

Course outline: S03 Solar Design K135A
UEENEEK135A Design grid connected photovoltaic power supply systems

Qualification:	Statement of Attainment issued on successful completion
Applicable to:	Learners, industry/employers, governments, community and Global Energy Training Solutions as the provider
Unit of competency:	Accessible from: http://training.gov.au/Training/Details/UEENEEK135A
Related policies:	<p>Policy & Procedure 1 – Enrolment Policy</p> <p>Policy & Procedure 2 – Credit Transfer & Recognition of Prior Learning</p> <p>Policy & Procedure 3 – Learner Support</p> <p>Policy & Procedure 4 – Assessment</p> <p>Policy & Procedure 5 – Academic Misconduct</p> <p>Policy & Procedure 6 – Alcohol & Other Drugs</p> <p>Policy & Procedure 7 – Access, Equity & Diversity</p> <p>Policy & Procedure 8 – Vulnerable People</p> <p>Policy & Procedure 9 – Work, Health & Safety</p> <p>Policy & Procedure 10 – Incident, Injury & Rehabilitation</p> <p>Policy & Procedure 11 – Competency, & Qualification Assessment Decisions</p> <p>Policy & Procedure 12 – Complaints & Appeals</p> <p>Policy & Procedure 13 – Privacy</p> <p>Policy & Procedure 14 – Fees</p> <p>Policy & Procedure 15 – Industry & Employer Engagement</p> <p>Policy & Procedure 16 – Trainers & Assessors</p> <p>Policy & Procedure 17 – Administration & Other Staff</p> <p>Policy & Procedure 18 – Quality Assurance</p> <p>Policy & Procedure 19 – Business & Financial Risk Management</p> <p>Policy & Procedure 20 – Changes to Qualifications or Business</p> <p>Policy & Procedure 21 – Conflict of Interest</p> <p>Policy & Procedure 22 – Records Management</p> <p>Policy & Procedure 23 – Marketing & Advertising</p>
Monitor and review:	Policy and Procedure 18 – Quality Assurance
Responsibility:	Ben Murphy – as Proprietor
Questions/queries:	Feedback and suggestions welcomed: office@gets.com.au (+61) 02 6262 0077

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1. Material requirements

- Internet access (provided)
- Scientific calculator, ruler, pens and pencils
- Note book
- Hand tools
- Covered footwear

2. Course formats

(1.5 days total, 5 days for all 3 units of Competency)

Weekend course (over 4 weekends)				Weekday course – Block (over 1 week)			
Session	Times	Time of day	Week day	Session	Times	Time of day	Week day
(Following Solar Install)				(Following Solar Install)			
Session 1	8 am – 12 pm	All day	Saturday	Session 1	1 pm – 4 pm	Afternoon	Thursday
Session 2	1 pm – 4 pm			Session 2	8 am – 12 pm	All day	Friday
Session 3	5 pm – 8:30 pm	Evening	Friday	Session 3	1 pm – 4 pm		

Weekday course – 1 day per week (over 5 weeks)				Other pathways
Session	Times	Time of day	Week day	
(Following Solar Install)				RPL and Assessment only pathways available by application.
Session 1	1 pm – 4 pm	Afternoon	TBA	
Session 2	8 am – 12 pm	All day	TBA	
Session 3	1 pm – 4 pm			

3. Session activities/tasks

Session	Length	Description			
Session 1	3 - 4 hours	Slide set 1 of 2	Work sheet 1 of 5	Work sheet 2 of 5	Work sheet 3 of 5
Session 2	3 - 4 hours	Slide set 2 of 2	Work sheet 4 of 5	Work sheet 5 of 5	Theory assessment
Session 3	3 - 4 hours	Practical assessment		Simulated work place assessment	

4. Slide sets

Item	Description	When
Slide set 1 of 2	System design - inverters	Session 1
Slide set 2 of 2	System design - other	Session 2

5. Work sheets

Item	Description	When
Work sheet 1 of 5	Selection of inverters based on constraints	Session 1
Work sheet 2 of 5	Selection of inverters based on size of array	Session 1
Work sheet 3 of 5	Maximum and minimum number of modules in a string	Session 1
Work sheet 4 of 5	Required protection	Session 2
Work sheet 5 of 5	Energy yield	Session 2

6. Assessments

Assessment	Description	When	Pass mark
Theory assessment	Multiple choice theory assessment	Session 2	70% overall, 50% in each Competency Point section
Practical assessment	Research legislation and provide references	Session 2	70%
Simulated work place assessment	Risk assessment of a given scenario	Session 2	100%

Note: Once theory, practical and simulated work place assessments are complete, competency assessment decisions can be made in conjunction with the learner, registered training organisation and employer where applicable.

7. Version control

Version	Date of release	Author	Authorised by	Position	Reason for change
V2	7/2/2017	Ben Murphy	Ben Murphy	Proprietor	Initial release. Version number consistent with full Course outline review version release.

8. Detailed session breakdown

GETS Competency Point Number and Description		Covered in session No #	Training materials		Assessments materials 'Y' for 'N'		
			Slide set No #	Worksheet No #	Theory Questions	Practical Questions	Simulated Workplace
IC1	Describe the basic characteristics of an inverter	K135A	-	-	-	Y	-
IC2	Identify the Australian standard symbol for a low voltage inverter.	K135A	-	-	-	Y	-
IC3	Describe the essential properties for grid connected inverters.	K135A	-	-	-	Y	-
IC4	Label the block diagram of a grid connected inverter.	K135A	-	-	-	Y	-
IC5	Using a switch analogue, describe an inverter's basic operating principles.	K135A	-	-	-	Y	-
IC6	Describe the basic features of FET switched inverters.	K135A	-	-	-	Y	-
IC7	Measure an inverter's parameters under various loads.	K135A	-	-	-	Y	-
IC8	Describe the basic features of PWM techniques.	K135A	-	-	-	Y	-
IC9	Identify the waveforms of square, modified square and sine wave inverters.	K135A	-	-	-	Y	-
IC10	Identify the typical output voltages and periodic times in IC9.	K135A	-	-	-	Y	-
IC11	List the 6 essential specifications for typical grid connected inverters.	K135A	-	-	-	Y	-
C1	Define declination angle, reflectance, sunshine hours, extraterrestrial irradiation.	K125A	-	-	-	Y	-
C2	Suggest energy reduction methods that could be used on a new installation.	1	1	-	-	N	Y
C3	Determine OHS and other regulatory requirements and risks that are used in a work site.	K125A	-	-	-	N	-
C4	Determine the site's solar potential, including any shading effects.	K125A	-	-	-	N	Y
C5	Determine the available area for the solar array.	1	1	-	-	Y	-

GETS Competency Point Number and Description		Covered in session No #	Training materials		Assessments materials 'Y' for 'N'		
			Slide set No #	Worksheet No #	Theory Questions	Practical Questions	Simulated Workplace
C6	Determine the roof's suitability for a specific array mounting method.	K135A	-	-	-	-	Y
C7	Determine the possible locations for switchboards, junction boxes & inverters.	K135A	-	-	-	-	Y
C8	Using the design brief, information gained in C4 to C7 and work timelines, prepare a plan to complete an installation.	-	-	-	-	-	Y
C9	Examine cable routing and estimate cable lengths needed from information in C8.	K135A	-	-	-	-	Y
C10	With the owner, determine if monitoring panels or screens are required.	1	1	-	-	-	Y
C11	Size and select possible inverter types and configurations, using data in C8.	1	1	1	Y	Y	Y
C12	Calculate the maximum and minimum number of modules in a string for the specified voltage	1	1	3	Y	Y	Y
C13	Determine the type and size of protection and isolation equipment required.	2	2	4	Y	Y	Y
C14	Calculate the expected energy yield performance for a planned installation.	2	2	5	Y	Y	Y
C15	Identify AS 4777 and AS 5033 requirements that must be followed in a planned installation.	K135A	-	-	-	Y	-
C16	Identify any economic, financial, contractual considerations impacting a new installation.	2	2	5	-	-	Y
C17	Estimate the annual reduction in greenhouse gas emissions, when using an installation.	2	2	5	-	-	Y
C18	Identify the components in a block diagram of a PV-grid connected system.	K135A	-	-	Y	-	-
C19	Explain the term "anti-islanding" .	2	2	-	Y	-	-
C20	Explain the typical safety features used in grid connected inverter systems, including synchronisation, power flow control and metering.	2	2	-	Y	Y	-
C21	Read and use schematic diagrams of grid connected inverter circuits as per AS 4777.1.	K135A	-	-	-	Y	-
C22	Calculate the cell's temperature dependant operating window of an inverter.	2	2		Y	-	Y

GETS Competency Point Number and Description		Covered in session No #	Training materials		Assessments materials 'Y' for 'N'		
			Slide set No #	Worksheet No #	Theory Questions	Practical Questions	Simulated Workplace
C23	Select and size an inverter based on an array's output.	1	1	2	Y	-	-
C24	Use labels and signs as set out in AS 4777.1	K135A	-	-	Y	-	-
C25	Describe the main features of a UPS system	2	2	-	Y	-	-
C26	Describe the requirements for UPS systems as specified in AS4777.1.	2	2	-	Y	-	-
C27	Monitor the quality of work against the design brief.	2	2	-	Y	-	-