

UEERE0004Y 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.

This unit replaces and is not equivalent to UEERE0004 Assess energy loads and uses for energy efficiency in industrial properties and enterprises. Modifications include:

- Update to application
- Prerequisite changed
- Element titles amended
- Performance criteria removed and added
- Range of conditions updated
- Updates to performance and knowledge evidence requirements and CVIG content developed.

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

UEERE0014 Develop strategies to address sustainability issues for electrical installations

Competency Field

Renewable Energy

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS

Elements describe the essential outcomes.

PERFORMANCE CRITERIA

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

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| <p>1 Prepare to assess energy efficiency of industrial properties and enterprises</p> | <p>1.1 Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace processes and procedures are identified and applied</p> <p>1.2 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</p> <p>1.3 Energy assessment activities/audits are planned to meet scheduled timelines in consultation with others involved in the work</p> <p>1.4 Strategies are determined to ensure energy efficient solutions are developed and implemented in accordance with industry standards and workplace procedures</p> |
| <p>2 Assess and evaluate energy efficiency of industrial properties and enterprises</p> | <p>2.1 Information on energy use, any onsite energy generation and energy costs are gathered and recorded</p> <p>2.2 Main sources of energy use are identified, measured and recorded</p> <p>2.3 Information about activities undertaken at facility, and their impact on energy efficiency, is gathered and recorded</p> <p>2.4 Industry/government initiatives/programs to support energy efficiency are identified and evaluated</p> <p>2.5 Energy loads are considered when developing energy efficient strategies to address and minimise energy use</p> <p>2.6 Parameters, specifications and performance requirements in relation to energy use are set in accordance with workplace procedures</p> |

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| | 2.7 | Approaches/strategies to resolving and minimising energy use are analysed to provide the most effective solutions in accordance with workplace procedures |
| | 2.8 | Energy, emissions and cost savings to be gained by implementing measures for improving energy efficiency are estimated and documented |
| 3 Document energy efficiency assessment of industrial properties and enterprises | 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 manufacturing/industrial properties/enterprises

Unit Mapping Information

This unit replaces and is not equivalent to UEERE0004 Assess energy loads and uses for energy efficiency in industrial properties and enterprises.

Links

UEE - Electrotechnology Training Package Companion Volume Implementation Guide at:
[sector webpage link here]

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Assessment Requirements for UEERE0004Y Assess energy loads and uses for energy efficiency in industrial properties and enterprises

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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 two occasions and include:

- applying relevant workplace procedures and practices, work health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk control measures
- performing energy use assessments and identifying efficiency improvements for industrial properties and enterprises in accordance with the range of conditions
- documenting and presenting final recommendations.

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. Additional advice and definitions for some items is provided in the UEE Training Package Companion Volume Implementation Guide (CVIG).

- relevant WHS/OHS legislated requirements, job safety assessments or risk mitigation processes and types of personal protective equipment (PPE) to be used when conducting on-site assessments of industrial properties and enterprises energy use
- alternative energy production and storage technologies applicable to industrial properties and enterprises
- energy ratings and power consumption of appliances and equipment and how they are calculated
- energy types and units of measurement
- key requirements of relevant codes, standards, regulations and government incentive programs for industrial property and enterprise energy efficiency
- major systems and other sources of industrial property and enterprise energy use including:
 - cooking
 - refrigeration
 - washing and drying

- home entertainment and home office equipment
- heating, cooling and ventilation
- internal and external appliances
- swimming pools and spas
- water heating
- water pumps
- building management systems
- use of renewables and energy storage
- electric vehicles
- process heat/water/steam
- compressed air
- power factor correction
- peak demand charge
- manufacturing equipment
- variable speed drives
- industrial/commercial lighting
- industrial/commercial ventilation
- methods for interpreting energy bills including: actual and estimated bills, plans and tariffs
- strategies for improving industrial property and enterprise energy efficiency including impact of building design, proximity and orientation on heating/cooling energy use, upgrade options and behavioural changes
- trends in energy use and emissions
- water supply, use, auditing services and design
- greenhouse gas emissions, ecological impacts and resource use
- energy management, legislation and regulation relevant to industrial properties and enterprises
- energy auditing and practice
- energy management
- power and energy data monitoring and recording
- lighting services and efficient design
- thermal performance and climate control
- food storage and preparation services and efficient design
- water heating services and efficient design
- entertainment and administration services and efficient design
- cleaning services and efficient design
- pumping systems (and pools) and efficient design
- smart metering solutions
- renewable energy (solar PV/energy storage)
- types and uses of energy measuring tools.

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.

Links

UEE - Electrotechnology Training Package Companion Volume Implementation Guide at:
[sector webpage link here]

Companion Volume Implementation Guide (CVIG) Content

Greenhouse gas emissions, ecological impacts and resource use may include:

- 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 may include:

- 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 renewable energy
- 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
- Calculate 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 auditing and practice may include:

- 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
- 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 industrial facilities energy audit.
- gathering information on industrial facilities energy use and costs
- Risks and hazards associated in a industrial facilities energy audit.

- Calculate energy and power
- Power rating of equipment and metering and measurement in a industrial facilities energy audit.
- Calculate energy balance for industrial facilities
- Advice on ways to improve energy efficiency
- Calculate greenhouse emission, 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 audit system

Energy management may include:

- 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 monitoring and recording may include:

- 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 industrial facility
- Establish the power and energy data gap from the energy audit in T7 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 industrial facility
- Deploy industrial facility power and energy monitoring strategy
- Draw conclusions and report on power and energy data collection in a industrial facility

Water supply, use, auditing services and design may include:

- collecting and analysis of information for industrial facilities water use and methods to improve water efficiency in the home
- ability to analyse the water consumption index for different industrial sectors.

- ability to analyse industrial facilities water use and ways to minimize the use of water.
- understanding on the methodology applied to water savings
- calculate water star rating 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 rain water and grey water systems
- Factors that impact on landscape water demand

Lighting services and efficient design may include:

- 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, 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 may include:

- 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 (RAC), 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 a industrial building envelop elements
- 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 describe each 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 a industrial facilities

Food storage and preparation services and efficient design may include:

- 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
- Cold room and freezer room energy saving opportunities
- Food storage saving opportunities
- 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 may include:

- different water heaters including electric and gas storage, gas instantaneous (continuous flow), electric heat pump and solar hot water heaters

	<ul style="list-style-type: none"> • solar water heater configurations and characteristics including passive (or thermo siphon) systems and active (or pumped) systems solar collector types, one shot booster • RECs and 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 & operation • Water heating / cooling calculations • EMI water heating methodology • industrial water heating saving opportunities • types of entertainment and administration appliances found in industrial facilities
Entertainment and administration services and efficient design may include:	<ul style="list-style-type: none"> • appliance standby power including the different mode; passive and active standby • appliance energy star ratings • MEPS and labelling requirements for televisions • Network standby management strategies • Computers energy consumption including computer power management • Entertainment and administration saving opportunities
Cleaning services and efficient design may include:	<ul style="list-style-type: none"> • clothes washers 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 • industrial cleaning saving opportunities
Pumping systems (and pools) and efficient design may include:	<ul style="list-style-type: none"> • 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 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
- pool systems saving opportunities

Smart metering solutions may include:

- benefits of the different metering available to the industrial sector
- metering opportunities relation to industrial sector

Renewable energy (solar PV) may include:

- 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