NSQF QUALIFICATION FILE
Approved in 8th NSQC Meeting, Dated: 27th May, 2021

NCVET Code
2021/EHW/SCGJ/04258

CONTACT DETAILS OF THE BODY SUBMITTING THE QUALIFICATION FILE

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List of documents submitted in support of the Qualification File

1. **Model Curriculum (Annexure-I)**
2. **Annexure O (Annexure-II)**

SUMMARY

1	Qualification Title:	Solar PV Installer – Electrical
2	Qualification Code, if any: -	SGJ/Q0102
3	NCO code and occupation: -	NCO-2015/7421.1401 Solar Panel Installation Technician
4	Nature and purpose of the qualification (Please specify whether qualification is short term or long term):	**Nature:** Skill Certification on Solar PV Plant installation **Purpose of the qualification:** The course aims to provide sound knowledge and skills to install, test and commission different electrical components of a Solar PV power plant.
5	Body/bodies which will award the qualification:	Skill Council for Green Jobs
3	Body which will accredit providers to offer courses leading to the qualification:	Skill Council for Green Jobs
7	Whether accreditation/affiliation norms are already in place or not, if applicable (if yes, attach a copy)	Yes
8	Occupation(s) to which the qualification gives access:	Solar Panel Installation Technician
9	Job description of the occupation:	Solar PV Installer – Electrical; installs, tests and commissions different electrical components of photovoltaic systems, that meet the performance and reliability needs of customers. The work is performed by incorporating quality craftsmanship while complying with all applicable codes, standards and safety requirements.
10	Licensing requirements:	NA

11	Statutory and Regulatory requirement of the relevant sector (documentary evidence to be provided):	-
12	Level of the qualification in the NSQF:	Level 4
13	Anticipated volume of training/learning required to complete the qualification:	220 hours
14	Indicative list of training tools required to deliver this qualification:	1KWp Solar PV grid connected system with all accessories for demonstration purposes, Wire Crimping, Stripping and Cutting Tool (s), Electrician Knife, Hack Saw Frame with Blade, Hand Crimping Tools, Cable Cutter, Screw Driver, Water Level, Measuring Tape, Standard Wire Gauge, Vernier Calliper, Hand Drill M/C, Sprit Level, Clampmeter, Multimeter, Megger, Earthing Rod, Soldering Iron & Flux, System service logbook, Phase Sequence Meter, Electrical Tape, First aid kit, Safety goggles, Safety gloves, Safety helmet, Safety shoes
15	Entry requirements and/or recommendations and minimum age:	10th + I.T.I (Electrical and Electronics)/ Diploma (Electrical, Electronics) Or 10th pass+3 years of experience as Electrician 18 years
16	Progression from the qualification:	Vertical Progression: Solar PV O&M Engineer (Level 5)
17	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 organizations. •Identify the candidates through training need analysis of the industry •Develop the RPL Training Delivery Plan

		and bridge course for bridging the skill gap •Training and certification of the candidates
18	International comparability where known (research evidence to be provided):	ISCO-08/7421
19	Date of planned review of the qualification:	26th May 2021
20	Formal structure of the qualification Mandatory/Optional components	

	Title of component and identification code/NOSs/Learning outcomes	**Mandatory /Optional**	**Estimated size (learning hours)**	**Level**
(i)	**Bridge Module:** Introduction to Solar PV Installer – Electrical Course		**6**	
(ii)	SGJ/N0101: Basics of Solar energy and Electrical concepts	Mandatory	12	4
(iii)	SGJ/N0101: Basics of Solar Photovoltaic systems and its components	Mandatory	34	4
(iv)	SGJ/N0104: Identification and Use of different tools and tackles used for installation of solar PV system	Mandatory	9	4
(v)	SGJ/N0101: Site Survey for Installation of Solar PV System	Mandatory	15	4
(vi)	SGJ/N0104: Installation of Electrical components of a Solar PV System	Mandatory	64	4
(vii)	SGJ/N0105: Test and Commission Solar PV system	Mandatory	24	4
(viii)	SGJ/N0106: Maintain personal health and safety at project site	Mandatory	16	4
(ix)	Bridge Module : Communication and Soft skills	Mandatory	20	4

(x)	SGJ/NXXXX: Promotion of Entrepreneurship	Mandatory	20	4
	Total		**220**	

SECTION 1
ASSESSMENT

21	**Body/Bodies which will carry out assessment:** Skill Council for Green Jobs through its affiliated and accredited Assessment Agency
22	**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. Final assessment will be carried out by affiliated Assessment Agency of SCGJ, as per RPL Policy and Guidelines
23	**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 assessor's guides. The assessors are provided with assessor's 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. 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

24. Assessment evidences

CRITERIA FOR ASSESSMENT OF TRAINEES

Job Role Solar PV Installer – Electrical

Qualification Pack SGJ/Q 0102

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.

Outcome Please refer to the QP-NOS for the Assessment outcome

SECTION 2

25. EVIDENCE OF LEVEL

OPTION A

Title/Name of qualification/component: Solar PV Installer – Electrical			**Level: 4**
NSQF Domain	**Key requirements of the job role**	**How the job role relates to the NSQF level descriptors**	**NSQF Level**
Process	The individual is expected to installs, tests and commissions different electrical components of solar photovoltaic systems, for proper electrical connectivity, incorporating quality craftsmanship and complying with all applicable codes, standards, and safety requirements	The individual **independently** performs **familiar, predictable, routine situation of clear choice** such as periodically checking the integrity and working condition of all connection, fuses, cables, earthing and lightening protection systems, solar modules, inverters, etc. through visual inspection and by measuring parameters like current, voltage output etc. Hence, role qualifies as a Level 4 role. Since the role does not involve several choices to be made even in a familiar context like creating the maintenance schedule, choosing amongst various types of equipment or products, taking decisions regarding replacement	4

Title/Name of qualification/component: Solar PV Installer – Electrical			**Level: 4**
NSQF Domain	**Key requirements of the job role**	**How the job role relates to the NSQF level descriptors**	**NSQF Level**
		equipment, etc., the role does not qualify for Level 5. This role requires the job holder to work in a familiar, predictable, routine of clear choice and the activities that h/she is expected to perform are not limited in range. For example, s/he is expected to inspect and interpret the integrity of various electrical components in the solar PV power plant, measure the compare the current and voltage parameters and take steps like regular cleaning, tightening of connections, cleaning of inverter fans to ensure proper functioning of electrical components, etc. S/he also has to ensure that the work area is safe and hygienic for working. Hence it cannot be placed at level 3.	
Professional knowledge	The individual is expected to be exhibit the knowledge of basic electrical concepts, typical specifications, functioning, operating principle and maintenance procedures of various types	The job holder is expected to exhibit an understanding **factual knowledge of the field of electrical components.** For example, s/he is expected to know how of electrical component	4

Title/Name of qualification/component: Solar PV Installer – Electrical			Level: 4
NSQF Domain	**Key requirements of the job role**	**How the job role relates to the NSQF level descriptors**	**NSQF Level**
	of solar PV plant components, working drawings of electrical equipment, maintenance and operations requirement and handling procedures of electrical components of solar PV power plant and common methods of identifying and rectifying common electrical faults that can occur in solar PV power plant	installation ,the various types of faults that can occur in any electrical component of solar PV power plant, various types of tools, measuring equipment involved in maintenance and troubleshooting of electrical parts of solar PV power plant, tightening and checking of connections. Further, s/he should know about the risks and hazards/ safe working practices/ materials and equipment needed/ tasks and activities to the required standard. S/he should also have the ability to speak read and write in the local vernacular language and English. Since all the above mentioned areas are related to factual knowledge in the field of electrical maintenance of solar PV power plant, the role qualifies for Level 4. The job holder is expected to know more than basic facts and principles, such as, understanding of the as built electrical drawings, the details of the manufacturer's instructions to	

Title/Name of qualification/component: Solar PV Installer – Electrical			**Level: 4**
NSQF Domain	**Key requirements of the job role**	**How the job role relates to the NSQF level descriptors**	**NSQF Level**
		use the equipment and tools, the various faults which can occur in the electrical equipment parts and their rectification, etc. Since this role requires factual knowledge of field of electrical Installation of solar PV power plant, it cannot be pegged at level 3. Further, since the job holder is not expected to be aware of principles/ process & general concepts in plant designing, components selection e as a whole, hence the role can't be pegged at level 5. For example, this role is not expected to have knowledge about the civil/mechanical maintenance and day to day operation of solar PV power plant	
Professional skill	The job holder is expected to operate/ use screw driver, inspection fixtures, wire cutter, pliers, testers, spanner, etc., plan and installed the regular components of solar pv plant. Further, the job holder must be able to take	The job holder is expected to **recall and demonstrate practical skills, which are routine and repetitive in a narrow range of application** such as checking the integrity and working conditions of connections, fuses, circuit	4

Title/Name of qualification/component: Solar PV Installer – Electrical			**Level: 4**
NSQF Domain	**Key requirements of the job role**	**How the job role relates to the NSQF level descriptors**	**NSQF Level**
	the day to day decisions and solve problem/s at work. The job holder should also be able to critically analyse the information gathered from different channels like current, voltage readings, observations made by helpers, etc. to identify the possible faults which can occur and take pro-active action	breakers through visual inspection and checking the working condition of cables, modules, inverters, earthing and lightening protection systems through measurement of the relevant parameters like string current, output voltages, etc. and carrying out routine cleaning and maintenance activities to ensure long life and stability of solar PV power plant. The incumbent further analyses the fault prone areas like connections, joints, earthing, etc., using standard techniques like measuring resistance, etc. takes steps to prevent faults. Further, the incumbent refers to and uses defined rules in SOP manual and tools as per organization's guidelines to conduct various types of maintenance activities Since all the above-mentioned professional skill are related to demonstrating practical skills, which are routine and repetitive in a narrow range and using appropriate rule and tool, the role qualifies for Level 4.	

Title/Name of qualification/component: Solar PV Installer – Electrical			**Level: 4**
NSQF Domain	**Key requirements of the job role**	**How the job role relates to the NSQF level descriptors**	**NSQF Level**
		The Job holder is expected to possess professional skills more than just demonstrating practical skills, which are routine and repetitive in a narrow range but also using appropriate rules & tools to analyse & interpret information. For example, S/he is expected to use quality concepts such as analysing the parameters like current, voltage and resistance to interpret working of electrical components. Also, the incumbent analyses the state of electrical equipment through visual inspection and other methods and takes steps to rectify the same. Hence, the job holder can't be placed at Level 3. Further the job holder doesn't require to use much cognitive skills to accomplish tasks and solve problems at the workplace. The activities performed primarily practical skill. Hence s/he can't be placed at level 5.	
Core skill	The individual is expected to exhibit effective communication skills by communicating clearly	The job holder is expected to exhibit **effective oral communication skills (including**	4

Title/Name of qualification/component: Solar PV Installer – Electrical			**Level: 4**
NSQF Domain	**Key requirements of the job role**	**How the job role relates to the NSQF level descriptors**	**NSQF Level**
	with the project helper, Design Engineer and site in charge and understanding the instructions given by the supervisors. Further, the individual is expected to perform respective record maintaining work and use basic arithmetic/ algebraic principles like summation, multiplication, etc. to compute resistance, voltages, etc. to identify common faults in the electrical equipment. The individual should also possess basic understanding of natural environment to understand the common faults and issues which can occur at the solar PV power plant	**awareness of vernacular language)** so as to understand the instructions of the supervisor as well as clearly instruct helpers while carrying out day to day maintenance activities. The job holder is also expected to possess reading and writing skills so as to read and understand equipment manuals, health and safety instructions, various signage and standard code and concepts well as well as maintain records as per organisation policies. **The job holder is also expected to display basic arithmetic/ algebraic awareness** to analyse and interpret the evaluation parameters of electrical equipment such as the standard current, voltage level, the accepted resistance levels for different components, etc. **The incumbent must understand the social, political of the local environment** so as to communicate effectively with solar project helpers who primarily belong to the surrounding regions **and natural environment** so as to identify common issues and faults which can affect the health of electrical parts in the solar	

Title/Name of qualification/component: Solar PV Installer – Electrical			**Level: 4**
NSQF Domain	**Key requirements of the job role**	**How the job role relates to the NSQF level descriptors**	**NSQF Level**
		PV power plant. Since all the above mentioned core skills are related to exhibiting effective oral, written communication skills along with basic understanding of the arithmetic principles as well as understanding of the social, political and natural environment such as clarifying the client's understanding and expectation prior to commencement of treatment the role qualifies for Level 4. The Job holder expected to possess core skills more than just demonstrating minimum clarity in oral & written communication such as getting specific instructions from the supervisor and carrying out activity or reporting to supervisor specific observations from the solar PV power plant. Hence, the role can't be placed at Level 3. Further since the job holder doesn't require to use detailed mathematical skill or skill of	

Title/Name of qualification/component: Solar PV Installer – Electrical			**Level: 4**
NSQF Domain	**Key requirements of the job role**	**How the job role relates to the NSQF level descriptors**	**NSQF Level**
		collecting & organizing information such as collecting information regarding plant operating parameters, getting information from sub-ordinates and peers to identify possible issues and faults, s/he can't be placed at level 5.	
Responsibility	The individual is primarily responsible to gain knowledge about standard protocols and SOPs regarding electrical Installation in solar PV power plant. S/he is also expected to update self with the solar PV power plant and functioning through equipment manuals, books, etc.	The solar PV Electrical Installer is **responsible for his/ her own work and learning.** S/he is expected to update self with the standard protocols and SOPs using the available equipment manuals, etc. S/he is also expected to have significant on the job learning about the equipment and their maintenance procedures. S/he works under some supervision but primarily carries out his/her day to day activities independently. Thus s/he can be placed at level 4. Since s/he is neither expected to be responsible of other's work and learning , so s/he can't be	4

Title/Name of qualification/component: Solar PV Installer – Electrical			**Level: 4**
NSQF Domain	**Key requirements of the job role**	**How the job role relates to the NSQF level descriptors**	**NSQF Level**
		placed at level 5 Also as is evident from the above examples that the incumbent is fully responsible for his/ her own work and learning rather than being responsible in defined limit since s/he gathers the practical skills/ techniques required to perform a task in the on the job, s/he analyses & interprets how to utilize the acquired skills & techniques while installation of the various electrical components. activities and enhances his/her knowledge base about use of several tools, equipments and materials for a given task therefore s/he can't even be placed at Level 3.	

SECTION 3
EVIDENCE OF NEED

26 **What evidence is there that the qualification is needed? What is the estimated uptake of this qualification and what is the basis of this estimate?**

Basis	In case of other Awarding Bodies (Institutes under Central Ministries and states departments)
Need of the qualification	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. Estimates have been made in manpower requirement in the Renewable energy sector till 2025 and 2030. The research provides the data that the discussed qualification is one of the critical roles in the sector. Evidence of the qualification is supported by validations with representation from across sub sectors
Industry Relevance	The increase in manpower requirements (as per projections) from 2020 to 2025 is quite significant for this role. It is estimated that close to 90,000 trained manpower are required for this role by 2025 and approx. another 150,000 shall be needed by 2030.
Usage of the qualification	A large number of persons are employed at Ultra Mega Solar PV power plants. RPL may be conducted at these sites. Further RPL can also be conducted at large scale rooftop facilities.
Estimated	During, industry interactions, large manpower

	uptake	requirement especially for the solar PV ground mount sector is estimated in line with the MNRE renewable energy targets till 2022 and industry commitments in global platforms such as INDC. A large number of Technician required to assist Engineers for maintenance of Solar PV plant. 182,400 workers would be needed annually by 2022 to carry out these low-skill operation and maintenance functions for the multitude of solar rooftop and utility scale projects.
27	**Recommendation from the concerned Line Ministry of the Government/Regulatory Body. To be supported by documentary evidences.** Ministry of New and Renewable Energy recommended the Qualification file.	
28	**What steps were taken to ensure that the qualification(s) does (do) not duplicate already existing or planned qualifications in the NSQF? Give justification for presenting a duplicate qualification** Discussed the growth trajectory within each occupation after studying organisational charts of various industry players across small, medium and large scale organizations. Explored various lateral career opportunities for the discussed qualification. Ensured 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 in **section 4 'Evidence of progression'** which clearly defines the career path. National Qualifications Register was searched to assess if there was any similar qualification and no overlap was found with the existing qualifications.	
29	**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? Specify the review process here** 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.	

SECTION 4
EVIDENCE OF PROGRESSION

30	**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?** ***Show the career map here to reflect the clear progression***