Australian Government

Assessment Requirements for UEERE0063 Design off-grid photovoltaic/generating set systems

Release: 1

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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 UEERE0031 Design stand-alone renewable energy (RE) systems. Modifications include:

- Unit title changed
- Unit application updated
- Prerequisites changed
- Significant amendments made to Elements and Performance Criteria
- Range of conditions updated
- Significant amendments to Performance and Knowledge Evidence
- 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, 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
- developing off-grid PV/genset systems 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:

- off-grid PV/genset system design, including:
  - power and energy usage analysis and projected use including maximum demand and surge demand
  - determining the available solar resource
  - incorporating fuel generating plant
  - selecting off grid PV system configuration
  - determining the system operation

- component selection including:
  - selected system configuration and operation requirements
  - matching component rating to required and projected power/energy usage
  - matching power, voltage and current of the individual system components
  - intended installation environment
  - maintenance and serviceability requirements
- selecting cabling, circuit protection and switching requirements in accordance to relevant Australian standard
- off grid PV system installation requirement in accordance with relevant Australian standards and manufacturers requirements
- schematic and wiring diagrams for the off grid PV/genset system showing the general circuit layout and protection between the various system components
- installed capital and life cycle costs of selected system configuration
- energy storage design
- system control requirements and configuration
- fuel storage requirements
- autonomy factors
- solar resource including:
  - peak sun hours, irradiance, irradiation, latitude, azimuth and altitude angles, tilt angle
  - interpretation of solar irradiation data
  - how irradiation varies throughout the year on the surface of a fixed collector
  - effect on solar resource of tracking
- PV modules, including:
  - cell, module, array
  - types, efficiencies and their typical applications
  - mechanical and electrical features necessary for the long life of a PV module
- module characteristics including:
  - I-V curve, operating point, maximum power point (MPP), power and voltage temperature co-efficient, Standard Test Conditions (STC), nominal operating cell temperature (NOCT)
  - major ratings of a PV module from manufacturer's information or nameplate data
  - configuration of a typical PV array
  - the effect of partial shading of a PV module or array
  - effect of temperature on module power output
  - function of blocking and bypass diodes
  - factors affecting the optimal tilt and orientation of PV arrays
- power conversion equipment (PCE) including:
  - types of PCEs used in renewable energy systems
  - the basic function of a PCE
  - PCE operation

    - PCE characteristics
- generating sets including:
    - types of generating sets
    - the basic function of a generating set
    - generating set operation
    - generating set characteristics
- 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
    - hazards associated with batteries and risk control measures
    - major features of batteries suitable for off-grid 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
- environmental considerations and required approvals
- relevant WHS/OHS requirements, job safety assessments or risk mitigation processes
- relevant manufacturer specifications.

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 suitable workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated suitable 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, design tasks and/or simulations
- relevant and appropriate materials, tools, facilities and equipment currently used in industry
- resources that reflect current industry practices in relation to designing stand-alone RE systems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6