

# Participant Handbook

Sector  
**Green Jobs**

Sub-Sector  
**Renewable Energy**

Occupation  
**Installation, Operation and Maintenance**

ReferenceID: **SGJ/Q0111 Version-1.0 NSQF Level 2**



**Solar PV Project  
Helper**





**Certificate**

**COMPLIANCE TO  
QUALIFICATION PACK – NATIONAL OCCUPATIONAL STANDARDS**

is hereby issued by the

**SKILL COUNCIL FOR GREEN JOBS**

for

**SKILLING CONTENT : PARTICIPANT HANDBOOK**

Complying to National Occupational Standards of  
Job Role/ Qualification Pack: **'Solar PV Project Helper'** QP No. **'SGJ/Q 0111 NSQF Level 2'**

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*Dr. Praveen Saxena*  
**Dr. Praveen Saxena**  
Authorised Signatory  
(Skill Council for Green Jobs)

\*Valid up to the next review date of the Qualification Pack or the  
'Valid up to' date mentioned above (whichever is earlier)

## Acknowledgements

National Skill Development Corporation (NSDC) working with the object of developing unskilled and semi-skilled labour force into productive and skilled labour through Sector Skill Councils (SSCs) and Assessment agencies has entrusted the responsibility of developing participant handbooks with National Instructional Media Institute (NIMI).

NIMI, set up by the Government of India to develop instructional material for the overall improvement in the standard of training in ITIs and skill development programmes is happy to widen the scope of its outreach by developing content for NSDC.

NIMI sincerely acknowledges the co-operation rendered by the media developers and their sponsoring organisations to bring out the participant handbook under Green Jobs Sector for Qualification Pack for Solar PV Project Helper.

This book is the outcome of teamwork by Green Job Sector Skill Council and experts from the construction industry.

NIMI thanks the media development committee members, data entry operators, CAD personnel, reviewer, editors and all others for their dedicated and continued support.

## About this book

Government of India cares more for the planet Earth and protects it from global warming through the exponential growth in Renewable energy capacity pushing coal to shade. Remarkably, since 2014 the electricity generated through renewable energy resources such as solar, wind, hydro and bio mass has been doubled from cumulative capacity of 35500 MW in 2013-14 to 70000 MW in 2017-18.

As on 2018 India stands in sixth place globally in solar electricity production. The installations unbelievably surpassed the target with current plants on going at 15000 MW and those tendered for 25000 MW are already on cards with a total estimate of 110000 MW against earlier expected 100000 MW by 2020. Hence the target is proudly revised by the Government of India to 175000 MW by 2022. This could be our cumulative renewable energy installation capacity in 2022.

If only solar energy is considered it has increased eight times since 2013-14. That is, in 2013-14 the solar energy installed capacity was 2630 MW and in 2017-18 the same is 22000 MW.

The benefits of these developments not only include reduction in energy cost, but also saving the planet against environment pollution, and also retaining the coal for some more years. It also gives way for huge manpower development in India. There are many needs for skilled Indian youths for installing, commissioning, operating and maintaining the solar photovoltaic electrical plants in all parts of the country. Every state has its own nodal agency to implement state's solar policy at par with global counterparts. There exists a healthy competition among the states in promoting the projects supporting government of India's plans to achieve the target in time.

The training for **Solar PV project helper** job role is a boon for the Indian youths who may not be having an opportunity to even complete their school education, and who is looking for a break through to earn on their own efforts to meet their both ends. Obviously the youths after this training can make a good start as a Solar PV project helper and in due course they can upgrade themselves to a higher level.

This study material has been developed to meet the thoughtful skill needs of the job role in the Solar energy field. This will guide the helper to get the expertise needed. The Indian youth will get complete utilization by the contents given in this book.

Jai Hind.

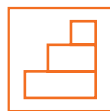
NOS code	Major function/Task
1. SGJ/N0130:	Assist in Installation and Maintenance of Solar PV Power Plant
2. SGJ/N0131:	Assist in Installation and Maintenance of Off-grid Solar System
3. SGJ/N9148:	Maintain Personal Health and Safety at Workplace

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## Symbols Used



Key Learning  
Outcomes



Steps



Unit  
Objectives



Notes



Tips



Exercise



Practical

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## 1. Introduction

Unit 1.1 Introduction to the Training Programme

Unit 1.2 An overview of the Solar Green Jobs Sector

Unit 1.3 Solar PV Project Helper Job Role









## UNIT 1.1 Introduction to the Training Programme

### Unit Objectives

At the end of this unit, you will be able to:

1. recognise the importance of green jobs sector
2. identify the purpose of the training
3. state National Occupation Standards and Qualification Pack
4. describe the green job sector.

### 1.1.1 Green job Sector

At the end of this topic, you will be able to:

1. get an idea about the Skill Council for Green Jobs.

Green Jobs sector demonstrates the use of renewable energy as a viable approach. It is a policy instrument for clean local development. It brings poverty reduction through the creation of direct green jobs. Indirectly, it induces decent work opportunities in small enterprises all over the country providing growth potential to enter the global market through Make in India initiatives. Skill Council for Green Jobs covers the following Sectors:

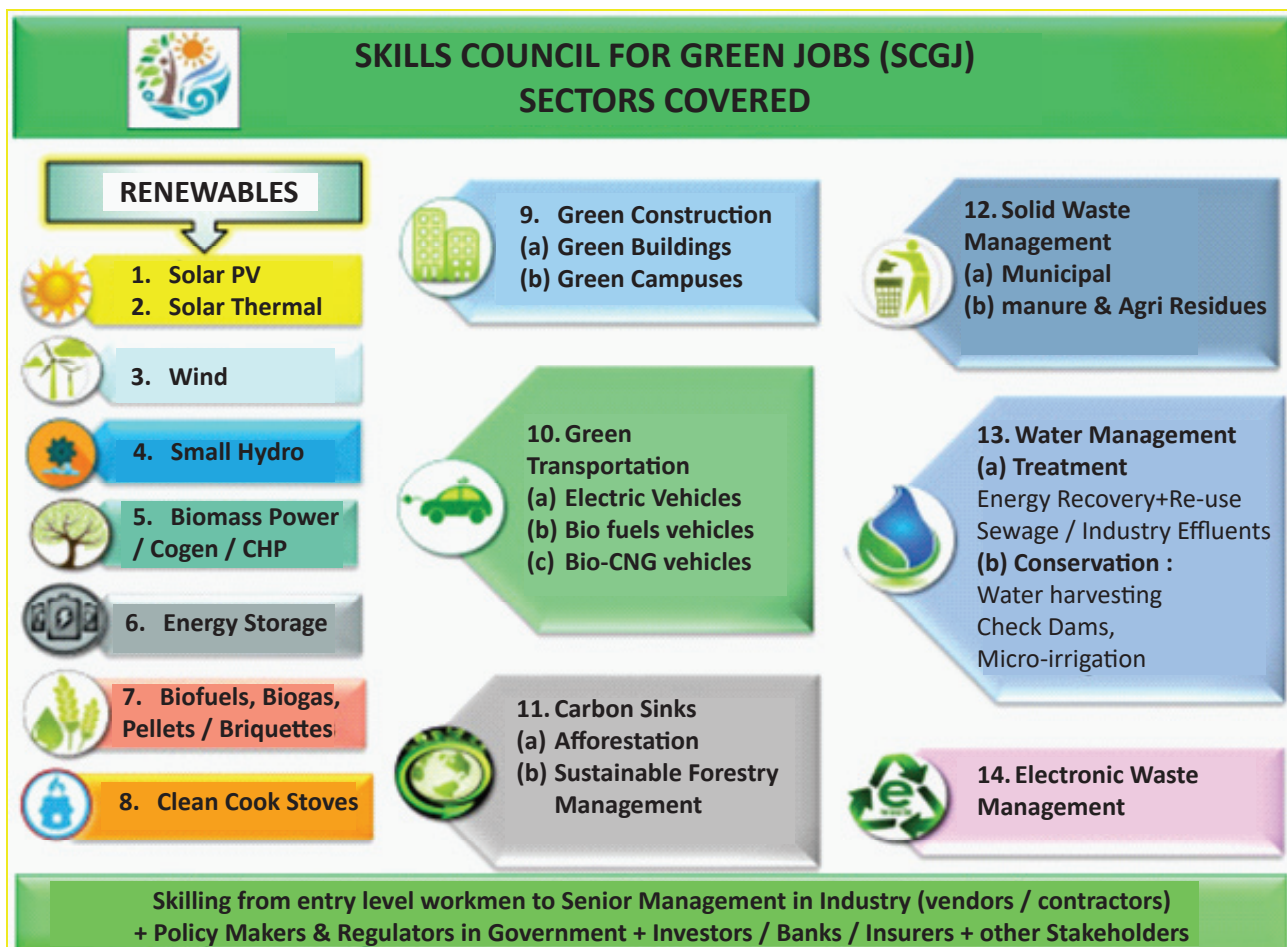


Fig. 1.1.1 Green Job Sector

### 1.1.2 Purpose of Training

**At the end of this topic, you will be able to:**

1. explain the utility of this training.

This training brings an opportunity to the trainees to enter the world of trending “Green technology” as a helper and practice necessary skills in the solar PV field. In the process he/she can acquire enough national market ideas and eventually grow as an independent contractor. The training includes a lot of practical exercises in the workshop as well as in the field. The training can extend from 6 to 8 weeks. Assessment carried out on each trainee results in a qualified and certified, field-ready helper for solar PV plants.

### 1.1.3 National Occupation Standard and Qualification Pack

**At the end of this topic, you will be able to:**

1. identify the meaning of SSC, QP, NOS etc
2. identify the qualification package and NOS relevant for the training.

Sector Skill Council (SSC) comprises well defined broad collection of skill domains of similar characteristics. Under SSC different sectors are identified with connected skills that are commonly required to do major activities in a set of organizations.

Each sub sector has significant Occupation Standards (OS). OS specify the standards of performance an individual must achieve when carrying out a function in the workplace. It includes the knowledge and understanding they need to meet the requirements of the standard consistently. Occupational Standards are applicable both in the Indian and global contexts.

QP comprises a set of NOS, together with the educational training and other criteria required to perform a job role. A QP is assigned a unique qualifications pack code. NOS are specific to Indian industries.

Job role is defined as a unique set of functions that together form a unique employment opportunity in an organization. Different job roles are found in each NOS.

The Qualifications Pack (QP) code relevant to the modules is SGJ/Q0111. It has the following three applicable National Occupational Standards (NOS) which are of compulsory nature for this QP:

NOS code	Function /Task
1. SGG/N0130:	Assist in Installation and Maintenance of Solar PV Power Plant
2. SGJ/N0131:	Assist in Installation and Maintenance of Off-grid Solar Systems
3. SGJ/N0148:	Maintain Ppersonal Health & Safety at Workplace

Since this is a growing market with emerging technologies, this job role has more opportunities in the field.

The training shall enables the trainee to get awareness and practice to assist in site survey, erection, commissioning and maintenance activities for solar PV power plants and off-grid solar systems.

After successful completion of training and passing the assessment, the candidate will be issued a certificate. The certificate will help the candidate get employment and earn better wages than an untrained person.

### Exercise

**I. Answer the following questions.**

1. What does a QP consist of?

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## UNIT 1.2 An Overview of the Green Jobs Sector

### Unit Objectives

**At the end of this unit, you will be able to:**

1. identify different job roles under green jobs sector
2. identify employment opportunities in renewable energy sector
3. list the importance of solar energy
4. identify solar energy policy of the Indian Government and the regional variations
5. describe the benefits of the solar power plants.

### 1.2.1 Renewable Energy Industries and Opportunities

**At the end of this topic, you will be able to:**

1. understand briefly about the various industries in the Green jobs sector.

The Sector Skill Council is “Skill Council for Green Jobs”. This includes around 18 subsectors such as Renewable Energy, Green Transportation, Green Construction, Waste Management, Water Management, Co-Generation and Other Green Jobs.

Solar Photovoltaic (PV) is one subsector under Renewable Energy. Actually five occupations are identified under the Solar PV subsector.

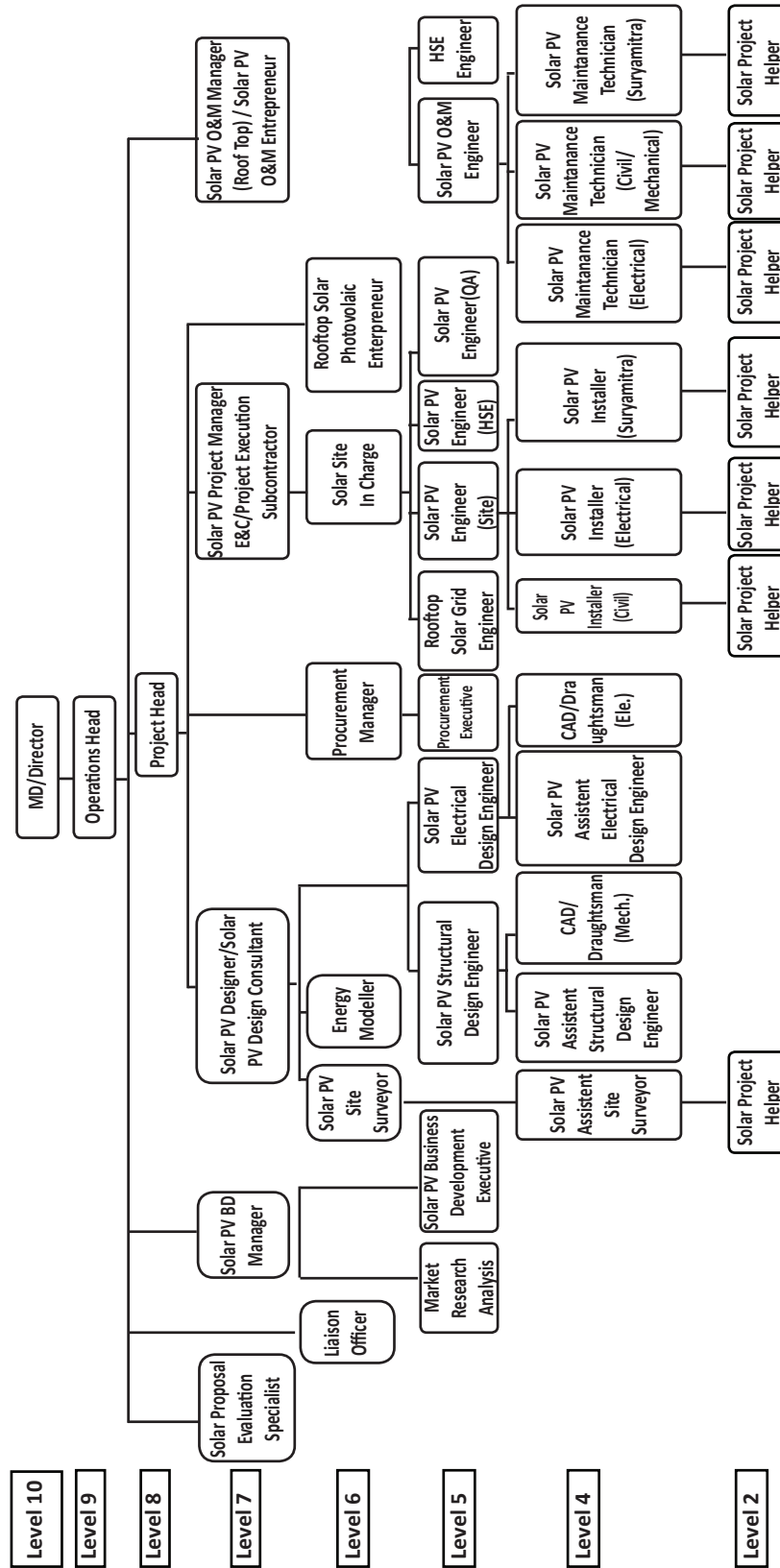


Fig. 1.2.1 Solar PV plant

## National Occupation Standards in Solar PV

Sl. No.	Qualification Pack Title	QP Code	NSQF level
1	Solar PV Installer (Suryamitra)	SGJ/Q0101	4
2	Solar PV Installer - Electrical	SGJ/Q0102	4
3	Solar PV Installer - Civil	SGJ/Q0103	4
4	Rooftop Solar Photovoltaic Entrepreneur	SGJ/Q0104	6
5	Solar Proposal Evaluation Specialist	SGJ/Q0105	7
6	Rooftop Solar Grid Engineer	SGJ/Q0106	5
7	Solar PV Business Development Executive	SGJ/Q0107	5
8	Solar PV Site Surveyor	SGJ/Q0108	6
9	Solar PV Structural Design Engineer	SGJ/Q0109	5
10	Solar PV Designer	SGJ/Q0110	7
11	Solar PV Project Helper	SGJ/Q0111	2
12	Solar PV Engineer (Option: Water pumping system)	SGJ/Q0112	5
13	Solar Site In-charge	SGJ/Q0113	6
14	Solar PV Project Manager (E&C)	SGJ/Q0114	7
15	Solar PV Maintenance Technician - Electrical (Ground Mount)	SGJ/Q0115	4
16	Solar PV Maintenance Technician - Civil (Ground Mount)	SGJ/Q0116	4
17	Solar PV O&M Engineer	SGJ/Q0117	5
18	Solar Off Grid Entrepreneur	SGJ/Q0118	5
19	Solar Lighting Technician (Options: Home lighting system / Street lights)	SGJ/Q0119	4
20	Solar PV Manufacturing Technician	SGJ/Q0120	4

As per the skill gap report developed by Skill Council for Green Jobs, approximately 2.3 lakh Solar PV Project helpers will be required across the solar PV domain in India itself by 2025. It means there is a huge requirement of Solar PV Project helpers in EPC (Erection, Procurement and Commissioning), O&M, Manufacturing and off grid sectors. Solar PV helpers may be employed by the organizations conducting site survey, site preparation, logistics of solar PV components, installations of Solar PV plants, maintenance of solar PV plants. Helpers will assist their supervisors in Installation and Maintenance of on-grid as well as off-grid solar PV power plants. They will also carry out their work with all the required personal health and safety.



## 1.2.2 Solar Photovoltaic Power Plant

At the end of this topic, you will be able to:

1. get a broad idea on categories of solar energy based technologies
2. differentiate between thermal based and light based solar energy utilization techniques.

Solar technology is broadly classified as Solar Thermal and Solar Photovoltaic applications. Solar Thermal is based on heat from sunlight and uses tube, box or concentrator type collectors for tapping the energy. Its applications are for cookers, water heaters and agricultural products most of which are not yet popular. Solar Thermal electricity plants are a more viable solution for our power needs.

On the other hand, Solar Photovoltaic power plants use components like PV panel, charge controller, inverter and battery to produce electricity. Most of the Solar PV integrator companies work in this area and promote Government policies. Hence more Solar PV Project Helpers are in demand.

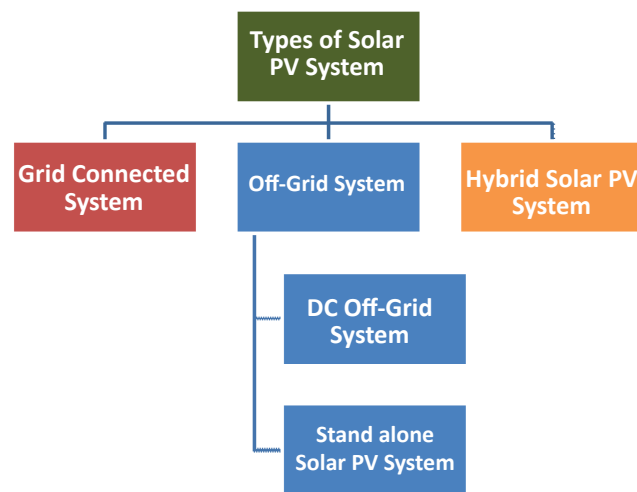


Fig. 1.2.2 Different Types of Solar PV Systems

## 1.2.3 Government of India’s Energy Policies

At the end of this topic, you will be able to:

1. understand Government of India’s energy policy
2. appraise the growth over the recent years in solar energy utilities
3. explain with reasons to work in this sector.

Installed solar PV on 31 March 2018	
Year	Cumulative Capacity (in MW)
2010	161
2011	461
2012	1,205
2013	2,319
2014	2,632
2015	3,744
2016	6,763
2017	12,289
2018	21,651



India has set an ambitious target of reaching 175 GW of installed capacity from renewable energy sources by the year 2022. It which includes 100 GW of solar and 60 GW of wind power capacity. Various policy initiatives have been taken to achieve this target. At the end of 2017-18, the total renewable power installed capacity in the country was almost 70 GW.

The knowledge on our Government of policies will help us to understand the need of manpower in Solar PV plant installation, operation and maintenance.

As a Solar PV Project Helper one can plan to obtain enough experience in ongoing projects with a futuristic approach to develop as an integrator. This would be possible by upgrading oneself through various training programmes organized from time to time.

Updated details of renewable energy generation, utilization and demand in different states of India is available in MNRE website. Cost of projects, cost of electricity, etc., can also be obtained to have an effective plan.

### 1.2.4 Advantages of Using Solar Electricity

Normally, people feel solar PV plants are of high cost. But in reality, it has a high initial investment with low recurring expenditure. Immediately after installation the cost of electricity becomes free when the sun shines. When we go for backup power using battery an extra cost prevails.

Solar plants are environment friendly since there is no wastage, smoke and noise generated from these plants as compared to other types of power generation plants. Coal based Thermal power plants are the most polluting ones and generate a lot of ash waste which is not easy to dispose.

#### Exercise

I. Answer the following questions.

1. What are the skills that a Solar PV Project Helper has to develop to assist in the Solar PV plants?

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2. What is the minimum area required for installation of 1 Kilowatt Solar PV plant?

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3. What is the installed capacity of all grid connected solar plants in India till March 2018?

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4. Compare the effectiveness of the Solar PV plant with a coal based Thermal power plant.

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#### Notes

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## UNIT 1.3 Solar PV Project Helper Job Role

### Unit Objectives

**At the end of this topic, you will be able to:**

1. identify job role of solar PV project Helper
2. list the responsibilities of a solar PV project Helper
3. list the activities to be done in a solar plant.

### 1.3.1 Role of Solar PV Project Helper

**At the end of this topic, you will be able to:**

1. understand the importance of the job role.

Solar PV power plant projects are growing rapidly and there is more demand the future too. Solar PV Project Helper will assist the site supervisor, technicians and project head during installation, commissioning, operation and maintenance of Solar PV power plants.

The job role is required for all project types starting from rural and interior areas to urban, national and international spaces. Hence, the scope of employment for Solar PV Project Helper is on the rise.

There are multiple skills such as civil, electrical, mechanical, control room assistance and report generation. Therefore, Solar PV Project Helper will not have monotony in work. Change of work on rotational basis is an added advantage within this short module of training.



*Fig. 1.3.1 Role of Solar PV Project Helper*

### 1.3.2 Activities of Solar PV Project Helper

At the end of this topic, you will be able to:

1. appraise the duties of the Solar PV project helper
2. learn the technical details about in Solar electricity
3. plan to obtain the necessary skills to work efficiently.

The job of the Solar PV project Helper requires the individual to concentrate on the work at hand and complete it without any accidents. Awareness and adherence to safety protocols are critical attributes for individuals performing this role.

The candidate must be good at following the instructions of the supervisor. Solar PV Project Helpers shall assist in site survey, erection and commissioning activities and maintenance activities for solar PV power plants and off-grid solar systems. The work may be in the rooftop of buildings of schools, colleges, restaurants, houses, hospitals, government offices, railway stations, bus stations/stands, resorts, apartments and similar places. The work may be in open grounds, fields, converted sites, water bodies and different terrains.

The capacity of the plants may be from 1 KW to large mega Watts. It may also be limited to small installations but in large numbers such as automatic street lights, solar water pumps for irrigation, etc. Future expansion possibilities for waste water treatment and similar areas where need-based huge investment prospects are to grow very rapidly. Hence the overall manpower requirement is assured and projected to grow in installation, operation and maintenance activities.

#### Exercise

I. Answer the following questions.

1. What are activities that a Solar PV Project Helper is supposed to do?

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2. What is the nature of work to be done available in a solar PV plant?

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#### Notes

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## 2. Assist in Installation and Maintenance of Solar PV Power Plant

Unit 2.1 Identification of tools and components

Unit 2.2 Assist in the Activities at a Solar PV Power Plant Site

Unit 2.3 Completing the work



