



Australian Government

UEERE0003 Assess energy loads and uses for energy efficiency in commercial facilities

Release: 1

UEERE0003 Assess energy loads and uses for energy efficiency in commercial facilities

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 commercial facilities, evaluate the energy efficiency of the facilities and to make recommendations on design implementations.

It includes working safely, applying extensive knowledge of commercial 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

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

Competency Field

Renewable Energy

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS

Elements describe the essential outcomes.

- 1 Prepare to assess commercial facility for energy efficiency**

PERFORMANCE CRITERIA

Performance criteria describe the performance needed to demonstrate achievement of the element.

- 1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace processes and procedures for relevant work area are identified,

evaluation	obtained and applied
	1.2 Hazards are assessed, risks are assessed and control measures implemented
	1.3 Extent of the energy assessment is determined from analysis of facilities, 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/audits 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 commercial facility 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/strategies to resolving and minimising 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 are monitored against personal performance agreement and/or workplace procedures and industry standards
3 Document assessment of commercial facility 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 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 commercial facilities

Unit Mapping Information

This unit replaces and is equivalent to UEENEEK154A Assess energy loads and uses for energy efficiency in commercial facilities.

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 UEERE0003 Assess energy loads and uses for energy efficiency in commercial facilities

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 impacts 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 relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
 - applying safe working practices
- applying sustainable energy principles and practices
- assessing commercial facilities for energy efficiency evaluation
- calculating best practice energy and water star ratings
- calculating energy and energy balance, including power calculations, usage time calculations, power factor calculations and energy conversions from kilowatt hour (kWh) to megajoules (MJ)
- calculating energy and power

- calculating energy balance for commercial facilities
- calculating greenhouse gas emissions, emissions factors, carbon intensity of electricity vs. natural gas and liquified petroleum gas (LPG) and global warming potential and carbon dioxide (CO₂) equivalents
- carrying out energy assessments to address energy efficiency issues in commercial facilities, including:
 - dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- communicating effectively with relevant stakeholders
- conducting thermal performance assessment of a commercial facility
- considering energy loads when determining strategies
- determining strategies to ensure energy efficient solutions are developed and implemented
- developing a power and energy monitoring strategy for a commercial facility
- operating of commercial pools in terms of pool pumps, pool backwashing, cartridge filters, pool turnovers, pool water use and pool heating
- operating an air conditioning system and each component, including the compressor, evaporator, condenser, expansion valve and fan coil
- planning assessment activities/audits to meet scheduled timelines
- performing solar photovoltaic (PV) energy calculations and calculating renewable energy certificate (REC) entitlement for a small solar PV system.

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:

- commercial facilities energy efficiency assessment, including:
 - energy management, legislation and regulation relevant to residential, office and retail premises encompassing:
 - national Building Code of Australia (BCA)
 - state/territory building codes
 - Standards Australia for energy auditing
 - state/territory-based legislation for energy management in business
 - National Australian Built Environment Rating System (NABERS) tenancy
 - NABERS office
 - building energy efficiency certificates
 - minimum renewable energy (RE)
 - RE credits
 - small technology credits
 - water supply and use encompassing:
 - collection and analysis of information for commercial facilities water use and methods to improve water efficiency in the home

- ability to analyse the water consumption index for different commercial sectors
- ability to analyse commercial facilities water use and ways to minimise the use of water
- understanding of the methodology applied to water savings
- calculate water star rating
- environmental context – greenhouse gas emission, ecological impacts and resource use encompassing:
 - concept of greenhouse gas emissions and global warming
 - fossil fuel resource depletion and how mining impacts the environment
 - breakdown of energy consumption in the Australian commercial sector
 - breakdown of water consumption in the Australian commercial sector
- energy efficiency methodologies encompassing:
 - energy services approach and relationship to energy auditing
 - end-user focus and relationship to energy auditing
 - opportunistic approach and relationship to energy auditing
 - energy management strategy in relationship to energy efficiency, energy management, demand management, fuel switching and RE
 - financially viable best practice solutions; including net present value and internal rate of return
 - water management strategy in relationship to water efficiency, water management, source switching and water reuse/recycling
 - opportunistic best practice solutions in relationship to water and the differences to the 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 relationship to reporting energy audit outcomes
 - sustainable initiative investment tables in relationship 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 tax or similar and impact on electricity prices
 - RE target and impact on electricity prices
 - impact of electricity prices to commercial facilities
- energy auditing and practice encompassing:
 - scope of Australian Standards for energy auditing
 - energy audit process in relationship to data collection, analysis and the communication of results

- accounts, bills and data, tariff structures and the identification of commercial tariff types
- calculate energy and energy balance including power calculations, usage time calculations, power factor calculations and energy conversions from kWh to MJ
- process involved in onsite assessment in a commercial facilities energy audit
- gathering information on commercial facilities energy use and costs
- risks and hazards associated with a commercial facilities energy audit
- calculate energy and power
- power rating of equipment and metering and measurement in a commercial facilities energy audit
- calculate energy balance for commercial facilities
- advice on ways to improve energy efficiency
- calculating greenhouse gas emissions, 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
- energy management encompassing:
 - energy management strategies
 - practice-based energy management
 - technology-based energy management
 - interaction between human resources and practice-based control
 - application of technology-based energy management
 - identify potential energy savings from application of energy management
- power and energy data recording encompassing:
 - identify the structure and purpose of power and energy data recording for whole systems and equipment
 - review or develop single line schematic of electrical system of a commercial facility
 - establish the power and energy data gap from the energy audit to achieve Australian Standard compliant energy audits
 - identify electrical loads that need contribute more than 5% of energy use
 - understand and explain the operation seven different power and energy monitoring equipment available
 - understand the implications of data recording intervals for monitoring equipment
 - develop a power and energy monitoring strategy for a commercial facility
 - deploy commercial facility power and energy monitoring strategy
 - draw conclusions and report on power and energy data collection in a commercial facility
- water auditing services and design encompassing:
 - water flow rates of taps, showers and irrigation, toilets, washing machines, dishwashers and filtration and top-up water use for cooling towers and pool systems

- commercial facility water meter reading
- trends of water use and charges for commercial facilities
- water efficiency labelling scheme (WELS) as it relates to water auditing
- identification of water efficiency opportunities in commercial facility assessments
- operation of a rainwater and grey water systems
- factors that impact on landscape water demand
- lighting services and efficient design encompassing:
 - fundamental illumination design for commercial facilities
 - illumination terms: light output, light level and brightness
 - determining target light levels for differing tasks
 - characteristics of light sources including efficacy, colour temperature and colour rendering index
 - ballast types, their efficiency and benefits
 - incandescent lamps, light-emitting diode (LED), induction lamps, halogen lighting, commercial fluorescent lighting, metal halide, mercury vapour and comparisons between these and applications for the commercial facilities
 - application of lighting methodology for best practice energy efficiency design
 - energy saving lighting opportunities in the commercial facilities
- thermal performance and climate control encompassing:
 - thermal performance of a building impacts on heating, ventilation and air conditioning energy use, including orientation, thermal mass, insulation, glazing, shading and ventilation
 - air conditioning designs, including central, ducted systems, split-system air conditioners, multi-headed split systems, individual room air conditioners, and through wall/window and portable units
 - improvement to air movement systems in commercial facilities, including diffusers
 - improvement to ventilation systems in commercial facilities
 - improvement of thermal performance of a commercial building envelope
 - ability to apply the knowledge of 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 to commercial facilities
 - 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 commercial facilities

- commercial facilities climate control saving opportunities
- conducting thermal performance assessment of a commercial facilities
- food storage services 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 anti-sweat heaters, seals, insulation, compressor efficiency and age
 - refrigerator and freezer star ratings
 - cold room and freezer room energy saving opportunities
 - food storage saving opportunities
- food preparation services 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 and efficient design
- water heating services 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
 - renewable energy certificates (RECs) and standard test conditions (STCs) and how these relate to solar water heater STCs
 - 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
 - commercial water heating saving opportunities
 - types of entertainment and administration appliances found in commercial residences
- entertainment and administration services and efficient design encompassing:
 - appliance standby power, including the different mode, passive and active standby
 - appliance energy star ratings
 - minimum energy performance standard (MEPS) and labelling requirements for televisions
 - network standby management strategies

- computer energy consumption, including computer power management
- entertainment and administration saving opportunities
- cleaning services 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
 - commercial cleaning saving opportunities
- pumping systems (and pools) and efficient design encompassing:
 - pumping services in relation to commercial 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
 - operating of commercial pools in terms of pool pumps, pool backwashing, cartridge filters, pools turnovers, pool water use and pool heating
 - energy efficiency pool systems design methodology
 - energy efficiency hot water, chilled and condenser water pumping systems
 - commercial pool systems saving opportunities
- smart metering solutions encompassing:
 - benefits of the different metering available to the commercial sector
 - metering opportunities relation to commercial sector
- RE (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
 - solar power system utility approval process
 - balance of systems, rules of thumb, shading, orientation and shading of strings in an on grid solar power system
 - solar PV energy calculations and calculate REC entitlement for a small solar PV system
 - different feed-in tariff schemes and how they apply to solar PV
- energy audit system encompassing:
 - commercial facilities energy audit forms and legend
 - conducting energy and water audit for the commercial sector

- commercial facilities sector energy audit report
- effective communication techniques
- personal performance agreement and/or workplace/industry standards
- problem-solving techniques
- relevant manufacturer specifications
- relevant job safety assessments or 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.

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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