

UEERE5001Y Design grid-connected battery storage systems

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 UEERE5001 - Design battery storage systems for grid-connected photovoltaic systems. Modifications include:

- Unit title changed
- Unit application updated
- Prerequisites changed
- Amendments made to Elements and Performance Criteria
- Range of conditions updated
- Significant amendments to performance and knowledge evidence requirements and CVIG content developed
- Assessment conditions updated

Application

This unit involves the skills and knowledge required to design battery storage systems.

This unit applies to a person with a sound knowledge of the components and different system configurations of battery storage systems for grid-connected photovoltaic (PV) systems and suitable energy management strategies that can be applied to the site where a system can be installed.

A person competent in this unit will be able to design a system, which includes calculating and selecting the correct sized equipment so the system output performance meets the client specific objectives within the guidelines of relevant industry standards, regulations and manufacturer requirements.

The unit involves designing a system taking into consideration all necessary work health and safety requirements relevant for the selected system and documenting the design including all calculations, equipment specifications and layouts.

Licensing, legislative or certification requirements that apply to this unit may differ between jurisdictions and system types. They should be checked prior to commencing this unit.

Pre-requisite Unit

UEERE9999Y Conduct site survey for grid-connected photovoltaic and battery storage systems and

UEEEL0039 Design, install and verify compliance and functionality of general electrical installations

or

UEERE9993Y Apply electrical principles to renewable energy design

Competency Field

Renewable and Sustainable Energy

Unit Sector

Electrotechnology

Elements and Performance Criteria

Elements describe the essential outcomes.

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

1 Prepare to design grid-connected battery storage systems

1.1 Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures are identified and applied

1.2 Potential grid-connected battery storage system options are determined from interpretation of site survey and available information

1.3 People or organisations involved in the design and installation are identified and roles clarified

1.4 Industry regulations, legal obligations and job requirements are identified and applied to work in accordance with workplace procedures

2 Develop a grid-connected battery storage system design

2.1 Grid-connected battery storage system, performance standards and compliance methods are applied to the design development

2.2 Safety, functional and budgetary considerations are incorporated in design

- 2.3** Grid-connected battery storage system design draft is checked for compliance with the design brief, industry standards and regulations, job requirements and workplace procedures
- 2.4** Grid-connected power supply system design is documented and submitted in line with industry standards and regulations, job requirements 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 can be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is not equivalent to UEERE5001 - Design battery storage systems for grid-connected photovoltaic systems

Links

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

Assessment Requirements for UEERE5001Y Design grid-connected battery storage systems

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 UEERE5001 - Design battery storage systems for grid-connected photovoltaic systems. Modifications include:

- Unit title changed
- Unit application updated
- Prerequisites changed
- Amendments made to Elements and Performance Criteria
- Range of conditions updated
- Significant amendments to performance and knowledge evidence requirements and CVIG content developed
- Assessment conditions updated

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two separate 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
- developing grid-connected battery storage system design based on site survey data and within safety and functional requirements and budget limitations and meet design brief
- documenting and presenting final design.

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

- batteries including:
 - meaning of the terms that define aspects of batteries including:
 - cell
 - battery

- nominal voltage
- amp hour capacity
- watt hour capacity
- charge and discharge rate
- fault/short-circuit current
- useable capacity
- depth of discharge (DOD)
- state of charge (SOC)
- cycle life
- useable capacity
- hazards associated with batteries and risk control measures
- major features of batteries suitable for grid-connected systems
- factors affecting the life of batteries
- common reasons for failure of batteries
- charging regimes suitable for batteries
- procedures for safe disposal and recycling of batteries
- battery storage energy demand including:
 - load profiles illustrating average demand and maximum demand, based on appliances required during grid outages or during periods of high tariffs
 - total energy demand including:
 - energy required during periods of high tariffs
 - length of time of typical or expected grid outage
- grid connected battery storage systems including:
 - applications for battery storage including:
 - electrical energy supply direct to loads during periods of high tariffs
 - electrical energy supply during grid outages
 - network / aggregator provider requirements
 - communications, monitoring and metering
 - objectives of grid-connected battery storage
 - purpose of each component in a battery storage system for grid-connected PV system
 - typical configurations of battery storage systems for grid-connected PV systems
- types and applications of charge controllers
- diagrams including:
 - single line diagrams of battery storage systems for grid-connected PV systems including modifications to switchboard to cater for specified loads
 - site diagrams to show the locations of equipment, fittings and cabling
- energy management strategies
- power conversion equipment including:
 - differences between multimode and grid-connected

- output rating of multimode in relation to:
 - capacity for battery charging
 - required maximum demand
- program parameters for a multimode for the correct operation of the system
- blackout protection
- system design including:
 - determining the system components, performance and warranty
 - size and selection of the battery storage to meet the system performance requirements
 - selecting and sizing the balance of system components to meet relevant industry standards, regulations and manufacturer requirements
 - determining labelling to meet relevant industry standards, regulations and manufacturer requirements
 - maintenance requirements to meet relevant industry standards, regulations and manufacturer requirements
 - documentation requirements to meet relevant industry standards, regulations and manufacturer requirements
- Network / aggregator provider requirements
- WHS/OHS policy, workplace procedures and instructions.

Assessment Conditions

As a minimum, assessors must satisfy applicable regulatory requirements, which include requirements in the Standards for Registered Training Organisations, current at the time of assessment.

As a minimum, assessment must satisfy applicable regulatory requirements, which include requirements in 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:

- relevant industry standards
- relevant industry product standards
- AS/NZS 3000 Electrical installations (known as the Australian/New Zealand Wiring Rules)
- applicable documentation including:
 - energy assessment forms
 - examples of typical client objectives and site specific details

- manufacturer data sheets, installation manuals and user guides
- circuit diagrams
- relevant industry standards and regulations
- solar resource data and electricity tariffs.

Assessment must include the design of battery storage systems for grid-connected PV systems that meet the specific requirements of the client within the guidelines of relevant Australian Standards, including designs for new and retrofit installations.

Links

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

Companion Volume Implementation Guide (CVIG) Content

System performance may include:

- return on investment
- virtual power plants

Network / aggregator provider requirements

- May differ between providers

Typical configurations of battery storage systems for grid-connected PV systems may include:

- multimode inverter/s for connecting to renewable energy, grid, loads and battery storage; this inverter/s provide backup to dedicated loads on grid failure and may:
 - have a built in charge controller for direct connection of a PV array or
 - require a separate charge controller to direct current (DC) couple the PV array and battery
- two types of inverters comprising, photovoltaic grid-connected inverters and multimode inverters where:
 - both inverter types are connected to the grid and loads via a switching device that provides backup to dedicated loads during grid failure
 - both inverter types are connected to the grid and only the multimode inverter/s provide backup to dedicated loads on grid failure
 - only the multimode inverter/s are connected to the grid; the grid-connected inverter/s are alternating current (AC) coupled to the multimode inverter/s and both types can provide backup to dedicated loads on grid failure

Energy management strategies may include:

- energy source switching options to reduce the maximum and surge demand, based on load profile analysis
- heat pumps
- tariff optimisation