

Model Curriculum

Solar Lighting Technician (Options: Home Lighting System/ Street Lights)

SECTOR: GREEN JOBS
SUB-SECTOR: RENEWABLE ENERGY
OCCUPATION: ASSEMBLY AND REPAIR
REF ID: SGJ/Q0201, V1.0
NSQF LEVEL: 4

		
<h2>Certificate</h2>		
COMPLIANCE TO QUALIFICATION PACK – NATIONAL OCCUPATIONAL STANDARDS		
is hereby issued by the		
SKILL COUNCIL FOR GREEN JOBS		
for the		
SKILLING CONTENT: PARTICIPATION HANDBOOK		
Complying to National Occupational Standards of Job Role/ Qualification Pack: Solar Lighting Technician (Options: Home Lighting System/ Street Lights) QP No. SGJ/Q 0201 NSQF Level 4		
Date of issuance:	Aug 25 th , 2017	 Authorised Signatory (Skill Council for Green Jobs)
Valid up to:	April 1 st , 2019	
* Valid up to the next review date of the Qualification Pack		

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Solar Lighting Technician (Options: Home Lighting System/ Street Lights)

CURRICULUM / SYLLABUS

This program is aimed at training candidates for the job of a “Solar Lighting Technician (Options: Home Lighting System/ Street Lights)”, in the “Green Jobs” Sector/Industry and aims at building the following key competencies amongst the learner

Program Name	Solar Lighting Technician (Option: Home Lighting System/ Street Lights)		
Qualification Pack Name & Reference ID	SGJ/Q0201, v1.0		
Version No.	1.0	Version Update Date	13 th oct 2017
Pre-requisites to Training	Preferably 8 th Pass		
Training Outcomes	<p>After completing this programme, participants will be able to:</p> <ul style="list-style-type: none"> • Assembly of different types of solar lamps • Repair of solar lamps • Maintain personal health & safety in a manufacturing facility • Maintain personal health and safety at project site <p>Optional:</p> <ul style="list-style-type: none"> • Assembly and repair of solar home lighting systems • Assembly and Repair of solar street lights 		

This course encompasses 4 out of 4 Compulsory National Occupational Standards (NOS) and 2 out of 2 Optional NOS of “Solar Lighting Technician (Options: Home Lighting System/ Street Lights)” Qualification Pack issued by “Skill Council for Green Jobs”.

COMPULSORY NOS:

Sr. No.	Module	Key Learning Outcomes	Equipment Required
1.	Introduction to role of Solar lighting technician Theory Duration (00:30) Practical Duration (00:00) Introduction Module	<ul style="list-style-type: none"> • Introduction to the Programme • Brief Job Description • Need of Clean Energy for Lighting 	
2.	Basic Electrical Concepts and Introduction to Solar Energy Theory Duration (01:00) Practical Duration (06:30) Corresponding NOS Code SGJ/N0201	<ul style="list-style-type: none"> • Introduction to Electricity • Introduction to Circuit • Importance of Measurement • Introduction to Importance of Sunlight • Introduction to the Uses of Sunlight 	Multimeter, Circuit, Open wire, closed loop wires , semiconductors, led bulbs , resistance, Batteries, capacitors
3.	Tools and Tackles Theory Duration (02:00) Practical Duration (14:00) Corresponding NOS Code SGJ/N0201	<ul style="list-style-type: none"> • Introduction to a Tool Kit • Introduction to Screw Driver • Soldering Iron • You are now Ready to Start Soldering • Safety Precautions 	Tweezers, Solder iron, Solder wire, M-seal, Battery, Fevi-quick, Cutter, PCB cleaner, Screw drivers
4.	Solar PV lighting system and its components Theory Duration (03:00) Practical Duration (21:00) Corresponding NOS Code SGJ/N0201	<ul style="list-style-type: none"> • Introduction to Solar PV Lighting System • Components of a Solar PV Lighting System • Introduction to Multimeter • Technical Testing 	

Sr. No.	Module	Key Learning Outcomes	Equipment Required
5.	Assembly of different types of solar lamp Theory Duration (05:00) Practical Duration (35:00) Corresponding NOS Code SGJ/N0201	<ul style="list-style-type: none"> Identify different types of solar lamps Verify physical properties of all the lamp components. Measure basic electrical parameters like resistance, current and voltage of different solar lamp electrical components. Test the solar panel to check if the Voltage at open circuit (VoC) and current at open circuit (IoC) are according to the specifications mentioned by the manufacturer Test the battery to check if it's voltage is within the range specified by the manufacturer Perform a continuity check of the load wire to check for any internal breakage Verify the PCB and LED as per technical specifications mentioned by the manufacturer. Perform step by step procedure to assemble a solar lamp 	Tweezers, Solder iron, Solder wire, M-seal, Battery, Fevi-quick, Cutter, PCB cleaner, Screw drivers
6.	Repair of solar lamps Theory Duration (05:00) Practical Duration (35:00) Corresponding NOS Code SGJ/N0202	<ul style="list-style-type: none"> Perform visual inspection of the solar lamp. Measure and verify the terminal voltage of the battery as per manufacturer's specification. Measure and verify the voltage and current of solar PV modules with technical specifications Verify and replace the faulty switches and DC sockets Verify the connector pin and other components of a solar lamp Verify the working of a PCB/ LED drivers Prepare a basic repair and maintenance report. 	Tweezers, Solder iron, Solder wire, M-seal, Battery, Fevi-quick, Cutter, PCB cleaner, Screw drivers
7.	Maintain health & safety in a manufacturing facility Theory Duration (07:00) Practical Duration (09:00)	<ul style="list-style-type: none"> identify corporate policies required for workplace safety identify requirements for safe work area and create a safe work environment identify contact person when workplace safety policies are violated provide information about incident/violation 	

Sr. No.	Module	Key Learning Outcomes	Equipment Required
	Corresponding NOS Code SGJ/N0147	<ul style="list-style-type: none"> identify the location of first aid materials and administer first aid identify the personal protection equipment required for specific locations on-site identify expiry dates and wear & tear issues of specified equipment demonstrate safe and accepted practices for personal protection identify environmental hazards associated with the manufacturing facility identify electrical hazards identify personal safety hazards or work site hazards and mitigate hazards select tools, equipment and testing devices needed to carry out the work demonstrate safe and proper use of required tools and equipment 	
8.	Maintain personal health & safety at project site Theory Duration (06:30) Practical Duration (09:30) Corresponding NOS Code SGJ/N0106	<ul style="list-style-type: none"> Identify corporate policies required for workplace safety. Identify requirements for safe work area and create a safe work environment. Identify contact person when workplace safety policies are violated. Provide information about incident/violation. Identify the location of First Aid materials and administer first aid Identify the personal protection equipment required for specific locations on-site Identify expiry dates and wear & tear issues of specified equipment. Demonstrate safe and accepted practices for personal protection. Identify environmental hazards associated with photovoltaic installations. Identify electrical hazards. Identify personal safety hazards or work site hazards and Mitigate hazards. Select tools, equipment and testing devices needed to carry out the work. 	Safety helmet, Safety souse, Safety belt, , Ear plug, PVC hand glove, Cotton hand glove, Reflective jacket, Safety Gloves

Sr. No.	Module	Key Learning Outcomes	Equipment Required
		<ul style="list-style-type: none"> • Demonstrate safe and proper use of required tools and equipment. • Check access from ground to work area to ensure it is safe and in accordance with requirements. • Reassess risk control measures, as required, in accordance with changed work practices and/or site conditions and undertake alterations. • Inspect/install fall protection and perimeter protection equipment ensuring adequacy for work and conformance to regulatory requirements. • Identify approved methods of moving tools and equipment to work area and minimize potential hazards associated with tools at heights • Select and install appropriate signs and barricades • Place tools and materials to eliminate or minimize the risk of items being knocked down. • Dismantle safety Power Plant in accordance with sequence and remove from worksite to clear work area. 	
	<p>Total Duration</p> <p>Theory Duration 30:00</p> <p>Practical Duration 130:00</p>	<p>Unique Equipment Required: Multimeter, Circuit, Open wire, closed loop wires , semiconductors, led bulbs , resistance, Batteries, capacitors, Safety helmet, Safety souse, Safety belt, , Ear plug, PVC hand glove, Cotton hand glove, Reflective jacket, Safety Gloves</p>	

Grand Total Course Duration: 160 Hours, 00 Minutes

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

OPTIONS (Optional to choose any or all or none)
OPTION 1: Solar home lighting system

1.	Assembly of solar home lighting system Theory Duration (hh:mm) 05:00 Practical Duration (hh:mm) 15:00 Corresponding NOS Code SGJ/N0203	<ul style="list-style-type: none"> • Verify physical properties of all the solar home lighting systems components. • Measure basic electrical parameters like resistance, current and voltage of different solar home lighting electrical components. • Test the solar panel to check if the Voltage at open circuit (VoC) and current at open circuit (IoC) are according to the specifications mentioned by the manufacturer • Test the battery to check if it's voltage is within the range specified by the manufacturer • Perform a continuity check of the load wire to check for any internal breakage • Verify the PCB and LED as per technical specifications mentioned by the manufacturer. • Perform step by step procedure to assemble a solar home lighting systems 	Tweezers, Solder iron, Solder wire, M-seal, Battery, Fevi-quick, Cutter, PCB cleaner, Screw drivers
2.	Repair of solar home lighting systems Theory Duration (hh:mm) 05:00 Practical Duration (hh:mm) 15:00 Corresponding NOS Code SGJ/N0203	<ul style="list-style-type: none"> • Perform visual inspection of the solar home lighting systems. • Measure and verify the terminal voltage of the battery as per manufacturer's specification. • Measure and verify the voltage and current of solar PV modules with technical specifications • Verify and replace the faulty switches and DC sockets • Verify the connector pin and other components of a solar home lighting systems • Verify the working of a PCB/ LED drivers • Verify the working of the charge controller • Prepare a basic repair and maintenance report. 	Tweezers, Solder iron, Solder wire, M-seal, Battery, Fevi-quick, Cutter, PCB cleaner, Screw drivers

Option 2: Solar street lights

1	Assembly of solar street lights Theory Duration (hh:mm) 05:00 Practical Duration (hh:mm) 15:00 Corresponding NOS Code SGJ/N0204	<ul style="list-style-type: none"> • Verify physical properties of all the street lights components. • Measure basic electrical parameters like resistance, current and voltage of different solar street lights electrical components. • Test the solar panel to check if the Voltage at open circuit (VoC) and current at open circuit (IoC) are according to the specifications mentioned by the manufacturer • Test the battery to check if it's voltage is within the range specified by the manufacturer • Perform a continuity check of the load wire to check for any internal breakage • Verify the PCB and LED as per technical specifications mentioned by the manufacturer. • Perform step by step procedure to assemble a solar street lights 	Tweezers, Solder iron, Solder wire, M-seal, Battery, Fevi-quick, Cutter, PCB cleaner, Screw drivers
2.	Repair of Solar Street lights Theory Duration (hh:mm) 05:00 Practical Duration (hh:mm) 15:00 Corresponding NOS Code SGJ/N0204	<ul style="list-style-type: none"> • Perform visual inspection of the solar street lights. • Measure and verify the terminal voltage of the battery as per manufacturer's specification. • Measure and verify the voltage and current of solar PV modules with technical specifications • Verify and replace the faulty switches and DC sockets • Verify the connector pin and other components of a solar street lights • Verify the working of a PCB/ LED drivers • Verify the working of the charge controller • Prepare a basic repair and maintenance report. 	Tweezers, Solder iron, Solder wire, M-seal, Battery, Fevi-quick, Cutter, PCB cleaner, Screw drivers

	Grand Duration Minimum Duration: 160 hrs Theory Duration 30:00 Practical Duration 130:00 Maximum Duration: 240 hrs Theory Duration 50:00 Practical Duration 190:00	Total	Unique Equipment Required: Multimeter, Circuit, Open wire, closed loop wires, semiconductors, led bulbs, resistance, Batteries, capacitors, Tweezers, Solder iron, Solder wire, M-seal, Battery, Feviquick, Cutter, PCB cleaner, Screw drivers, Safety helmet, Safety souse, Safety belt, Ear plug, PVC hand glove, Cotton hand glove, Reflective jacket, Safety Gloves
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Trainer Prerequisites for Job role: “Solar Lighting Technician (Options: Home Lighting System/ Street Lights)” mapped to Qualification Pack: “SGJ/Q0201, 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/Q0201, 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	10 th Pass+ ITI Or Diploma in Technical Education
4a	Domain Certification	Certified for Job Role: “Solar Lighting Technician (Options: Home Lighting System/ Street Lights)” mapped to QP: “SGJ/Q0201, Version 1.0”. Minimum accepted score as per SCGJ is 80%.
4b	Platform Certification	Recommended that the Trainer is certified for the Job Role: “Trainer”, mapped to the Qualification Pack: “MEP/Q0102, Version 1.0”. Minimum accepted score as per SSC is 80%.
5	Experience	1 year of experience in manufacturing of solar lighting devices or 2 years of experience in operation and maintenance of solar lighting devices

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CRITERIA FOR ASSESSMENT OF TRAINEES

Job Role Solar Lighting Technician(Options: Home Lighting System/ Street Lights)

Qualification Pack SGJ/Q0201

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 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 criteria
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					
NOS	Assessment Criteria for outcomes	Total Marks	Out Of	Theory	Skills Practical
SGJ/N0201: Assembly of different types of Solar Lamp	PC1. Identify different types of Solar lamps	50	3	1	2
	PC2. Verify physical properties of all the lamp components.		6	2	4
	PC3. Measure basic electrical parameters like resistance, current and voltage of different solar lamp electrical components.		8	2	6
	PC4. Test the solar panel to check if the Voltage at open circuit (VoC) and current at open circuit (IoC) are according to the specifications mentioned by the manufacturer		6	1	5
	PC5. Test the battery to check if it's voltage is within the range specified by the manufacturer		6	1	5
	PC6. Perform a continuity check of the load wire to check for any internal breakage		6	1	5
	PC7. Verify the PCB and LED as per technical specifications mentioned by the manufacturer		6	1	5
	PC8. Perform step by step procedure to assemble a solar Lamp		9	3	6
	Total		50	12	38
SGJ/N0202: Repair of Solar lamps	PC1. Perform visual inspection of the solar lamp.	50	6	2	4
	PC2. Measure and verify the terminal voltage of the battery as per manufacturer's specification.		6	1	5
	PC3. Measure and verify the voltage and current of solar PV modules with technical specifications		6	2	4

	PC4. Verify and replace the faulty switches and DC sockets		8	2	6
	PC5. Verify the connector pin and other components of a solar lamp		8	2	6
	PC6. Verify the working of a PCB/ LED drivers		10	2	8
	PC7. Prepare a basic repair and maintenance report.		6	2	4
		TOTAL	50	13	37
SGJ/N0147: Maintain personal health & safety in a manufacturing facility	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		8	3	5
	PC7. identify expiry dates and wear & tear issues of specified equipment		2	1	1
	PC8. demonstrate safe and accepted practices for personal protection		8	3	5
	PC9. identify environmental hazards associated with the manufacturing facility		4	2	2
	PC10. identify electrical hazards		4	2	2
	PC11. identify personal safety hazards or work site hazards and mitigate hazards		6	3	3
	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		5	2	3
		Total	50	24	26
SGJ/N0106: Maintain personal health and 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 manufacturing facility		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 safety Power Plant in accordance with sequence and remove from worksite to clear work area.		2	1	1
		Total	50	29	21

Options					
Option 1: Solar Home Lighting System					
Total Marks:100			Marks Allocation		
NOS	Assessment Criteria for outcomes	Total Marks	Out Of	Theor y	Skills Practical
SGJ/N0202: Assembly and Repair of solar home lighting systems	PC1. Verify physical properties of all the solar home lighting systems components.	100	8	4	4
	PC2. Measure basic electrical parameters like resistance, current and voltage of different electrical components of solar home lighting system.		8	2	6
	PC3. Test the solar panel to check if the Voltage at open circuit (VoC) and current at open circuit (IoC) are according to the specifications mentioned by the manufacturer		6	1	5
	PC4. Test the battery to check if it's voltage is within the range specified by the manufacturer		6	1	5
	PC5. Perform a continuity check of the load wire to check for any internal breakage		6	1	5
	PC6. Verify the PCB and LED as per technical specifications mentioned by the manufacturer.		6	1	5
	PC7. Perform step by step procedure to assemble a solar home lighting systems		12	2	10
	PC8. Perform visual inspection of the solar home lighting systems.		6	2	4
	PC9. Measure and verify the terminal voltage of the battery as per manufacturer's specification.		6	1	5
	PC10. Measure and verify the voltage and current of solar PV modules with technical specifications		6	2	4
	PC11. Verify and replace the faulty switches and DC sockets		6	1	5
	PC12. Verify the connector pin and other components of a solar home lighting systems		6	2	4
	PC13. Verify the working of a PCB/ LED drivers		6	1	5
	PC14. Verify the working of the charge controller		6	2	4
	PC15. Prepare a basic repair and maintenance report.		6	2	4
	TOTAL		100	25	75
Options					
Option 2: Solar Street Light					

Total Marks:100			Marks Allocation		
NOS	Assessment Criteria for outcomes	Total Mark	Out Of	Theor y	Skills Practical
SGJ/N0203: Assembly and Repair of solar street lights	PC1. Verify physical properties of all the street lights components.	100	8	4	4
	PC2. Measure basic electrical parameters like resistance, current and voltage of different electrical components of solar street light .		8	2	6
	PC3. Test the solar panel to check if the voltage at open circuit (VoC) and current at open circuit (IoC) are according to the specifications mentioned by the manufacturer		6	1	5
	PC4. Test the battery to check if it's voltage is within the range specified by the manufacturer		6	1	5
	PC5. Perform a continuity check of the load wire to check for any internal breakage		6	1	5
	PC6. Verify the PCB and LED as per technical specifications mentioned by the manufacturer.		6	1	5
	PC7. Perform step by step procedure to assemble a solar Street lights		12	2	10
	PC8. Perform visual inspection of the solar street light.		6	2	4
	PC9. Measure and verify the terminal voltage of the battery as per manufacturer's specification.		6	1	5
	PC10. Measure and verify the voltage and current of solar PV modules with technical specifications		6	2	4
	PC11. Verify and replace the faulty switches and DC sockets		6	1	5
	PC12. Verify the connector pin and other components of a solar street lights		6	2	4
	PC13. Verify the working of a PCB/ LED drivers		6	1	5
	PC14. Verify the working of the charge controller		6	2	4
	PC15. Prepare a basic repair and maintenance report.		6	2	4
	TOTAL		100	25	75