

NATIONAL SKILL QUALIFICATION FRAMEWORK QUALIFICATION FILE

Version 6: Draft of 01 September 2016

CONTACT DETAILS OF THE BODY SUBMITTING THE QUALIFICATION FILE

Name and address of submitting body:

Skill Council for Green Jobs,
CIBP Building, Malcha Marg,
Chankyapuri, New Delhi - 110021

Name and contact details of individual dealing with the submission

Name: Dr. Praveen Saxena
Position in the organisation: Chief Executive Officer
Address if different from above: (Same as above)
Tel number(s): 9871119101
E-mail address: psaxena@sscgj.in

Name: Mr. Tanmay Bishnoi
Position in the organisation: Head – Standards and Research
Address if different from above: (Same as above)
Tel number(s): 7838784433
E-mail address: tanmay@sscgj.in

List of documents submitted in support of the Qualifications File

1. Qualifications Pack
2. Industry Validations letters
3. Industry Endorsement tracker
4. Integrated Occupational Map
5. Summary Sheet

NSQF QUALIFICATION FILE

Version 6: Draft of 01 September 2016

SUMMARY

Qualification Title	Solar PV Engineer
Qualification Code	QP SGJ/ 0112
Nature and purpose of the qualification	Nature of the qualification - A qualification pack The main purpose of the qualification - This Qualification will enable the individual to specialize in the erection and commissioning of solar PV power plants, its quality assurance and HSE issues
Body/bodies which will award the qualification	Skill Council for Green Jobs
Body which will accredit providers to offer courses leading to the qualification	Skill Council for Green Jobs
Body/bodies which will carry out assessment of learners	Affiliated Assessment Agency of SCGJ
Occupation(s) to which the qualification gives access	Solar PV Engineer
Licensing requirements	N/A
Level of the qualification in the NSQF	Level 5
Anticipated volume of training/learning required to complete the qualification	300 hours
Entry requirements and/or recommendations	Diploma /Pursuing B.Tech (Contingent to passing B.Tech. examination) (Civil/Mechanical/Electrical/EEE/Instrumentation). 1 years' experience with Diploma is required for this role.
Progression from the qualification	Vertical Progression: Solar Site In-charge (Level 6) Horizontal Progression: Solar PV O&M Engineer
Planned arrangements for the Recognition of Prior learning (RPL)	SCGJ recognizes that there may be candidates who have prior learning experience in the Renewable Energy Sector and are desirous of being certified. - Propose to carry out RPL for candidates working in Solar, Power Sector. - A bridge course would be conducted for people who are working in solar industry. - Linking of this Qualification to Start Up India
International comparability where known	This Level 5 qualification compares with UK NOS: Level 3 UK NOS: Pro Skills Sector Skill Council PROST06. PROST07, PROST01, PROST 04
Date of planned review of the qualification.	30 th September 2019

NSQF QUALIFICATION FILE

Version 6: Draft of 01 September 2016

Formal structure of the qualification			
Title and identification code of component.	Mandatory/ Optional	Estimated size (learning hours)	Level
SGJ/N0109 Prepare site feasibility study report	Mandatory	60	5
SGJ/N0146 Design of solar PV power plant	Mandatory	90	5
SGJ/ N0132 Installation and commissioning of solar PV power plant	Mandatory	60	5
SGJ/ N0133 Quality assurance of solar PV power plant and its components	Mandatory	50	5
SGJ/ N0106 Maintain personal health & safety at project site	Mandatory	20	2
SGJ/ N0120 Work effectively with others	Mandatory	20	4
SGJ/ N0134 Design, Installation and Commissioning of solar water pumping system	Optional	120	5

Please attach any document giving further detail about the structure of the qualification – e.g. a Curriculum Document or a Qualification Pack.

Give the titles and other relevant details of the document(s) here. Include page references showing where to find the relevant information.

NSQF QUALIFICATION FILE

Version 6: Draft of 01 September 2016

SECTION 1 **ASSESSMENT**

Body/Bodies which will carry out assessment:

Affiliated Assessment Agency of SCGJ

How will RPL assessment be managed and who will carry it out?

The RPL assessment will be carried out through pre assessment, identifying the skills gaps, provide bridge training to cover the competency gap, where required, and then conduct final assessment of the candidates.

Confederation of Indian Industry (CII) or any other Affiliated Assessment Agency of SCGJ, as per RPL Policy and Guidelines

Describe the overall assessment strategy and specific arrangements which have been put in place to ensure that assessment is always valid, reliable and fair and show that these are in line with the requirements of the NSQF.

The emphasis is on examination of existing businesses through case study analysis and practical demonstration of skills and knowledge based on the performance criteria.

The assessment papers are developed by Subject Matter Experts (SME) available with the Assessment Agency, in collaboration with Skill Council for Green Jobs, as per the performance and assessment criteria mentioned in the Qualification Pack. The assessments papers are also checked for the various outcome based parameters such as quality, time taken, precision, tools & equipment requirement etc. The assessment sets are then reviewed for consistency. The technical limitations at the training centres are taken care in theory and viva.

The assessment agencies are instructed to hire assessors with integrity, reliability and fairness. Each assessor shall sign a document with its assessment agency by which they commit themselves to comply with the rules of confidentiality and conflict of interest, independence from commercial and other interests that would compromise impartiality of the assessments. The assessment agencies are instructed to identify assessors as per the Assessment Policy and Guidelines established by Skill Council for Green Jobs relevant for that Qualification.

The assessors selected by Assessment Agencies are scrutinized and made to undergo training and introduction to SCGJ Assessment Framework, competency based assessments, and assessors guides. The assessors are provided with assessors guide developed by the Subject Matter Expert of the assessment agency in collaboration with SCGJ as per the assessment framework. The assessment guides are developed to ensure the maximum possible consistency in the assessment by different assessors and elaborate on the following

- Qualification Pack Structure
- Guidance for the assessor to conduct theory, practical and viva assessments
- Guidance for trainees to be given by assessor before the start of the assessments.
- Guidance on assessments process, practical brief with steps of operations practical observation checklist and mark sheet
- Viva guidance for uniformity and consistency across the batch.

NSQF QUALIFICATION FILE

Version 6: Draft of 01 September 2016

The assessment by assessment agency is completely based on the assessment criteria as mentioned in the Qualification Pack. Each NOS in the Qualification Pack (QP) is assigned a relative weightage for assessment based on the criticality of the NOS. Therein each Performance Criteria in the NOS is assigned marks for or practical based on relative importance, criticality of function and training infrastructure.

The following tools are proposed to be used for final assessment:

Practical Assessment: This will comprise of a test to evaluate the individual's grasp on domain skills imparted.

Viva/Structured Interview: This tool will be used to assess the conceptual understanding and the behavioural aspects as regards the job role and the specific task at hand. It will also include questions to ascertain the soft skills of interacting with the customer or client.

Written Test: Under this test few key items which cannot be assessed practically will be assessed. The written assessment will comprise of:

- True / False Statements
- Multiple Choice Questions
- Problem Statements
- Case Study Analysis

Please attach any documents giving further information about assessment and/or RPL.

Give the titles and other relevant details of the document(s) here. Include page references showing where to find the relevant information.

NSQF QUALIFICATION FILE

Version 6: Draft of 01 September 2016

ASSESSMENT EVIDENCE

Complete a grid for each component as listed in “Formal structure of the qualification” in the Summary.

NOTE: this grid can be replaced by any part of the qualification documentation which shows the same information – i.e. Learning Outcomes to be assessed, assessment criteria and the means of assessment.

Title of Component: Solar PV Engineer

CRITERIA FOR ASSESSMENT OF TRAINEES

Job Role Solar PV Engineer

Qualification Pack SGJ/ Q0112

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.

Assessment Outcomes	Assessment Criteria for outcomes	Total Marks	Marks allocation		
			Out of	Theory	Skills Practical
SGJ/N0109 Prepare a site feasibility study report	PC1. Identify optimum location of Installations	65	3	1	2
	PC2. Assess the site level pre-requisites for solar panel installation		10	4	6
	PC3. Decide on the type of mounting to be constructed and place of mounting as per client requirement		4	2	2
	PC4. Check for any shading obstacles		3	1	2
	PC5. Prepare a site map of the location where installation has to be carried out		3	1	2
	PC6. Assess the load to be run on Solar PV power plant and prepare a load profile		3	1	2

NSQF QUALIFICATION FILE

Version 6: Draft of 01 September 2016

	PC7. Estimate the capacity of Solar PV power plant		5	2	3
	PC8. Decide on battery backup as per grid availability, loads and client expectation		5	2	3
	PC9. Assess or obtain the site specific major parameters of solar resource data like GHI, DNI, Temperature and Wind		3	1	2
	PC10. Perform shading analysis		5	2	3
	PC11. Estimate the energy generated from the rooftop solar PV power plant using software like PV*SOL®, PVSYST, etc.		10	3	7
	PC12. Identify the risks associated with the specific solar project		5	2	3
	PC13. Prepare a site feasibility study report		6	3	3
		TOTAL	65	25	40
SGJ/N0146 Design of solar PV power plant	PC1. Review and interpret of the mounting structure and foundation design drawings	100	4	1	3
	PC2. Review the overall structural layout of the solar PV power plant		6	2	4
	PC3. Select solar module technology and size, based on analysis of cost, power output, quality, climatic conditions of the site, global and diffused irradiance ratio at the site, etc.		6	2	4
	PC4. Workout the total numbers of modules based on the total capacity of the plant and the capacity of selected modules		6	2	4
	PC5. Prepare the earthing design of solar module arrays		4	2	2
	PC6. Select inverter, based on compatibility with module technology, compliance with grid code and other applicable regulations, reliability, system availability, serviceability, quality, cost, DC TO AC conversion efficiency		6	2	4
	PC7. In case of a roof top power plant, decide on specifications of the inverter to power the AC loads in the building		4	2	2
	PC8. Decide on number of inverters to be used based on the capacity and specifications of the inverter selected		6	2	4
	PC9. Finalize the inverter layout and inverter locations on the basis of total capacity		4	2	2
	PC10. Prepare the earthing design of inverters		2	1	1
	PC11. Workout number of modules in a string based on the input voltage and MPPT voltage range of the inverter		2	1	1
	PC12. Workout number of strings connected to a combiner box based on minimum run of DC connecting cables to minimized DC losses		4	2	2
	PC13. Finalize the inter space between the		4	2	2

NSQF QUALIFICATION FILE

Version 6: Draft of 01 September 2016

		solar modules on the basis of minimum inter row shading, adequate space for cleaning and maintenance of solar modules and the tilted to south at an angle that optimizes the annual energy yield			
	PC14.	Specify DC cabling material, size, type of PVC for cables connecting modules, junction boxes to the combiner boxes and combiner boxes to the inverter panels etc.	6	2	4
	PC15.	Prepare the specification of DC connectors (plugs and sockets) to be used	4	2	2
	PC16.	Prepare the design specifications for junction boxes/combiner including IP number	4	2	2
	PC17.	Prepare the specifications for disconnects/switches	4	2	2
	PC18.	Workout number of combiner boxes connected to one panel of the inverter based on the input current rating of the inverter	4	2	2
	PC19.	Prepare islanding facility for grid connected power plant, in case of non- availability of grid	4	2	2
	PC20.	Protect incorrect polarity, over-voltage and overload for the DC cables	4	1	3
	PC21.	Decide on specification of charge controller/ inverter to the control the overcharging/ discharging of batteries	4	2	2
	PC22.	Decide the storage battery capacity (AH) based on the number of days autonomy required (KWH/WH) and the depth of discharge of the battery bank	4	1	3
	PC23.	Decide on the specifications for the charge controller/ inverter to control the overcharging/discharging of the batteries, prepare energy generation report using simulation software	4	1	3
		TOTAL	100	40	60
SGJ/N0132 Installation and commissioning of solar PV power plant	PC1.	Read and interpret the design and detailed drawings of the civil, mechanical and electrical works to be carried out at site	4	2	2
	PC2.	Ensure the marking of the complete layout of the plant as per design	2	1	1
	PC3.	Arrange for tools and consumable required for installation	2	1	1
	PC4.	Follow the schedule for each of the civil and mechanical construction activity	8	2	6
	PC5.	Manage the schedule for installation of modules, inverters, transformers, power protection devices , lightning arresters ,earthing systems, etc. and ensure installation as per the design documents	8	2	6
	PC6.	Ensure the installation of cables	6	2	4
		100			

NSQF QUALIFICATION FILE

Version 6: Draft of 01 September 2016

	between different components including modules, inverter and other components as per design documents				
	PC7. Check cables for continuity		4	1	3
	PC8. Manage the installation of communication and storage system with SCADA facility/ any monitoring system		8	2	6
	PC9. Ensure installation of battery banks if required		4	2	2
	PC10. Prepare, review and report progress on daily basis to the site in-charge for further action		4	2	2
	PC11. Visually inspect the plant after installation		4	2	2
	PC12. Get pre connection connectivity and conductivity test done		4	2	2
	PC13. Verify system grounding and get the insulation resistance measured		4	2	2
	PC14. Confirm that electrical protections, disconnection and other provisions are fulfilled as per design documents		4	2	2
	PC15. Get the DC voltage and current test done for each of the module strings		4	2	2
	PC16. Measure and record all relevant parameters of energy storage system if present		4	2	2
	PC17. Ensure calibration of SCADA/any monitoring system		4	2	2
	PC18. Prepare inspection report and forward to site in-charge for further		8	2	6
	PC19. On getting the clearance from electricity inspector, initiate start up procedures as per manufacturer's instructions		4	2	2
	PC20. Monitor the energy readings and voltages at regular intervals on start up		6	3	3
	PC21. Record and report any anomalous condition to the site in-charge for further action		2	1	1
	PC22. Document design changes, if any		2	1	1
		TOTAL	100	40	60
SGJ/N0133 Quality Assurance of solar PV power plant and components	PC1. Visit the module manufacturing facility of the supplier	100	2	1	1
	PC2. Check modules earmarked for power plant using a random selection as per relevant IS/IEC standards		6	3	3
	PC3. Visit manufacturing facility of Inverter supplier and witness testing of a few inverters		4	1	3
	PC4. Collect documentation related to each and every equipment and submit to site in-charge		4	2	2
	PC5. Ensure proper delivery/off-load of solar equipment		6	2	4
	PC6. Check all the material and equipment received at site for any physical damage		6	2	4
	PC7. Ensure specifications of the		6	3	3

NSQF QUALIFICATION FILE

Version 6: Draft of 01 September 2016

	equipment and components match with what has been ordered				
	PC8. Ensure all warranties by manufacturers are properly signed and are in order		6	3	3
	PC9. Inspect the foundations of structures		4	1	3
	PC10. Inspect and verify cable routes and specifications as per design documents		6	2	4
	PC11. Inspect module installation		4	1	3
	PC12. Inspect the cable terminations and ensure tightness		4	1	3
	PC13. Inspect the installation of inverters, protection devices and systems		4	1	3
	PC14. Carry out visual inspection of the plant to find out defects and deficiencies		6	4	2
	PC15. Measure and record the circuit voltage and short circuit current of all the module strings and compare that with design values		8	3	5
	PC16. Carry out thermography of doubtful strings and modules to know the defects		8	4	4
	PC17. Carry out performance ratio test by continuous operation of the plant as per the industry norms and compare with designed values		8	4	4
	PC18. Collect and compile conformity, warranty documentation, performance guarantees, calibration certificates and any other relevant documentation and handover to site in-charge, certificates		8	2	6
		TOTAL	100	40	60
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

NSQF QUALIFICATION FILE

Version 6: Draft of 01 September 2016

	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
SGJ/N0120 Work effectively with others	PC1.	Accurately pass on information to the authorized persons who require it and within agreed timescale and confirm its receipt	50	4	2	2
	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

NSQF QUALIFICATION FILE

Version 6: Draft of 01 September 2016

	PC12. Facilitate an understanding and appreciation of the differences among team members		4	2	2
		TOTAL	50	24	26

Optional NOS: Solar PV Pump Engineer

SGJ/N0134 Design, installation and commissioning of solar pumping system	PC1. Analyse the water usage and level of water table at site	100	6	3	3
	PC2. Decide on the specifications of the pumping set and motor		6	3	3
	PC3. Decide on the capacity of PV modules		6	3	3
	PC4. Design the plan of mounting structures and foundation		4	2	2
	PC5. Oversee the preparation of the foundation for solar module mounting structure and motor pump set		4	2	2
	PC6. Ensure structure is fixed on the foundations		4	2	2
	PC7. Oversee the mounting of solar modules		4	2	2
	PC8. Oversee the connection of solar module array to pump set in case of DC pumps		6	3	3
	PC9. Oversee the installation of inverter in case of AC pumps		4	2	2
	PC10. Ensure protection system are in place		8	4	4
	PC11. Perform inspection and testing of equipment		8	2	6
	PC12. Perform start-up procedures and measure output		8	3	5
	PC13. Compare the output with design output and take corrective actions, if required		8	4	4
	PC14. Ensure connection of the solar module array to motor pump set through a Maximum Power Point Tracker (MPPT) to get maximum power from the array		3	1	2
	PC15. Install an inverter after MPPT to convert DC power to AC power in case an AC submersible motor pump set is used		3	1	2
	PC16. Ensure periodical cleaning of solar module array		6	3	3
	PC17. Periodically ensure tightness of cable connections		6	2	4
	PC18. Ensure periodic maintenance of motor pump set		6	2	4
	TOTAL	100	44	56	

Means of assessment 1

NSQF QUALIFICATION FILE

Version 6: Draft of 01 September 2016

Means of assessment 2
Pass/Fail

NSQF QUALIFICATION FILE

Version 6: Draft of 01 September 2016

SECTION 2 **EVIDENCE OF LEVEL**

Awarding bodies will enter a proposed NSQF level for the qualification in the Qualification File Summary. This section asks for the evidence on which that proposal is based. The evidence must refer to the level descriptors of the NSQF.

NSDA recommends an approach to working out the level of qualifications which starts with the level descriptor domains (Process, Professional knowledge, Professional skill, Core skill and Responsibility: see annex A). Two variants for providing the evidence of level are offered here: Option A and Option B in the following pages. Awarding bodies should choose the option which best suits the qualification.

NSQF QUALIFICATION FILE

Version 6: Draft of 01 September 2016

OPTION A

Title/Name of qualification/component: Solar PV Engineer		Level: 5	
NSQF Domain	Key requirements of the job role	How the job role relates to the NSQF level descriptors	NSQF Level
Process	<p>The individual is expected to monitor the operation of the solar PV power plant using the installed monitoring system. He/ She keeps a watch on voltages at various levels, operational efficiencies of individual components, generation of power; computes performance ratio and compares with simulated values etc. From the monitoring system he/she identifies electrical faults and gets it rectified in the plant down to modules string level. He/ She also maintains the civil and mechanical works of the plant through maintenance team.</p>	<p>The Job holder is expected to exhibit well developed skills with a clear choice of procedures in familiar context such as ensuring marking of complete layout of plant as per detailed drawings, managing schedule for installation of plant components, inspecting the plant equipment during and post-installation, measuring and recording and monitoring all parameters like voltage, current, energy prior to commissioning, checking the modules through random selection, ensuring proper off-load of equipment at site, carrying out visual inspection of the plant and carrying out various tests like performance ratio tests, thermography, ensuring the test values are as per industry norms and carrying out corrective action, if necessary. Optionally is also expected to carry out design, installation and commissioning of solar pumping systems</p> <p>Thus considering the scope of work the job holder can be placed at Level 5</p> <p>Since the individual's work is not limited to working in familiar, routine & predictable environment but rather encompasses job that requires working in non-routine and fairly unpredictable environment such as ensuring that the erection and commissioning is carried out safely and as per schedule, inspection the plant equipment during and post installation through visual inspection and test and deciding on actions in case of deviations, monitoring the plant performance during start-up and taking corrective actions in case of fault occurrence, visiting the OEMs factory to carry out inspection through random selection, etc., s/he can't be placed in Level 4.</p>	5

NSQF QUALIFICATION FILE

Version 6: Draft of 01 September 2016

Title/Name of qualification/component: Solar PV Engineer		Level: 5	
NSQF Domain	Key requirements of the job role	How the job role relates to the NSQF level descriptors	NSQF Level
		<p>And as the individual doesn't require to exhibit wide range of specialized developed skill and working around non-standard practices, it does not qualify as a level 6 role.</p>	
Professional knowledge	<p>The individual is expected to exhibit the knowledge of the typical specifications, functioning, operating principle of various solar PV plant components, the monitoring system (SCADA or any other), related performance metrics of solar PV power plant, as built electrical drawings, fault identification procedures, various types of tools, measuring equipment, maintenance procedures and requirement.</p>	<p>The Job holder is expected to exhibit knowledge of facts such as typical specifications and types of solar PV plant components like solar PV modules, inverters, charge controllers, mounting structures, cables, junction boxes, etc. site survey reports and evaluation parameters, grid connection codes, relevant IEC/ IS standards, industry norms of test outputs like IV curve and performance ratio tests knowledge of principles such as solar PV power generation technology, solar PV power plant testing principles, fault identification and rectification principles, etc. knowledge of processes like solar PV plant operating procedures, testing procedures of solar PV plant components, random sampling processes according to standards, and general concepts of in the field of solar PV such as knowledge of power generation, electrical concepts like voltage, current, power, etc. S/he should possess the ability to speak, read and write in the local vernacular language and English which is always preferred. Optionally, h/she is also expected to know the working and usage of solar simulation software like PV*SOL, tracking systems like Maximum power point tracker (MPPT), DC/ AC solar pumping systems, etc.</p> <p>Thus considering the professional knowledge, s/he can be placed at level 5</p> <p>The Job holder is expected to possess professional skills more than just factual knowledge about solar PV components but also knowledge of facts like solar PV power</p>	5

NSQF QUALIFICATION FILE

Version 6: Draft of 01 September 2016

Title/Name of qualification/component: Solar PV Engineer		Level: 5	
NSQF Domain	Key requirements of the job role	How the job role relates to the NSQF level descriptors	NSQF Level
		<p>output and testing parameters like power, energy, power factor, performance metrics like IV curve, performance ratio, grid connectivity standards, random sampling standards, etc. therefore s/he can't be placed at Level 3</p> <p>And since the job holder doesn't require to exhibit factual & theoretical knowledge in broad contexts within solar PV such as evolving technological trends, the various socio-economic factors and their impact on solar PV etc., the individual can't be placed at Level 6</p>	
Professional skill	<p>The individual is expected to plan & organize the schedule for all meetings and discussions to be undertaken by self or by the team. Further s/he must be able to take decisions on a regular basis, manage relationship with customers and apply domain knowledge to perform tasks related to solar PV. S/he is also expected to critically evaluate information obtained from customers and teams to create relevant solutions</p>	<p>The Job holder is expected to possess a range of practical and cognitive skills required to accomplish tasks and solve problems by selecting and applying basic methods and tools. For example, the individual has to visit the facility of the module manufacturer and ensure the quality of solar PV modules through random sampling, ensure that the solar modules delivered at site are according to specifications, ensure the erection and commissioning of the plant happens according to schedule, carry out testing of the plant equipment through visual inspection and measurement and analysis of plant parameters like voltage, IV curve, performance ratio, etc., ensuring all safety protocols are followed during the installation and commissioning of the solar PV power plant, monitor performance of solar PV plant during start-up and take corrective action if necessary. Optionally, he is also expected to analyse the water usage and level of water table at site and design a suitable solar PV pumping solutions and ensure the installation, testing and</p>	5

NSQF QUALIFICATION FILE

Version 6: Draft of 01 September 2016

Title/Name of qualification/component: Solar PV Engineer		Level: 5	
NSQF Domain	Key requirements of the job role	How the job role relates to the NSQF level descriptors	NSQF Level
		<p>commissioning of solar pumping system as well as carry out its operation and maintenance periodically.</p> <p>Thus considering the professional skills the job holder can be placed at Level 5</p> <p>Since the Job holder is expected to exhibit cognitive skills along with practical skills required to accomplish the tasks and solve problems like carrying out random sampling at manufacturer's site, identifying faults by though visual inspection and by carrying out tests like IV curve and performance ratio tests, etc. s/he can't be placed at Level 4.</p> <p>And as the job holder is not expected to possess practical and cognitive skills required to generate solutions for specific problems related to solar PV as a whole, but rather expected to generate solutions specific to the solar PV power plant, s/he can't be placed at level 6</p>	
Core skill	The individual is expected to exhibit fluent business communications skills, networking skills & capable of handling and using customer data in the prescribed way.	The Job holder is expected to be possess the desired mathematical skills for analysing and comparing test parameters like conductivity tests, IV curve tests, energy readings, etc. have understanding of social /political environment like local cultures so as to communicate effectively with solar project helpers under him/her who primarily belong to the regions surrounding the solar PV power plant skill of collecting and organizing information like collecting information about progress of plant erection and commissioning, recording and analysing information about plant equipment condition from the installation technicians as well as test outputs and anticipate the probable faults and issues and take corrective action and communication skill for so as to provide instructions	5

NSQF QUALIFICATION FILE

Version 6: Draft of 01 September 2016

Title/Name of qualification/component: Solar PV Engineer		Level: 5	
NSQF Domain	Key requirements of the job role	How the job role relates to the NSQF level descriptors	NSQF Level
		<p>and guidance to the solar PV installers so as to carry out daily activities in the plant.</p> <p>Thus considering the core skills, s/he can be placed at Level 5.</p> <p>The Job holder is expected to exhibit core skills more than language to communicate with required clarity, basic algebraic and arithmetic skill and basic understanding of socio- political environment. For example, s/he is supposed to compute complex plant performance metrics, compare them with norms and analyze and deviations in plant performance through the same, etc. S/he is also expected to carry out inspection at manufacturer's site as well as project site to ensure fault free installation of solar PV equipment. Hence, s/he can't be placed at Level 4.</p> <p>And since the job holder requires only some skill of collecting and organizing information but doesn't need to be reasonably good like conducting primary and secondary research and only the desired mathematical skill restricted to evaluating, comparing and analysing plant performance metrics, s/he can't be placed at Level 6.</p>	
Responsibility	The individual is primarily responsible to identify market trends through various means like primary research and secondary research like magazines, etc. and responsible to create a suitable strategy for sale to his/her region. He/she is responsible to transfer knowledge and trends with team to ensure development of business across various regions	The solar PV business development executive is responsible for his/ her own work as s/he has to monitor the plant performance and ensure proper maintenance of plant equipment and to an extent subordinate's works and learning as s/he is responsible for passing knowledge to his team of installers and ensuring that the work allocated to them is carried out as per schedule.	5

NSQF QUALIFICATION FILE

Version 6: Draft of 01 September 2016

Title/Name of qualification/component: Solar PV Engineer		Level: 5	
NSQF Domain	Key requirements of the job role	How the job role relates to the NSQF level descriptors	NSQF Level
		<p>Considering the responsibilities the individual can be placed at level 5.</p> <p>Since the Job holders responsibility is not limited till his/her own work & learning but also encompasses some responsibilities for others learning as s/he is expected to ensure knowledge transfer to team members s/he can't be placed at 4.</p> <p>As the responsibilities are not so broad enough to be fully responsible for other's work and learning like conducting trainings, taking disciplinary actions in case of deviations from organisation conduct rules, etc. s/he can't be placed at level 6.</p>	

NSQF QUALIFICATION FILE

Version 6: Draft of 01 September 2016

SECTION 3 **EVIDENCE OF NEED**

What evidence is there that the qualification is needed?

During extensive industry interactions carried out while creating occupational maps and prioritization of job roles for Qualification Pack development, the mentioned qualification was indicated as a key requirement by the industry. In addition, the Skill Gap Report for the sector has indicated that a significant proportion of the workforce is involved in this work function. The study also indicates that this domain will be in great demand, due to focus of Government of India to support the sector through policy and implementation. Research was conducted in the Renewable energy sector manpower requirement estimates till 2025. The research provides the data that the discussed qualification is one of the critical roles in the sector. The details of statistics and research analysis are provided separately as a research analysis report

Evidence of the qualification is supported by validations with representation from across sub sectors. The complete list of validating companies has been enclosed as an annexure to the Q file.

What is the estimated uptake of this qualification and what is the basis of this estimate?

The increase in manpower requirements (as per projections) from 2017 to 2025 is approx. 5 times for this role. All the numbers are provided in research analysis study

What steps were taken to ensure that the qualification(s) does/do not duplicate already existing or planned qualifications in the NSQF?

Currently, Skill Council for Green Jobs is the only Sector Skill Council set up which has the mandate of Certification and Assessment of candidates undergoing Skill Development courses in Solar Photovoltaic domain. NSDC list of Approved QPs was checked prior to commissioning the work. There is no overlap of these Qualification Packs with existing Qualification Packs.

The NCO/2015 Classification and MES Course List was also cross examined for existing trades, wherein no overlap / existing trade was found.

What arrangements are in place to monitor and review the qualification(s)? What data will be used and at what point will the qualification(s) be revised or updated?

In the Qualification Pack, review date is scheduled for after 3 years in consultation with Subject Matter Experts. The monitoring of evaluation of assessments and Employer feedback will be sought post-placement, for review of the effectiveness of the Qualification.

Please attach any documents giving further information about any of the topics above.

Give the titles and other relevant details of the document(s) here. Include page references showing where to find the relevant information.

NSQF QUALIFICATION FILE

Version 6: Draft of 01 September 2016

SECTION 4

EVIDENCE OF PROGRESSION

What steps have been taken in the design of this or other qualifications to ensure that there is a clear path to other qualifications in this sector?

1. Discussing the growth trajectory within each occupation after studying organisational charts of various industry players across small, medium and large scale organizations.
2. Exploring various lateral career opportunities for the discussed qualification
3. Ensuring that there is a clear role up in terms of performance criteria qualification experience and skill requirement from lower NSQF Level to higher levels in the hierarchy.

Please refer to attached career path as per annexure 1 which clearly defines the career path.

Please attach any documents giving further information about any of the topics above.

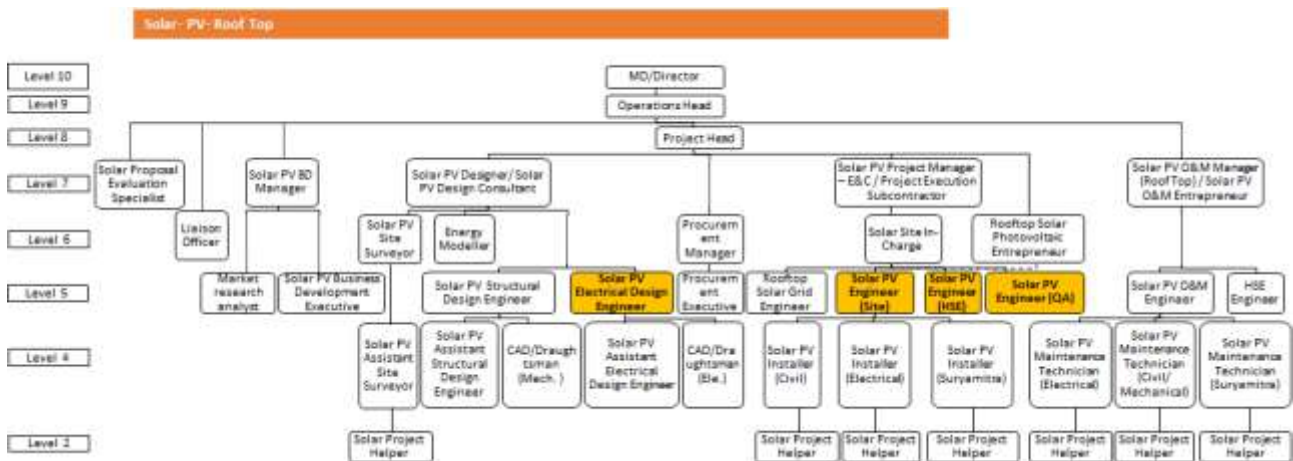
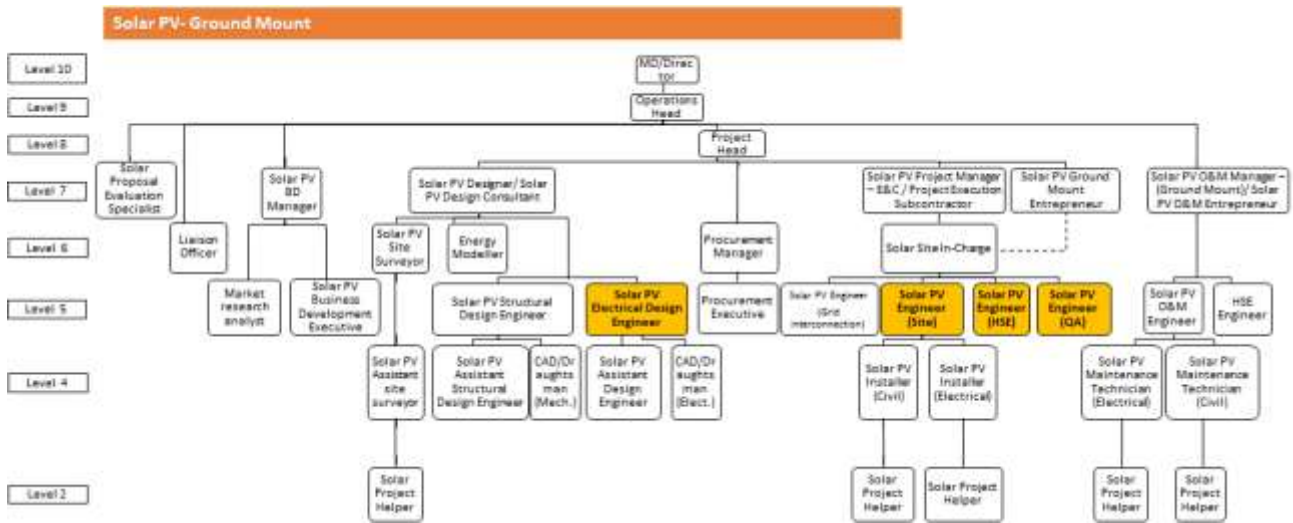
Give the titles and other relevant details of the document(s) here. Include page references showing where to find the relevant information.

1. Career Map of Solar PV Engineer - Annexure 1
2. QP SGJ/ Q0112 - Annexure 2

NSQF QUALIFICATION FILE

Version 6: Draft of 01 September 2016

Annexure 1: Career Map



Note: The QP solar PV engineer is a blanket QP which encompasses the four roles of Solar PV Engineer (Site), Solar PV Engineer (HSE), Solar PV Engineer (QA), Solar PV Design Engineer (Electrical).

Annexure 2: QP SGJ/ Q0112