- greenhouse gas emissions encompassing:
 - concept of greenhouse gas emissions and global warming
 - fossil fuel resource depletion and mining impacts on the environment
 - breakdown of energy consumption in the Australian domestic sector
- environmental context – ecological impacts and resource use encompassing:
 - concept of greenhouse gas emissions and global warming
 - fossil fuel resource depletion and mining impacts on the environment
 - breakdown of energy consumption in the Australian domestic sector
 - breakdown of water consumption in the Australian domestic sector
- energy efficiency methodologies encompassing:
 - energy services approach and how it relates to energy auditing
 - end-user focus and how it relates to energy auditing
 - opportunistic approach and how it relates to energy auditing
 - energy management strategy in relation to energy efficiency, energy management, demand management, fuel switching and RE
 - financially viable best practice solutions
 - water management strategy in relation to water efficiency, water management, source switching and water reuse/recycling
 - opportunistic best practice solutions in relation to water and how this differs from financially viable best practice solutions
 - benchmarking with reference to statistical benchmarks, technology benchmarks and best practice financially viable benchmark methodologies
 - calculating best practice energy and water star ratings
 - property cost and environmental impact tables in relation to reporting energy audit outcomes
 - sustainable initiative investment tables in relation to reporting energy audit outcomes
- energy and society encompassing:
 - understanding of electricity charges
 - drivers of the predicted electricity price increases in Australia
 - network charge and retail charge increases and how they relate to electricity price
 - the carbon pollution reduction scheme impact on electricity prices
 - RE target impact on electricity prices
- energy auditing theory and practice encompassing:
 - scope of Australian Standards for energy auditing
 - energy audit process in relation to data collection, analysis and the communication of results
 - accounts, bills and data, tariff structures and the identification of domestic tariff types
 - energy and energy balance calculations, including power calculations, usage time

- calculations, power factor calculations and energy conversions from kilowatt (kW) to megajoule (MJ)
- process involved in onsite assessment in a domestic and small business energy audit
- ways of gathering information on household energy use and costs
- risks and hazards associated in a domestic and small business energy audit
- performing energy and power calculation
- power rating of equipment and metering and measurement in a domestic and small business energy audit
- energy balance calculations
- ways to improve energy efficiency
- greenhouse emission calculations, emissions factors, carbon intensity of electricity vs. natural gas and LPG and global warming potential and CO₂ equivalents
- financial analysis in terms of simple payback and simple payback period and return on investment or rate of return
- reporting and communication of energy audit results
- water auditing services theory and design encompassing:
 - water flow rates of taps, showers and irrigation, toilets, washing machines, dishwashers and filtration and top up water use for pool systems
 - residential water meter reading
 - trends of water use and charges
 - water efficiency labelling scheme (WELS) as it relates to water auditing
 - water efficiency opportunities in home sustainability assessments
 - operation of a greywater system
 - factors that impact on garden water demand
- lighting services theory and efficient design encompassing:
 - fundamental illumination design for domestic and small business
 - illumination in terms of light output, light level and brightness
 - determine target light levels for differing tasks
 - characteristics of light sources, including efficacy, colour temperature and colour rendering index
 - different ballast types, their efficiency and benefits
 - incandescent lamps, halogen lighting, domestic fluorescent lighting and comparisons between these and applications for the domestic and small business sector
 - the application of lighting methodology for best practice energy efficiency design
 - energy saving lighting opportunities in the domestic and small business sector
- thermal performance and climate control encompassing:
 - thermal performance of a building and how it impacts on heating, ventilation and air conditioning energy use, including orientation, thermal mass, insulation, glazing, shading and ventilation
 - air conditioning designs, including ducted systems, split-system air conditioners, multi-headed split systems, individual room air conditioners, through wall/window

- and portable units
- ways for improving the thermal performance of a residential building envelope elements
- Australian climate zones
- air conditioning technologies, including refrigerated type air conditioning, inverter type air conditioning, reverse cycle air conditioning, evaporative air conditioners, breeze power systems and digital scroll compressors
- application of energy efficiency ratio (EER) and coefficient of performance (COP) and show proficiency in EER and COP calculations
- application of the air conditioning star ratings
- gas and electric heating options and air (ducted) heating
- operation of an air conditioning system and each component, including the compressor, evaporator, condenser, expansion valve and fan coil
- ceiling and pedestal fans and ventilation climate control
- factors that impact on climate control energy consumption
- best practice climate control methodology as applied to the domestic and small business sector
- domestic and small business climate control saving opportunities
- conducting a thermal performance assessment of a domestic residence
- food storage services theory and efficient design encompassing:
 - refrigeration system basics operation
 - different refrigeration models
 - refrigeration characteristics, including operation, automatic defrost, cooling temperature control, ice maker, ice and water dispenser, door seals and hinges
 - factors that impact on refrigerator energy use, including size, configuration temperature setting, clearance around cabinet and ambient conditions, making ice, ice and water antisweat heaters, seals, insulation, compressor efficiency and age
 - refrigerator and freezer star ratings
 - food storage saving opportunities
- food preparation services theory and efficient design encompassing:
 - different food preparation appliances
 - different operation of gas and electric hot plates and ovens and the advantages and disadvantages of each
 - EMI food preparation methodology
 - food preparation saving opportunities
 - food preparation services theory and efficient design
- water heating services theory and efficient design encompassing:
 - different water heaters, including electric and gas storage, gas instantaneous (continuous flow), electric heat pump and solar hot water heaters
 - solar water heater configurations and characteristics, including passive (or thermo siphon) systems and active (or pumped) systems solar collector types, one shot booster

- how renewable energy certificates (RECs) relate to solar water heater RECs
- factors that influence water heater energy use, including pipe work and fitting insulation, atmospheric conditions, water efficiency, temperature setting and maintenance and operation
- water heating/cooling calculations
- EMI water heating methodology
- domestic water heating saving opportunities
- types of entertainment and administration appliances found in domestic residences
- entertainment and administration services theory and efficient design encompassing:
 - appliance standby power including the different mode; passive and active standby
 - appliance energy star ratings
 - minimum energy performance standards (MEPS) and labelling requirements for televisions
 - computer energy consumption, including computer power management
 - entertainment and administration saving opportunities
- cleaning services theory and efficient design encompassing:
 - clothes washer types, including vertical axis and horizontal axis
 - factors that impact on clothes washing energy use
 - energy and water MEPS star ratings and how they apply to clothes washers
 - clothes dryer types, including spin dryer, condenser dryers, gas dryers and heat pump dryers
 - clothes dryer controls
 - dishwasher types
 - vacuum cleaner types
 - EMI cleaning methodology
 - domestic cleaning saving opportunities
- pumping systems (and pools) theory and efficient design encompassing:
 - pumping services in relation to domestic and the small business sector
 - pumping types, including centrifugal and positive displacement and pump selection and design
 - pumping theory, including pressure head, pressure pumping vs. transfer pumping, pump curves, pump best efficiency (operating) point (BEP), variable speed drive, energy balance for a typical pumping system and electric motors
 - operation of domestic pools in terms of pool pumps, pool backwashing, cartridge filters, pools turnovers, pool water use and pool heating
 - energy efficiency pool systems design methodology
 - domestic pool systems saving opportunities
- smart metering solutions encompassing:
 - benefits of the different metering available to the domestic and the small business sector
 - metering opportunities relation to domestic and the small business sector

- renewable energy (solar PV) encompassing:
 - design of solar PV Systems and different panel types, including mono-crystalline, poly-crystalline and amorphous
 - solar panel characteristics and choice of selection
 - the balance of systems, rules of thumb, shading, orientation and shading of strings in an on grid solar power system
 - performing solar PV energy calculations and calculating REC entitlement for a small solar PV System
 - different feed-in tariff schemes and how they apply to solar PV
- energy audit system encompassing:
 - domestic and small business energy audit forms and legend
 - ability to conduct an energy and water audit for the domestic and the small business sector
 - domestic and small business sector energy audit report
- effective communication techniques
- energy loads
- performance agreements and/or workplace/industry standards
- problem-solving techniques
- relevant manufacturer specifications
- relevant parameters, specifications and performance requirements in relation to setting energy use
- relevant risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- sustainable energy principles and practices
- techniques to analyse facilities orientation and floor plans, building structure plans, energy accounts and situation reports
- time management and planning techniques.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

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