



Australian Government

UEERE0004 Assess energy loads and uses for energy efficiency in industrial properties and enterprises

Release: 1

UEERE0004 Assess energy loads and uses for energy efficiency in industrial properties and enterprises

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 assess energy loads, undertake energy audits of industrial properties and enterprises, evaluate the energy efficiency of the facilities and make recommendations on design implementations.

It includes working safely, applying knowledge of industrial 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 industrial properties and enterprises for energy**

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 procedures for relevant work area are identified, obtained and

efficiency evaluation	applied
1.2	Hazards are identified, 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 industrial properties and enterprises for energy efficiency evaluation	2.1
	WHS/OHS risk control work measures and workplace 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 is monitored against performance agreement and/or workplace procedures and industry standards
3 Document assessment of industrial properties and enterprises 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
- 3.5** Energy efficiency is assessed and documented according to relevant industry codes, standards and regulations

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 industrial properties/enterprises

Unit Mapping Information

This unit replaces and is equivalent to UEENEEK155A Assess energy loads and uses for energy efficiency in industrial properties and enterprises.

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 UEERE0004 Assess energy loads and uses for energy efficiency in industrial properties and enterprises

Modification History

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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 instructions for implementation of solutions that incorporate risk control measures 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 industrial properties and enterprises for energy efficiency evaluation
- 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 best practice energy and water star ratings

- calculating energy balance for industrial 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 industrial properties, including:
 - conducting thermal energy performance assessment and a water audit of an industrial facility
 - considering energy loads when determining strategies
 - dealing with unplanned events/situations in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
 - determining strategies to ensure energy efficient solutions are developed and implemented
- communicating effectively with relevant stakeholders
- deploying a power and energy monitoring strategy in an industrial facility
- developing a single line schematic of electrical system and a power and energy monitoring strategy for an industrial facility
- establishing the power and energy data gap from the energy audit to achieve Australian Standard compliant energy audits
- explaining the operation of seven different power and energy monitoring equipment available
- identifying the structure and purpose of power and energy data recording for whole systems and equipment and electrical loads that need to contribute more than 5% of energy use
- identifying potential energy savings from application of energy management
- planning assessment activities/audits to meet scheduled timelines
- reporting on communication of energy audit results and power and energy data collection in an industrial facility.

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:

- industrial properties and enterprises energy efficiency assessment, including:
 - energy management, legislation and regulation relevant to industrial properties and enterprises encompassing:
 - national Building Code of Australia (BCA)
 - Standards Australia for energy auditing
 - state/territory-based legislation for energy management in business
 - energy efficiency opportunities Act
 - state/territory energy reporting schemes
 - minimum renewable energy (RE)
 - RE credits

- small technology credits
- water supply and use encompassing:
 - collection and analysis of information for industrial facilities water use and methods to improve water efficiency in the industrial facilities
 - ability to analyse the water consumption index for different industrial sectors
 - ability to analyse Industrial facilities water use and ways to minimise the use of water
 - understanding on the methodology applied to water savings
 - calculate water star rating
- environmental context – greenhouse gas emissions, 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 industrial sector
 - breakdown of water consumption in the Australian industrial 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 industrial 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 industrial tariff types
- calculating 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 an industrial facilities energy audit
- gathering information on industrial facilities energy use and costs
- risks and hazards associated with an industrial facilities energy audit
- calculating energy and power
- power rating of equipment and metering and measurement in industrial facilities energy audits
- calculating energy balance for industrial 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:
 - structure and purpose of power and energy data recording for whole systems and equipment
 - review or develop single line schematic of an electrical system of an industrial 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
 - the implications of data recording intervals for monitoring equipment
 - develop a power and energy monitoring strategy for an industrial facility
 - deploy industrial facility power and energy monitoring strategy
 - draw conclusions and report on power and energy data collection in an industrial 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
- industrial facility water meter reading
- trends of water use and charges for industrial facilities
- water efficiency labelling (WELS) scheme as it relates to water auditing
- identification of water efficiency opportunities in industrial 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 industrial 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, industrial fluorescent lighting, metal halide, mercury vapour and comparisons between these and applications for the industrial facilities
 - application of lighting methodology for best practice energy efficiency design
 - energy saving lighting opportunities in the industrial 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, through wall/window and portable units
 - improvement to air movement systems in Industrial facilities, including diffusers
 - improvement to ventilation systems in industrial facilities
 - improvement of thermal performance of an industrial 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 industrial facilities
 - gas and electric heating options and air (ducted) heating
 - operation of an air conditioning system and components, 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 industrial facilities
- industrial facilities climate control saving opportunities
- conducting thermal performance assessment of industrial facilities
- product storage services and efficient design encompassing:
 - industrial refrigeration system basic operation
 - different industrial refrigeration chilling methods and system elements
 - industrial refrigeration characteristics including operation, cooling and heat loads calculations, and operational performance
 - factors that impact on industrial refrigeration energy use, including size, configuration temperature setting, heat load, cooling time, seals, insulation, compressor efficiency and age
 - industrial cold rooms and freezer rooms energy saving opportunities
 - product 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, and 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 pipework and fitting insulation, atmospheric conditions, water efficiency, temperature setting, and maintenance and operation
 - water heating/cooling calculations
 - EMI water heating methodology
 - industrial water heating saving opportunities
 - types of entertainment and administration appliances found in industrial 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 standards (MEPS) and labelling requirements for televisions
 - network standby management strategies

- computers energy consumption including computer power management
- entertainment and administration saving opportunities
- industrial services and efficient design encompassing:
 - compressed air, hydraulic and steam systems
 - overview of industrial services in relation to industrial sector
 - compressed air, hydraulic and steam system selection and design
 - compressed air, hydraulic and steam system theory, energy balance for a typical system in industrial processes
 - energy efficiency pumping compressed air, hydraulic and steam systems design methodology
 - energy efficiency compressed air, hydraulic and steam systems
 - industrial pumping compressed air, hydraulic and steam systems saving opportunities
- industrial cogeneration services and efficient design encompassing:
 - cogeneration systems
 - overview of industrial cogeneration systems in relation to industrial sector
 - cogeneration system selection and design
 - cogeneration system theory, energy balance for a typical system in industrial processes
 - energy efficiency cogeneration systems design methodology
 - energy efficiency cogeneration systems
 - industrial cogeneration systems saving opportunities
- pumping systems (and pools) and efficient design encompassing:
 - pumping services in relation to industrial 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 water pumps in industrial processes
 - energy efficiency pumping systems design methodology
 - energy efficiency pumping systems
 - industrial pumping systems saving opportunities
- smart metering solutions encompassing:
 - benefits of the different metering available to the industrial sector
 - metering opportunities relation to industrial sector
- RE (solar photovoltaic (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:
 - industrial facilities energy audit forms and legend
 - conducting energy and water audit for the industrial sector
 - industrial facilities sector energy audit report
- effective communication techniques
- RE (solar PV) systems
- 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 WHS/OHS legislated requirements
- relevant workplace policies and procedures
- risk mitigation process
- 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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