

Model Curriculum

Solar Site In-charge

SECTOR: GREEN JOBS
SUB-SECTOR: RENEWABLE ENERGY
OCCUPATION: INSTALLATION AND COMMISSIONING
REF ID: SGJ/Q0113, V1.0
NSQF LEVEL: 6



Certificate

CURRICULUM COMPLIANCE TO QUALIFICATION PACK – NATIONAL OCCUPATIONAL STANDARDS

is hereby issued by the

SKILL COUNCIL FOR GREEN JOBS

for the

MODEL CURRICULUM

Complying to National Occupational Standards of Job Role/
Qualification Pack: **'Solar Site In-Charge'** OP No. **'SGJ/Q 0113 NSQF Level 6'**

Date of Issuance: **October 16th, 2017**

Valid up to: **September 30th, 2019**

* Valid up to the next review date of the Qualification Pack



Authorised Signatory
(Skill Council for Green Jobs)

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Solar Site In-charge

CURRICULUM / SYLLABUS

This program is aimed at training candidates for the job of a “Solar Site In-charge”, in the “Green Jobs” Sector/Industry and aims at building the following key competencies amongst the learner

Program Name	Solar Site In-charge		
Qualification Pack Name & Reference ID.	SGJ/Q0113, v1.0		
Version No.	1.0	Version Update Date	01 th Aug 2017
Pre-requisites to Training	B.E. / B.Tech. (Civil/Mechanical/EEE/Instrumentation/Construction Management) with 3 years' experience in solar PV power plant installation and commissioning or M.Tech. / MBA with 1 year of experience in solar PV power plant installation and commissioning		
Training Outcomes	After completing this programme, participants will be able to: <ul style="list-style-type: none"> • Manage installation and commissioning of solar PV power plant at site • Maintain personal health & safety at project site • Work effectively with others 		

This course encompasses 3 out of 3 National Occupational Standards (NOS) of “Solar Site-In-charge” Qualification Pack issued by “Skill Council for Green Jobs”.

S. No	Module	Key Learning Outcomes	Equipment Required
1	Introduction to Solar PV Sector in India Theory Duration (hh:mm) 12:00 Practical Duration (hh:mm) 12:00 Introduction Module	<ul style="list-style-type: none"> • overview of solar PV technology • overview of ground mount solar sector in India • understand the various market research reports and industrial magazines present in the market • type of ground mount PV Power Plants and working principles • overview of Rooftop Solar Sector in India • type of Rooftop Solar PV Power Plants and working principles • solar energy and power sector landscape in the country • identify tools and methodology to do site survey • typical specifications, functioning, operating principle, maintenance requirements, handling procedures and warranties of different types of solar PV plant components like PV modules, inverters, cables, junction boxes, monitoring system and other components • types of foundations of various components depending on the roof structure and its appropriateness for installing a solar PV power plant • types of foundations of various components depending on the different types of soils and its appropriateness for installing a solar PV power plant 	
2.	Preparing before initiating construction at site Theory Duration (hh:mm) 12:00 Practical Duration (hh:mm) 06:00 Corresponding NOS Code SGJ/N0135	<ul style="list-style-type: none"> • obtain copies of all required permits/ approvals for construction including permission for grid connectivity • read & interpret design and detailed drawings of the civil, mechanical and electrical works to be carried out at site • manage overall procurement & installation schedule on site • check copy of the transportation insurance of each equipment ordered • check copy of sequencing, logistics and mobilization plan of the project 	Computer Lab, Licensed Project management software

<p>3.</p>	<p>Managing schedule for installation</p> <p>Theory Duration (hh:mm) 12:00</p> <p>Practical Duration (hh:mm) 18:00</p> <p>Corresponding NOS Code SGJ/N0135</p>	<ul style="list-style-type: none"> ensure that the approach road to the site is constructed ensure to get the project area leveled and graded as per plan for ease of construction and drainage of water, respectively ensure that the water and sanitation facilities are created for the engineers, sub-contractors and staff ensure unloading and transporting facilities in place ensure that the office, store and welfare accommodation is constructed mark the complete layout of the plant on the land locating each and every component including internal roads, solar module arrays mounting structures and the walkways between those, inverter, transformer, control room, substation, switchyards and transmission towers etc. Ensure adherence to the schedule for each of the civil and mechanical construction activity i.e. construction of internal roads, construction of foundations for mounting module support structures, combiner boxes, inverters, transformers, and substation etc. obtain all the material and equipment received at site and inspect for any physical damage and in case of damage, inform the supplier for service/replacement and help him in filling claim with insurance company ensure safe handling of the materials onsite and obtain the specifications of the material and equipment on the name plate checked with the order copy and take it up with the supplier in case of mismatch manage schedule for installation of module structures and modules, installation of inverters, transformers, piles, DC / AC power protection devices, lightning arresters, earthing systems as per design, and substation, switchyard, transmission towers as per the grid codes and regulatory provisions supervise the interconnection of modules as per string design, connect module strings to junction boxes/combiner boxes and combiner boxes to the panel of the inverter with dc cables of designed specifications 	<p>Licensed Project management software</p>
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		<ul style="list-style-type: none"> supervise the connection of the output of the inverter to transformer with ac cables of given specifications ensure the installation of data communication and storage system with SCADA facility prepare all schedule updates weekly and review progress on daily basis, in case of problem, be ready with contingency plan 	
4.	<p>Monitoring key stages and tests during installation</p> <p>Theory Duration (hh:mm) 12:00</p> <p>Practical Duration (hh:mm) 12:00</p> <p>Corresponding NOS Code SGJ/N0135</p>	<ul style="list-style-type: none"> inspect road construction on its adherence to the desired specifications inspect foundations on its adherence to the desired specifications verify cable routes on its adherence to the desired specifications inspect cable tracks on its adherence to the desired specifications ensure the delivery/off-load of solar modules, transformers, inverters and switchgear inspect module, switchgear and inverter installation as per the desired specifications ensure the conduct of site acceptance tests ensure the conduct of completion tests 	Licensed Project management software
5.	<p>Preparing security and safety plan</p> <p>Theory Duration (hh:mm) 06:00</p> <p>Practical Duration (hh:mm) 06:00</p> <p>Corresponding NOS Code SGJ/N0135</p>	<ul style="list-style-type: none"> ensure the availability of security guards for security of plant ensure the availability of fire alarms and fire extinguisher ensure the availability of street lights to lit the solar field during night ensure that the staff and authorized visitor should wear helmet and shoes in the construction area 	Licensed Project management software
6.	<p>Managing Commission of the Solar PV power plant</p> <p>Theory Duration (hh:mm) 12:00</p> <p>Practical Duration (hh:mm) 26:00</p> <p>Corresponding NOS Code SGJ/N0135</p>	<ul style="list-style-type: none"> visually inspect the plant after installation ensure that pre-connection connectivity and conductivity test are done ensure that the open circuit voltage and short circuit current of all the module strings are measured properly and recorded to compare with the design values confirm that electrical protections, disconnection and other provisions, as required for grid connectivity as per grid regulators, are fulfilled 	Licensed Project management software

		<ul style="list-style-type: none"> • arrange for the inspection electricity inspector for grid connectivity • ensure that the DC current test is done for each of the module strings • ensure that the string current value is connected per inverter against average value of total strings connected to that inverter and confirm that it is within the acceptance criteria • ensure the conduct of performance ratio test by continuous operation of the plant as per industry norms • ensure the conduct of plant availability test as per industry norms 	
7.	<p>Managing subcontractors and staff relationships</p> <p>Theory Duration (hh:mm) 12:00</p> <p>Practical Duration (hh:mm) 12:00</p> <p>Corresponding NOS Code SGJ/N0135</p>	<ul style="list-style-type: none"> • maintain good relationship with subcontractors • arrange to pay the bills of subcontractors in a time bound manner as the agreement with them • resolve disputes with subcontractor at his level or through reference to seniors • motivate the staff to improve their performance levels 	
8.	<p>Maintain Personal Health & Safety at project site</p> <p>Theory Duration (hh:mm) 06:00</p> <p>Practical Duration (hh:mm) 12:00</p> <p>Corresponding NOS Code SGJ/N0106</p>	<ul style="list-style-type: none"> • Identify the requirements for safe work area; • Administer first aid; • Identify the personal protective equipment used for the specific purpose; • Identify the hazards associated with photovoltaic installations; • Identify work safety procedures and instructions for working at height; • Understand Occupational health & Safety standards and regulations for installation of Solar PV system 	<p>Safety helmet, Safety souse, Safety belt, , Ear plug, PVC hand glove, Cotton hand glove, Reflective jacket, Safety Gloves</p>
9.	<p>Work effectively with others</p> <p>Theory Duration (hh:mm) 06:00</p> <p>Practical Duration (hh:mm) 06:00</p>	<ul style="list-style-type: none"> • accurately pass on information to the authorized persons who require it and within agreed timescale and confirm its receipt • assist others in performing tasks in a positive manner where required and possible • consult and assist others to maximize effectiveness and efficiency in carrying out tasks 	

	Corresponding NOS Code SGJ/N0120	<ul style="list-style-type: none"> display appropriate communication etiquette while working display active listening skills while interacting with others at work demonstrate responsible and disciplined behaviors at the workplace escalate grievances and problems to appropriate authority as per procedure to resolve them and avoid conflict identify the need for common grounds with clients, team members, etc. and negotiate in an effective manner to achieve the same consider and respect the opinions, creativity, values, beliefs and perspectives of others ensure collaboration and group participation to achieve common goals promote a friendly, co-operative environment that is conducive to employee's sense of belonging facilitate an understanding and appreciation of the differences among team members 	
	Theory Duration (hh:mm) 90:00 Practical Duration (hh:mm) 110:00	Computer Lab, Licensed Project management software, Safety helmet, Safety souse, Safety belt, , Ear plug, PVC hand glove, Cotton hand glove, Reflective jacket, Safety Gloves	

Grand Total Course Duration: 200 Hours, 0 Minutes

(This syllabus/ curriculum has been approved by [Skill Council for Green Jobs](#))

Trainer Prerequisites for Job role: “Solar Site In-charge” mapped to Qualification Pack: “SGJ/Q0113, v1.0”

Sr. No.	Area	Details
1	Description	To deliver accredited training service, mapping to the curriculum detailed above, in accordance with the Qualification Pack “SGJ/Q0113, Version 1.0”.
2	Personal Attributes	Aptitude for conducting training, and pre/ post work to ensure competent, employable candidates at the end of the training. Strong communication skills, interpersonal skills, ability to work as part of a team; a passion for quality and for developing others; well-organised and focused, eager to learn and keep oneself updated with the latest in the mentioned field.
3	Minimum Educational Qualifications	Any Graduate.
4a	Domain Certification	Certified for Job Role: “Solar Site In-charger” mapped to QP: “SGJ/Q0113, Version 1.0”. Minimum accepted score as per respective as per SCGJ guidelines is 80%.
4b	Platform Certification	Recommended that the Trainer is certified for the Job Role: “Trainer”, mapped to the Qualification Pack: “MEP/Q0102” or equivalent. Minimum accepted score as per SSC is 80%.
5	Experience	Three years of experience in managing installation & commissioning of solar PV power plants

CRITERIA FOR ASSESSMENT OF TRAINEES

Job Role Solar Site In-charge

Qualification Pack SGJ/Q0113

Sector Skill Council Green Jobs

Guidelines for Assessment

1. Criteria for assessment for each Qualification Pack will be created by the Sector Skill Council. Each Performance Criteria (PC) will be assigned marks proportional to its importance in NOS. SSC will also lay down proportion of marks for Theory and Skills Practical for each PC.
2. The assessment for the theory part will be based on knowledge bank of questions created by the SSC.
3. Assessment will be conducted for all compulsory NOS, and where applicable, on the selected elective/option NOS/set of NOS.
4. Individual assessment agencies will create unique question papers for theory part for each candidate at each examination/training center (as per assessment criteria below).
5. Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/training center based on this criterion.
6. To pass the Qualification Pack, every trainee should score a minimum of 70% of aggregate marks to successfully clear the assessment.
7. In case of *unsuccessful completion*, the trainee may seek reassessment on the Qualification Pack.

Compulsory NOS			Marks allocation		
Total Marks: 200			Out of	Theory	Skills Practical
Assessment Outcomes	Assessment Criteria for outcomes	Total Marks			
SGJ/N0135 Manage installation and commissioning of solar PV power plant at site	PC1. obtain copies of all required permits/ approvals for construction including permission for grid connectivity	100	1	1	0
	PC2. read & interpret design and detailed drawings of the civil, mechanical and electrical works to be carried out at site		2	2	0
	PC3. manage overall procurement & installation schedule on site		5	1	4
	PC4. check copy of the transportation insurance of each equipment ordered		1	1	0
	PC5. check copy of sequencing, logistics and mobilization plan of the project		1	1	0
	PC6. ensure that the approach road to the site is constructed		2	0	2
	PC7. ensure to get the project area levelled and graded as per plan for ease of construction and drainage of water, respectively		4	2	2
	PC8. ensure that the water and sanitation facilities are created for the engineers, sub-contractors and staff		2	1	1
	PC9. ensure unloading and		2	1	1

	transporting facilities in place				
	PC10.ensure that the office, store and welfare accommodation is constructed		2	1	1
	PC11.mark the complete layout of the plant on the land locating each and every component including internal roads, solar module arrays mounting structures and the walkways between those, inverter, transformer, control room, substation, switchyards and transmission towers etc.		4	0	4
	PC12.ensure adherence to the schedule for each of the civil and mechanical construction activity i.e. construction of internal roads, construction of foundations for mounting module support structures, combiner boxes, inverters, transformers, and substation etc.		4	1	3
	PC13.obtain all the material and equipment received at site and inspect for any physical damage and in case of damage, inform the supplier for service /replacement and help him in filling claim with insurance company		4	1	3
	PC14.ensure safe handling of the materials onsite and obtain the specifications of the material and equipment on the name plate checked with the order copy and take it up with the supplier in case of mismatch		4	1	3
	PC15.manage schedule for installation of module structures and modules, installation of inverters, transformers, piles, DC / AC power protection devices, lightning arresters, earthing systems as per design, and substation, switchyard, transmission towers as per the grid codes and regulatory provisions		4	1	3
	PC16.supervise the interconnection of modules as per string design, connect module strings to junction boxes/ combiner boxes and combiner boxes to the panel of the inverter with dc cables of designed specifications		2	1	1

PC17. supervise the connection of the output of the inverter to transformer with ac cables of given specifications	2	1	1
PC18. ensure the installation of data communication and storage system with SCADA facility	2	1	1
PC19. prepare all schedule updates weekly and review progress on daily basis, in case of problem, be ready with contingency plan	2	1	1
PC20. inspect road construction on its adherence to the desired specifications	2	0	2
PC21. inspect foundations on its adherence to the desired specifications	2	1	1
PC22. verify cable routes on its adherence to the desired specifications	1	0	1
PC23. inspect cable tracks on its adherence to the desired specifications	1	0	1
PC24. ensure the delivery/off-load of solar modules, transformers, inverters and switchgear	1	0	1
PC25. inspect module, switchgear and inverter installation as per the desired specifications	1	0	1
PC26. ensure the conduct of site acceptance tests	1	0	1
PC27. ensure the conduct of completion tests	1	0	1
PC28. ensure the availability of security guards for security of plant	1	0	1
PC29. ensure the availability of fire alarms and fire extinguisher	1	0	1
PC30. ensure the availability of street lights to lit the solar field during night	1	0	1
PC31. ensure that the staff and authorized visitor should wear helmet and shoes in the construction area	1	0	1
PC32. visually inspect the plant after installation	4	1	3
PC33. ensure that pre-connection connectivity and conductivity test are done	2	1	1
PC34. ensure that the open circuit voltage and short circuit current of all the module strings are measured properly and recorded to compare with the design values	2	1	1
PC35. confirm that electrical	1	0	1

	protections, disconnection and other provisions, as required for grid connectivity as per grid regulators, are fulfilled				
	PC36.arrange for the inspection electricity inspector for grid connectivity		1	0	1
	PC37.ensure that the DC current test is done for each of the module strings		2	1	1
	PC38.ensure that the string current value is connected per inverter against average value of total strings connected to that inverter and confirm that it is within the acceptance criteria		2	1	1
	PC39.ensure the conduct of performance ratio test by continuous operation of the plant as per industry norms		1	1	0
	PC40.ensure the conduct of plant availability test as per industry norms		1	0	1
	PC41.ensure that the operation and maintenance manual is prepared		2	1	1
	PC42.ensure that all conformity and guarantee certificates are collected		2	1	1
	PC43.ensure completion of all warranty documentation, performance guarantees, compliance certificates and signed commissioning report		6	3	3
	PC44.handover the plant to operation and maintenance department along with the above documents		2	1	1
	PC45.maintain good relationship with subcontractors		2	1	1
	PC46.arrange to pay the bills of subcontractors in a time bound manner as the agreement with them		2	1	1
	PC47.resolve disputes with subcontractor at his level or through reference to seniors		2	1	1
	PC48.motivate the staff to improve their performance levels		2	1	1
		TOTAL	100	36	64
SGJ/N0106 Maintain personal health & safety at project site	PC1. identify corporate policies required for workplace safety	50	2	1	1
	PC2. identify requirements for safe work area and create a safe work environment		3	2	1
	PC3. identify contact person when workplace safety policies are violated		1	1	0

	PC4. provide information about incident/violation		1	1	0
	PC5. identify the location of first aid materials and administer first aid		2	1	1
	PC6. identify the personal protection equipment required for specific locations on-site		3	2	1
	PC7. identify expiry dates and wear & tear issues of specified equipment		2	1	1
	PC8. demonstrate safe and accepted practices for personal protection		3	2	1
	PC9. identify environmental hazards associated with the project site		2	1	1
	PC10. identify electrical hazards		4	2	2
	PC11. identify personal safety hazards or work site hazards and mitigate hazards		4	2	2
	PC12. select tools, equipment and testing devices needed to carry out the work		4	2	2
	PC13. demonstrate safe and proper use of required tools and equipment		4	2	2
	PC14. check access from ground to work area to ensure it is safe and in accordance with requirements		2	1	1
	PC15. reassess risk control measures, as required, in accordance with changed work practices and/or site conditions and undertake alterations		2	2	0
	PC16. inspect/install fall protection and perimeter protection equipment ensuring adequacy for work and conformance to regulatory requirements		4	2	2
	PC17. identify approved methods of moving tools and equipment to work area and minimize potential hazards associated with tools at heights		2	1	1
	PC18. select and install appropriate signs and barricades		2	1	1
	PC19. place tools and materials to eliminate or minimize the risk of items being knocked down		1	1	0
	PC20. dismantle plant safely in accordance with sequence and remove from worksite to clear work area		2	1	1
		TOTAL	50	29	21
	PC1. accurately pass on information to the authorized persons who	50	4	2	2

SGJ/N0120 effectively others	Work with	require it and within agreed timescale and confirm its receipt			
	PC2.	assist others in performing tasks in a positive manner where required and possible	4	2	2
	PC3.	consult and assist others to maximize effectiveness and efficiency in carrying out tasks	4	2	2
	PC4.	display appropriate communication etiquette while working	6	3	3
	PC5.	display active listening skills while interacting with others at work	4	2	2
	PC6.	demonstrate responsible and disciplined behaviours at the workplace	4	2	2
	PC7.	escalate grievances and problems to appropriate authority as per procedure to resolve them and avoid conflict	3	1	2
	PC8.	identify the need for common grounds with clients, team members, etc. and negotiate in an effective manner to achieve the same	3	1	2
	PC9.	consider and respect the opinions, creativity, values, beliefs and perspectives of others	4	2	2
	PC10.	ensure collaboration and group participation to achieve common goals	6	3	3
	PC11.	promote a friendly, co-operative environment that is conducive to employee's sense of belonging	4	2	2
	PC12.	facilitate an understanding and appreciation of the differences among team members	4	2	2
		TOTAL	50	24	26