



# Model Curriculum

**QP Name: Renewable Energy**

**Qualification Code: SGJ/Q4008**

**Qualification Version: 1.0**

**NSQF Level: 4.5**

**Model Curriculum Version: 1.0**

Skill Council for Green Jobs (SCGJ)  
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## Training Parameters

<b>Sector</b>	Green Jobs		
<b>Sub-Sector</b>	Renewable Energy		
<b>Occupation</b>	Renewable Energy Professional		
<b>Country</b>	India		
<b>NSQF Level</b>	4.5		
<b>Aligned to NCO/ISCO/ISIC Code</b>	NCO 2015/7421.1402		
<b>Minimum Educational Qualification and Experience</b>	<b>S. No.</b>	<b>Academic/Skill Qualification (with Specialization - if applicable)</b>	<b>Required Experience (with Specialization - if applicable)</b>
	1	Completed 1st year of UG (UG Certificate)	NA
	2	12th grade pass	1 year of relevant experience in concerned sector like Solar/ power sector
	3	10th grade pass with two years of any combination of NTC/NAC/CITS or equivalent.	1 year of relevant experience in concerned sector like Solar/ power sector
	4	Previous relevant Qualification of NSQF Level 4.0	1.5 year of relevant experience in concerned sector like Solar/ power sector
<b>Pre-Requisite License or Training</b>	NA		



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<b>Minimum Job Entry Age</b>	19 years
<b>Last Reviewed On</b>	06.05.2024
<b>Next Review Date</b>	05.05.2024
<b>NSQC Approval Date</b>	31.01.2024
<b>QP Version</b>	1.0
<b>Model Curriculum Creation Date</b>	31.01.2024
<b>Model Curriculum Valid Up to Date</b>	30.01.2026
<b>Model Curriculum Version</b>	1.0
<b>Minimum Duration of the Course</b>	Total 510 Hours: (Theory with ES: 190 hours+Practical:260 hours+ 60 hours of On-the-Job Training (OJT))
<b>Maximum Duration of the Course</b>	Total 510 Hours: (Theory: 160 hours+Practical:260 hours+ 30 hours of employability skills + 60 hours of On-the-Job Training (OJT))



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## Program Overview

This section summarizes the end objectives of the program along with its duration.

### Training Outcomes

At the end of the program, the learner should have acquired the listed knowledge and skills.

- Adequate knowledge of solar and wind energy.
- Installation on grid, off-grid, and hybrid plants
- Designing of Solar plant .
- Installation of wind turbine.
- Knowledge of software like AutoCAD, PV Syst, Windpro.
- Operation and maintenance of Solar and Wind plant.
- Best industry practices and standards.

### Compulsory Modules

The table lists the modules and their duration corresponding to the Compulsory NOS of the QP.

NOS and Module Details	Theory Duration	Practical Duration	On-the-Job Training Duration (Mandatory)	On-the-Job Training Duration (Recommended)	Total Duration
<b>SGJ/N4054: Basic of Solar and Wind Energy</b> <b>NOS Version No. 1.0</b> <b>NSQF Level 4</b> <b>Credit-3</b>					90:00
Module 1: Basics of Solar Photovoltaic Plant	22:30	22:30	-	-	45:00
Module 2: Basics of Wind Power Plant	22:30	22:30	-	-	45:00
<b>SGJ/N4055: Tools and Equipment Used in Solar and Wind Energy</b> <b>NOS Version No. 1.0</b>					30:00



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**NSQF Level 4**

**Credit-1**

Module 3 Tools and equipment used in Solar and wind	<b>15:00</b>	<b>15:00</b>	-	-	<b>30:00</b>
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**SGJ/N4056: Solar and Wind Turbine Installation**

**NOS Version No. 1.0** 120:00

**NSQF Level 4**

**Credit-4**

Module 4: Solar Photovoltaic Plant Installation Testing and Commissioning	<b>20:00</b>	<b>40:00</b>	-	-	<b>60:00</b>
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Module 5: Wind Turbine Installation Testing and Commissioning.	<b>20:00</b>	<b>40:00</b>	-	-	<b>60:00</b>
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**SGJ/N4057: Planning and Designing**

**NOS Version No. 1.0** 90:00

**NSQF Level 4**

**Credit-3**

Module 6: Planning and Designing of Wind and Solar Plant.	<b>30:00</b>	<b>60:00</b>	-	-	<b>90:00</b>
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**SGJ/N4058: Operation and Maintenance of Wind and Solar power Plant**

**NOS Version No. 1.0** 60:00

**NSQF Level 4**

**Credit-2**

Module 7: Operation and Maintenance of Wind and Solar Plant.	<b>15:00</b>	<b>45:00</b>	-	-	<b>60:00</b>
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**SGJ/N4059: Health and Safety Practices in Solar and Wind Power**

**NOS Version No. 1.0** 30:00

**NSQF Level 4**

**Credit-1**

Module 8: Health and Safety Practices in Solar and Wind Power Plants.	<b>15:00</b>	<b>15:00</b>	-	-	<b>30:00</b>
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### DGT/VSQ/N101: Employability Skills

NOS Version No. 1.0

NSQF Level 4

Credit-1

Module 9: Employability Skills **30:00** **30:00**

OJT **60**

<b>Total Duration</b>	<b>190:00</b>	<b>260:00</b>	<b>60</b>	<b>510:00</b>
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## Module Details

### Module 1: Basics of Solar Photovoltaic Plant

*Mapped to SGJ/N4054*

#### Terminal Outcomes:

At the end of the program, the learner will be able to learn :

- About the Solar Energy.
- About the sun path diagram.
- About different components of Solar Plant.
- About different types of plant
- Basics of electricity and electrical concept

<b>Duration: 22:30</b>	<b>Duration: 22:30</b>
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<ul style="list-style-type: none"> <li>● Explain the Terms and Definition of Solar.</li> <li>● Explain the Sun Path Diagram and Solar Radiation</li> <li>● Discuss Components of a Solar PV System.</li> <li>● Explain the types of Solar Photovoltaic Systems</li> </ul>	<ul style="list-style-type: none"> <li>● Identify the Components used in Solar Photovoltaic plants.</li> <li>● Demonstrate how to interpret signs, notices, and/or cautions at the project site.</li> <li>● Perform simple calculations to illustrate the fundamental concepts of power and energy.</li> </ul>



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- Discuss Technical Parameters and Performance of Solar PV Panel
- Understand Ohm’s Law
- Understand the basics of electricity and electrical concepts;
- Perform simple calculations to derive power and energy
- Explain and understand DNI, GHI, and Diffused Irradiance and irradiation.
- Understand the movement of the sun and its effect on the performance of the plant;
- Understand Terminology used in the Solar Industry.
- Identify the different components of a Solar PV system and explain its basic operation.
- Explain the working of different types of Solar PV systems.
- Describe the different types, sizes, and specifications of modules, inverters, charge controllers, cables, conduits, junction boxes, solar batteries, and allied accessories.
- Explain the manufacturing data specification sheets of different types of solar PV components.
- Read and interpret various certification requirements for solar PV system components
- Demonstrate how the movement of the sun affects the performance of the solar power plant
- Show pictures and videos of solar plants.
- Analyze the different types, sizes, and specifications of solar modules, inverters, charge controllers, cables, conduits, junction boxes, solar batteries, and allied accessories.
- Analyze the manufacturing data specification sheets of different types of solar PV components.
- Demonstrate how to acquire know-how of different types, sizes, and specifications of foundations/ footings
- Demonstrate to selection of the right footing/foundation as per site location including suitability of roof condition or suitability of soil

**Classroom Aids:**

Laptop, whiteboard, marker, projector, Powerpoint Presentation, Various materials, including textbooks, online study material, safety and health PPEs as applicable for the respective job roles

**Tools, Equipment, and Other Requirements**

Pyranometer, Multimeter, Clamp meter, 1 kWp Solar PV system with 2 number of solar batteries



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## Module 2: Basics of Wind Power Plant

**Mapped to SGJ/N4054:**

### Terminal Outcomes:

At the end of the program, the learner will be able to learn :

- About the wind energy.
- About the wind technology and its type.
- About different components of Wind Plant.
- About the wind potential.
- About the wind ATLAS.

Duration: 22:30	Duration: 22:30
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> <li>● Identify different types of Wind technology and overview of the Wind energy sector in India</li> <li>● Understand key insights in the sector through various market research reports and magazines.</li> <li>● Identify different types of wind power plants, their components, and working principles.</li> <li>● Explain the benefits of wind energy over conventional sources of energy.</li> <li>● Describe the typical specifications, functioning, operating principle, warranties, and safe operating &amp; handling procedures of different Wind power plant components like Blades, towers, motors, monitoring systems, and other components.</li> <li>● Identify various ways to optimize material, energy/electricity consumption across processes and follow specified processes for waste disposal.</li> <li>● Explain how to analyze project site conditions.</li> <li>● Explain how to collect data on local weather conditions such as temperature range, flooding (in case of onshore), wind speed, humidity, wind direction, pressure, and rainfall and assess its impact on wind energy generation.</li> </ul>	<ul style="list-style-type: none"> <li>● Identify the Components used in Wind plants.</li> <li>● Show pictures or videos of the working of the Wind Power plant.</li> <li>● Analyse detailed site information.</li> <li>● Demonstrate how to analyze the daily, monthly, and annual wind resource data of the project site to evaluate the potential for wind energy generation.</li> <li>● Analyze the pre-site selection baseline data for project execution suitability.</li> <li>● Demonstrate how to verify the wind potential with other resources such as NREL/ATLAS.</li> <li>● Demonstrate how to prepare a contour map of the proposed wind plant site.</li> <li>● Demonstrate how to carry out route surveys.</li> <li>● Demonstrate how to prepare detailed site survey reports using</li> </ul>



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- Discuss and analyze the wind data collected from the met mast for estimating wind potential.
- GPS/DGPS and wind data analysis software.

**Classroom Aids:**

Laptop, whiteboard, marker, projector, PowerPoint Presentation, Various materials, including textbooks, online study material, safety and health PPEs as applicable for the respective job roles

**Tools, Equipment, and Other Requirements**

Small Wind Turbine, Multimeter , Clamp meter, and Different components of wind plants

### Module 3: Identification of Tools and equipment

*Mapped to SGJ/N4055:*

**Terminal Outcomes:**

At the end of the program, the learner will be able to learn :

- About tools and equipment used in Solar and wind.
- Select the right tools to make work faster and easier.
- About the uses of tools.
- About the use of different toolkit for separate task such as installation, testing, commissioning and operation.
- Use of Spirit level, Trisquare, Water level pipe.

<b>Duration: 15:00</b>	<b>Duration: 15:00</b>
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<ul style="list-style-type: none"> <li>• Discuss the electrical tools used in Solar plants for installation, operation, and maintenance.</li> <li>• Discuss the mechanical tools used in Solar plants for installation.</li> <li>• Discuss the electrical tools used in Wind for installation, operation, and maintenance.</li> <li>• Discuss the mechanical tools used in Wind for installation.</li> </ul>	<ul style="list-style-type: none"> <li>• Identify the tools used in Solar Photovoltaic plants.</li> <li>• Demonstrate how to use tools.</li> <li>• Illustrate how to Select the right tools at the right place</li> <li>• Show how to Identify all the tools &amp; equipment needed for the erection of wind power plant components.</li> <li>• Prepare a toolkit list for installation, testing and commissioning, Operation and Maintenance.</li> </ul>



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- Discuss checking and detection of Damaged tools.
- Discuss Basic Hand Tools used in Solar Photovoltaic power plants.
- Discuss the Measuring and Testing Instruments used in Solar and Wind plants.
- Discuss the Cordless drill used for different purposes.
- Discuss about Anemometer used in Wind plants.
- Demonstrate how to use Spirit Level and where to use
- Demonstrate the use of Tri square
- Illustrate how to use Tripod Laser Beam for marking to get accuracy.
- Demonstrate how to use Water Level Pipe.
- Show how to use Socket Wrench.
- Show the use of anemometer in Wind and Solar plant

#### Classroom Aids:

Laptop, whiteboard, marker, projector, PowerPoint Presentation, Various materials, including textbooks, online study material, safety and health PPEs as applicable for the respective job roles

#### Tools, Equipment, and Other Requirements

Multimeter, Clamp meter, Screwdriver set, Socket Wrench, Ring and open-end Spanners, Wire Stripper, Wire Cutter, MC4 Opener, Lugs crimping Tool, MC4 crimping tool, Measuring Tape, Trisquare, Spirit level, Tripod laser beam, Water level pipe Wind Sim, Google Earth, Global Mapper, Megger, Hydrometer, Magnetic Flux Meter, Pyranometer, Anemometer, Tool kit Box/bag portable, Electrical Symbol and Accessories Charts, Safety Kits.



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## Module 4: Solar Photovoltaic Plant Installation Testing and Commissioning

*Mapped to SGJ/N4056:*

### Terminal Outcomes:

At the end of the program, the learner will be able to learn :

- Best Installation Techniques.
- About on-grid, off-grid and hybrid PV System.
- Installation of on-grid, off-grid, and hybrid systems.
- Installation of module mounting structure with proper orientation and tilt angle.
- About crimping, stripping and best industry practice for installation.

Duration: 20:00	Duration: 40:00
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> <li>● Process of installing the solar panel</li> <li>● Discuss the best Installation Methods</li> <li>● Overview of grid-tied PV systems and their benefits</li> </ul>	<ul style="list-style-type: none"> <li>● Demonstrate how to assess the site conditions for the safe installation of a Solar PV system.</li> <li>● Demonstrate how to assess the load to be connected to the Solar PV system and how</li> </ul>

- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>● Understanding off-grid and hybrid PV systems</li> <li>● Read and Interpret the Single Line Diagrams, Layouts, and drawings</li> <li>● Understand the DO's and Don'ts of material handling</li> <li>● Read and interpret the Bill of Material to verify the delivery of components on-site and understand performing quality checks of material</li> <li>● Understand and acquire know-how in installing electrical components including inverters, batteries, junction boxes, energy meters, and other electrical components along with performing pre-installation checks</li> <li>● Identify and acquire know-how of installation of cables and conduits.</li> <li>● Understand the dos and Don'ts of DC wiring;</li> <li>● Identify and understand the use of tools &amp; tackles used for cable and conduit installation.</li> <li>● Understand Different types of Earthing and its installation.</li> <li>● Understand and identify the significance and types of earth faults as per standards.</li> <li>● Explain about the test related with string such as voltage, short circuit current test, continuity, Polarity &amp; Cable Insulation, AC voltage (L-N, L-E, N-E)</li> <li>● Explain all the test related with MMS.</li> <li>● Explain all the test related with Inverter.</li> <li>● Explain how to do commissioning of Inverter.</li> <li>● Explain all the test related with earth resistance and continuity test.</li> </ul> | <p>to prepare the load profile.</p> <ul style="list-style-type: none"> <li>● Show anti-islanding protection of the inverter.</li> <li>● Install on-grid Solar Photovoltaic System.</li> <li>● Install Solar panels on the slanted roof.</li> <li>● Install off-grid Solar Photovoltaic Systems.</li> <li>● Install other Balance of System (BOS) such as ACDB, DCDB, inverter and install on a wooden plyboard maintaining proper distance.</li> <li>● Show how to use the End Clamp and Mid Clamp.</li> <li>● Installation of the module mounting structure in the proper orientation.</li> <li>● Demonstrate how to do the Alignment of the module.</li> <li>● Measure the orientation of the roof as well as the structure.</li> <li>● Measure the tilt angle of the Module Mounting Structure as well as the deviation from the actual.</li> <li>● Show how to measure the distance between the Inverter, ACDB, and DCDB.</li> <li>● Show how to install the Module Mounting Structure according to the AutoCAD drawing.</li> <li>● Show how to strip the wire</li> <li>● Show how to crimp the lugs</li> <li>● Show how to properly connect the MC4 connector with the cable.</li> <li>● Demonstrate all the test related with string and module mounting structure.</li> <li>● Demonstrate all the test related with inverter.</li> <li>● Show how to commission the inverter.</li> <li>● Demonstrate earth resistance and continuity test.</li> <li>● Perform commissioning of solar plant.</li> </ul> |
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### Classroom Aids:

Laptop, whiteboard, marker, projector, Powerpoint Presentation, Various materials, including textbooks, online study material, safety and health PPEs as applicable for the respective job roles

### Tools, Equipment, and Other Requirements

Clamp meter, Multimeter, Screwdriver Set, Ring spanner set, Open End spanner Set, Drilling bit, Drilling bit set, Trisquare, Spirit level, Water level pipe, Few installation videos on Solar plant installation.



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## Module 5: Wind Turbine Installation Testing and Commissioning

### Mapped to SGJ/N4056:

#### Terminal Outcomes:

At the end of the program, the learner will be able to learn :

- Best Installation Techniques.
- Installation of wind turbine as per standard operating procedure.
- About gearbox assembly .
- Assembly of blades of wind turbine
- Alignment of nacelle with centre of the tower.

Duration: 20:00	Duration: 40:00
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> <li>● Discuss best Installation Methods.</li> <li>● Explain to identify the relevant technical and schematic drawings.</li> <li>● Explain how to carry out the alignment of the turbine hub gearbox assembly with the turbine generator gearbox assembly</li> <li>● Explain how to ensure the readiness of plant and equipment for erection.</li> <li>● Identify the relevant technical drawings and schematic drawings.</li> <li>● Explain how to prepare the site for the erection of mechanical components.</li> <li>● Explain how to conduct a route survey for each WTG base point.</li> <li>● Discuss how to carry out the erection of the tower shells as per standard operating procedures.</li> <li>● Explain to perform torquing of the joints to ensure optimum tightness.</li> <li>● Discuss to carry out the correct placement of the nacelle assembly at the top of the tower shell.</li> <li>● Discuss to carry out the proper alignment of the nacelle assembly with the center of the tower foundation.</li> </ul>	<ul style="list-style-type: none"> <li>● Installation of Wind Turbine</li> <li>● Show to identify relevant technical and schematic drawings.</li> <li>● Demonstrate to identify and mark the area where the tower is to be installed</li> <li>● Demonstrate how to select the appropriate PPE (Personal Protective Equipment) to carry out the specific activity.</li> <li>● Show how to arrange all tools, tackles, equipment, and associated components</li> <li>● Perform to carry out routine cleaning of tools, machines, and equipment.</li> <li>● Show to install anemometer as per schematic drawing.</li> <li>● Demonstrate to identify ways to optimize the usage of material including water in various tasks/activities/processes.</li> <li>● Analyze the single-line diagram, technical drawings/wiring/circuit diagrams, and schematic diagrams.</li> </ul>

- Explain how to carry out fixing of nacelle assembly with the tower shell using nuts and bolts.
- Explain to carry out the assembly of blades with turbine hub using cranes.
- Explain how to carry out proper alignment of blades with the turbine hub.
- Explain how to carry out proper fixing of the turbine hub with the blades with the nacelle assembly
- Explain how to carry out proper fixing of the turbine hub with the blades with the nacelle assembly
- Explain how to perform the planning and sourcing of construction power supply
- Explain how to install allied components like lights, AHUs for control rooms, etc.
- Discuss carrying out the laying of U/G cables in trenches as per the design
- Discuss carrying out the laying of the earth mat as per design drawings.
- Explain how to Commissioning on protection relays (ABB CM-UFD. M34) using a universal relay test set and commissioning tool
- Discuss to ensure the cable connections of the generator terminal box are as per design.
- Discuss to carry out pre-installation tests like earthing resistance, coil resistance, etc.
- Explain how to carry out the installation of WTG in the nacelle assembly.
- Explain how to ensure the alignment of WTG with gearbox.
- Discuss carrying out the cable termination of WTG with the control panel.
- Discuss carrying out the installation of CMS measuring equipment and sensors as per design
- Explain how to install wind turbine's electronic components such as I/O units, programmable logic controllers, etc
- Analyze the related manuals, blueprints, and schematic diagrams to determine the tasks, tools, equipment, and parts needed.
- Demonstrate to arrangement of all the tools, tackles, and associated components needed
- Show how to perform the route survey for laying of O/H line or U/G cables.
- Demonstrate to identify ways to optimize the usage of material including water in various tasks/activities/processes
- Show to carry out routine cleaning of tools, machines, and equipment
- Show how to do Testing of Wind Turbine.
- Show how to detect faults in the wind turbine system.
- Show how to perform commissioning of Wind turbine system.
- Show how to detect faults using drone.

#### Classroom Aids:

Laptop, whiteboard, marker, projector, Powerpoint Presentation, Various materials, including textbooks, online study material, safety and health PPEs as applicable for the respective job roles



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### Tools, Equipment, and Other Requirements

Wind Sim, Google Earth, Global Mapper, Multimeter, Megger, Hydrometer, Magnetic Flux Meter, Tool kit Box/bag portable, Electrical Symbol and Accessories Charts, Safety Kits

## Module 6: Planning and Designing of Wind and Solar

*Mapped to SGJ/N4057:*

### Terminal Outcomes:

At the end of the program, the learner will be able to learn :

- About the designing of Solar Photovoltaic plant.
- About Google Earth Pro software.
- About PV Syst
- About plant Layout, Single Line Diagram using AutoCAD.
- About Helioscope.
- About designing of Wind plant.
- About hybrid plant designing.
- About Windpro Software.
- About the policy of Government for Solar and Wind.

**Duration: :30:00**

#### Theory – Key Learning Outcomes

- Explain the parameter to be kept in mind before designing an ON grid Solar Photovoltaic Plant.
- Explain how to design the solar plant using an Excel sheet and perform all the calculations.

**Duration: 60:00**

#### Practical – Key Learning Outcomes

- Demonstrate how to draw the layout of the plant for a given site location using Google Earth Pro and select the best area for Solar plant installation.
- Calculate shadow free area available and download the kmz file.
- Show how to read electricity bills.



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- Explain how to do Site feasibility using Google Earth Pro for a given Site Location.
- Explain the designing of off-grid and hybrid solar plants.
- Discuss how to do plant design using PV Syst software.
- Discuss the financial analysis and payback period calculation of the Solar Plant.
- Explain how to design a solar plant using helioscope software.
- Discuss the difference between helioscope and PV Syst Software.
- Explain how to draw an Electrical Single Line diagram using AutoCAD.
- Discuss how to draw plant layouts using AutoCAD.
- Discuss how to use Wind Pro software used for wind farm designing.
- Discuss about Mean Power density curve from Wind Atlas.
- Explain about Wind Rose diagram.
- Discuss about the Mean wind speed.
- Discuss the Wind speed variability monthly, annually, and hourly.

- Design a Solar Photovoltaic plant for a given site location and also define the maximum capacity of the plant on an Excel sheet.
- Design a Solar plant using PV Syst and perform shadow analysis.
- Calculate the performance ratio and Capacity Utilization Factor.
- Draw a Single line diagram of a plant.
- Show how to do a load assessment of a building.
- Illustrate how to read a single-line diagram.
- Design a wind plant using Wind Atlas.
- Show how to download and read the Wind rose diagram and download the wind frequency, wind speed, and wind power diagram.
- Show to download and read mean wind speed at different heights.
- Show how to view and download the Energy Yield calculation using Wind Atlas.

#### Classroom Aids:

Laptop, whiteboard, marker, projector, Powerpoint Presentation, Various materials, including textbooks, online study material, safety and health PPEs as applicable for the respective job roles

#### Tools, Equipment, and Other Requirements

PV Syst, AutoCAD, Google Earth Pro, Helioscope, Windpro, Excel



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## Module 7: Operation and Maintenance of Wind and Solar

*Mapped to SGJ/N4058:*

### Terminal Outcomes:

At the end of the program, the learner will be able to learn :

- About the visual inspection.
- About the thermography analysis.
- About the commissioning of the plant.



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- About faults in Solar and wind plants.
- About the uses of SEAWARD PV 200.

Duration: 15:00	Duration: 45:00
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> <li>● Explain how to do Visual Inspection using drone technology.</li> <li>● Explain Thermography analysis</li> <li>● Discuss how to forecast the generation.</li> <li>● Discuss types of maintenance and its importance.</li> <li>● Discuss physical cleaning of components.</li> <li>● Discuss electrical cleaning of contacts.</li> <li>● Different faults in Solar Power plant.</li> <li>● Identify required approvals and permit to work (PTW) from the concerned authority</li> <li>● Discuss to ensure that the system is shut down before carrying out work</li> <li>● Explain how to carry out maintenance activities for mechanical components of WTG as per standard operating procedures</li> <li>● Explain how to carry out testing of WTG and associated components on a universal testing machine (UTM), and compression testing machine (CTM).</li> <li>● Arrange for tools and replacement equipment from the supervisor if required</li> <li>● Explain the importance of performing repair or replacement of faulty mechanical components of wind power plants as per standard operating procedures</li> <li>● Explain how to conduct readiness tests on post-replacement equipment</li> </ul>	<ul style="list-style-type: none"> <li>● Inspect Solar and Wind power plants using drones and also do visual inspection.</li> <li>● Demonstrate IV curve tracing over on the PV panel with SEAWARD PV 220/200.</li> <li>● Demonstrate thermography analysis on solar panels.</li> <li>● Carry out testing of Strings, module mounting structure and Inverter.</li> <li>● Perform troubleshooting and rectify the faults in the plant.</li> <li>● Show to do the cleaning of the inverter fan and other components.</li> <li>● Show how to identify faults in the inverter.</li> <li>● Carry out operation of mechanical components of wind power plant</li> <li>● Carry out maintenance of mechanical components of wind power plant</li> <li>● Demonstrate to select the appropriate PPE (Personal Protective Equipment) to carry out the specific activity</li> <li>● Demonstrate perform visual inspection of the mechanical components of a wind power plant and record any defects</li> <li>● Demonstrate to measure and record parameters post-maintenance activities.</li> <li>● Demonstrate how to report to the supervisor in case of any deviations from standard values.</li> <li>● Demonstrate how to carry out repair or replacement of faulty mechanical</li> </ul>



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components of a wind power plant as per standard operating procedures.

**Classroom Aids:**

Laptop, whiteboard, marker, projector, Powerpoint Presentation, Various materials, including textbooks, online study material, safety and health PPEs as applicable for the respective job roles

**Tools, Equipment, and Other Requirements**

1kW solar plant including inverter, ACDB, DCDB, battery ,Charts and Videos for Protection relays and SEAWARD PV 200.



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## Module 8: Health and Safety Practices

*Mapped to SGJ/N4059:*

### Terminal Outcomes:

At the end of the program, the learner will be able to learn :

- Perform steps to maintain personal health, safety, and hygiene at solar project site
- Perform good housekeeping and infection control practices
- Explain the usage of Personal protective equipment at the solar project site
- Explain the usage of different tyoes of PPE for different purpose of Work

Duration: 15:00	Duration: 15:00
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> <li>● Explain to identify the requirements for a safe work area.</li> <li>● Identify a contact person for reporting the violation of safety policies at the workplace and provide information about the incident/violation.</li> <li>● Explain purpose,uses, care, maintainance and storage of all the tools and equipment together with their safety implications.</li> <li>● Explain the importance of administering first aid.</li> <li>● Identify the personal protective equipment used for the specific purpose.</li> <li>● Identify the hazards associated with photovoltaic installations including electric shock and required mitigating measures;</li> <li>● Identify work safety procedures and instructions for working at height and handling heavy material.</li> <li>● Explain the importance of occupational health and safety standards and</li> </ul>	<ul style="list-style-type: none"> <li>● Demonstrate to identify the requirements for a safe work area.</li> <li>● Demonstrate how to administer first aid.</li> <li>● Demonstrate the usage of personal protective equipment for ensuring safety during installation and O&amp;M work.</li> <li>● Show work safety procedures and instructions for working at height and handling heavy material</li> <li>● Demonstrate good housekeeping and infection control &amp; prevention practices.</li> <li>● Demonstrate how to use appropriate Personal Protective Equipment (PPE) while performing work.</li> <li>● Demonstrate how to ensure personal hygiene at the workplace.</li> <li>● Demonstrate how to identify the location of first-aid materials and how to administer first-aid.</li> <li>● Demonstrate how to participate in emergency and evacuation drills to be</li> </ul>



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<p>regulations for installation of Solar PV systems.</p> <ul style="list-style-type: none"> <li>• Incorporate good housekeeping practices and infection control guidelines.</li> <li>• safe operating &amp; handling procedures of different Wind power plants.</li> <li>• Discuss how to use the personal protective equipment required at the workplace.</li> <li>• Explain how to ensure personal hygiene at the workplace.</li> <li>• Discuss how to identify the location of first-aid materials and how to administer first-aid</li> <li>• Explain how to report immediately to concerned authorities regarding signs and symptoms of illness □</li> <li>• Explain the safety operating procedures for the collection, segregation, and transportation of recyclable waste</li> <li>• Explain the processes specified for the disposal of hazardous waste from the project site as per organizational norms</li> </ul>	<p>able to take necessary action in case of accidents, fires, and natural calamities</p> <ul style="list-style-type: none"> <li>• Perform the steps to clean and disinfect material, tools, equipment, and other supplies before starting work and after completing the job.</li> <li>• Show how to report immediately to concerned authorities regarding signs and symptoms of illness at the project site.</li> <li>• Show the safety operating procedures for the collection, segregation, and transportation of recyclable waste</li> <li>• Show the processes specified for the disposal of hazardous waste from the project site.</li> </ul>
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**Classroom Aids:**

Laptop, whiteboard, marker, projector, Powerpoint Presentation, Various materials, including textbooks, online study material, safety and health PPEs as applicable for the respective job roles

**Tools, Equipment, and Other Requirements**

Personal Protective equipment, Safety Charts



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## Module 9: Employability Skills (30 hours)

Mapped to DGT/VSQ/N0101:

### Terminal Outcomes:

#### Introduction to Employability Skills Duration: 1 Hour

After completing this programme, participants will be able to:

1. Discuss the importance of Employability Skills in meeting the job requirements

#### Constitutional values - Citizenship Duration: 1 Hour

2. Explain constitutional values, civic rights, duties, citizenship, responsibility towards society etc. that are required to be followed to become a responsible citizen.
3. Show how to practice different environmentally sustainable practices

#### Becoming a Professional in the 21st Century Duration: 1 Hours

4. Discuss 21st century skills.
5. Display positive attitude, self -motivation, problem solving, time management skills and continuous learning mindset in different situations.

#### Basic English Skills Duration: 2 Hours

6. Use appropriate basic English sentences/phrases while speaking

#### Communication Skills Duration: 4 Hour

7. Demonstrate how to communicate in a well -mannered way with others.
8. Demonstrate working with others in a team

#### Diversity & Inclusion Duration: 1 Hour

9. Show how to conduct oneself appropriately with all genders and PwD
10. Discuss the significance of reporting sexual harassment issues in time

#### Financial and Legal Literacy Duration: 4 Hours

11. Discuss the significance of using financial products and services safely and securely.
12. Explain the importance of managing expenses, income, and savings.
13. Explain the significance of approaching the concerned authorities in time for any exploitation as per legal rights and laws

#### Essential Digital Skills Duration: 3 Hours

14. Show how to operate digital devices and use the associated applications and features, safely and securely
15. Discuss the significance of using internet for browsing, accessing social media platforms, safely and securely

#### Entrepreneurship Duration: 7 Hours

16. Discuss the need for identifying opportunities for potential business, sources for arranging money and potential legal and financial challenges

#### Customer Service Duration: 4 Hours

17. Differentiate between types of customers
18. Explain the significance of identifying customer needs and addressing them
19. Discuss the significance of maintaining hygiene and dressing appropriately

#### Getting ready for apprenticeship & Jobs Duration: 2 Hours

20. Create a biodata
21. Use various sources to search and apply for jobs
22. Discuss the significance of dressing up neatly and maintaining hygiene for an interview
23. Discuss how to search and register for apprenticeship opportunities



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# Annexure

## Trainer Requirements

Trainer Prerequisites						
Minimum Educational Qualification	Specialization	Relevant Industry Experience		Training Experience		Remarks
		Years	Specialization	Years	Specialization	
Graduate/Diploma (Technical)		Two years of relevant experience in Renewable Energy				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-organized and focused, eager to learn and keep oneself updated with the latest in the mentioned field.

**Certified under relevant Craft Instructor Training Scheme (CITS) Course**

Trainer Certification	
Domain Certification	Platform Certification
Domain certification on Renewable Energy mapped to QP: "SGJ/Q4008 Version 1.0". The minimum accepted score as per SCGJ is 80%.	Recommended that the Trainer is certified, and mapped to the Qualification Pack: "MEP/Q2601, V2.0". The minimum accepted Score as per SCGJ is 80%.



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## Assessor Requirements

Assessor Prerequisites						
Minimum Educational Qualification	Specialization	Relevant Industry Experience		Training Experience		Remarks
		Years	Specialization	Years	Specialization	

Graduate/Diploma (Technical)

Ten years of relevant experience in Renewable Energy

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-organized and focused, eager to learn and keep oneself updated with the latest in the mentioned field.

Have worked as a Jury member/expert in skill competitions and other competitions of similar nature at regional/national levels

Trained/mentored competitors for India Skills/ WorldSkills competitions (national/ international)

**Certified under relevant Craft Instructor Training Scheme (CITS) Course**

Assessor Certification	
Domain Certification	Platform Certification
Domain certification on Renewable Energy mapped to QP: "SGJ/Q4008 Version 1.0". The minimum accepted score as per SCGJ is 80%.	Recommended that the Assessor is certified, and mapped to the Qualification Pack: "MEP/Q2701", V2.0. The minimum accepted Score as per SCGJ is 80%.



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## Assessment Strategy

This section includes the processes involved in identifying, gathering, and interpreting information to evaluate the Candidate on the required competencies of the program.

Assessment is governed by the WorldSkills Assessment Strategy. The Strategy establishes the principles and techniques to which WorldSkills assessment and marking must conform. Expert assessment practice lies at the heart of the WorldSkills Competition. For this reason, it is the subject of continuing professional development and scrutiny. The growth of expertise in assessment will inform the future use and direction of the main assessment instruments used by the WorldSkills Competition: the Marking Scheme, Test Project, and Competition Information System (CIS).

Assessment at the WorldSkills Competition falls into two broad types: Measurement and Judgement. For both types of assessment, the use of explicit benchmarks against which to assess each Aspect is essential to guarantee quality.

The Marking Scheme must follow the weightings within the Standards. The Test Project is the assessment vehicle for the skill competition, and therefore also follows the Standards. The CIS enables the timely and accurate recording of marks; its capacity for scrutiny, support, and feedback is continuously expanding. The Marking Scheme, in outline, will lead the process of Test Project design. After this, the Marking Scheme and Test Project will be designed, developed, and verified through an iterative process, to ensure that both together optimize their relationship with the Standards and the Assessment Strategy. They will be agreed by the Experts and submitted to WSI for approval together, to demonstrate their quality and conformity with the Standards. Prior to submission for approval to WSI, the Marking Scheme and Test Project will liaise with the WSI Skill Advisors for quality assurance and to benefit from the capabilities of the CIS.



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## Glossary

Term	Description
<b>Declarative Knowledge</b>	Declarative knowledge refers to facts, concepts, and principles that need to be known and/or understood to accomplish a task or to solve a problem.
<b>Key Learning Outcome</b>	A key learning outcome is a statement of what a learner needs to know, understand, and be able to do to achieve the terminal outcomes. A set of key learning outcomes will make up the training outcomes. Training outcome is specified in terms of knowledge, understanding (theory), and skills (practical application).
<b>OJT (M)</b>	On-the-job training (Mandatory); trainees are mandated to complete specified hours of training on-site
<b>OJT (R)</b>	On-the-job training (Recommended); trainees are recommended the specified hours of training on-site
<b>Procedural Knowledge</b>	Procedural knowledge addresses how to do something, or how to perform a task. It is the ability to work or produce a tangible work output by applying cognitive, affective, or psychomotor skills.
<b>Training Outcome</b>	Training outcome is a statement of what a learner will know, understand, and be able to do <b>upon the completion of the training.</b>
<b>Terminal Outcome</b>	Terminal outcome is a statement of what a learner will know, understand, and be able to do <b>upon the completion of a module.</b> A set of terminal outcomes helps to achieve the training outcome.



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## Acronyms and Abbreviations

Term	Description
QP	Qualification Pack
NSQF	National Skills Qualification Framework
NSQC	National Skills Qualification Committee
NOS	National Occupational Standards