

CONCEPTS TO COMMISSIONING OF SOLAR POWER PLANTS

(16 January to 03 February 2023)

Duration: 3 Weeks

AIM

Electricity has been the backbone infrastructure facility of any country covering almost every aspect of human life, fast increase in demand over past few years, requiring huge generating capacity with enough reserve margins. Increasing environmental awareness and stringent regulatory norms are posing lot of restrictions on conventional power generation plants. These sources being sustainable and environment friendly gaining more popularity all over the globe. Recently with the growth in manufacturing and development in material technologies solar power generation has become competitive to conventional sources. Further depleting resources and ill effects of conventional power sources such as greenhouse gas emission are also concerning factors. Solar Energy being abundantly available in most of the countries provide an edge in this way over many sources. If adopted on a large scale, by improving the efficiency of the system, the cost of solar power generation can be brought down considerably minimizing the effect of Green House Gases. Many organizations world over are progressing in this direction steadfastly. Solar and wind plays vital importance in the energy basket of a generation utility India being one of major solar power generation country offers an unique example as a case study. In this scenario, this programmes is designed with objective to provide a detail technical, commercial and managerial knowledge on concept to commissioning of solar power plants.

OBJECTIVES/OUTCOME

- To familiarize on the issues and challenges in conventional power plants.
- To make participants aware about design concepts and O&M Practices of solar power generation with recent developments in solar power generation technologies
- To discuss Best Practices in O&M and protection for solar power plant
- Indian perspective on management and commercial aspects of solar power generation

CONTENTS OF THE COURSE

Global overview of solar power generation

Concepts and policies, solar power generation in India and Jawaharlal Nehru National Solar Mission (JNNSM), Policies and motivation, Case studies of global leaders in renewable power generation

Solar Thermal Power Generation technologies

Heat transfer from Sun, Concepts of Solar power generation, radiation analysis and measurement, Basic Concepts of solar thermal power generation, Issues and challenges in solar thermal power systems, applications for power Generation (High temp. System) Solar Collectors, Types, Parameters, classification of collectors, materials, and its relative efficiency

Solar Photo Voltaic Power Generation

Solar Photo voltaic, Principles & Technologies, Development of Photovoltaic Technology
Solar Cell Modules, Types of cells, Cell construction, selection, testing and applications and latest trends in the design of Solar Power Plants

Design concepts of Photovoltaic Systems

PV modules and arrays - PV Systems types– Stand alone and grid connected – Load estimation – Sizing of the PV array, battery, inverter, etc. – Maximizing efficiency of sub-systems – Balance systems – Single axis and two axis tracking at optimum inclination of the PV array, Power conditioning and control – Maximum Power Point Trackers, Charge controllers/regulators, DC/DC Converters, DC/AC inverters Selection criteria, Safety issues

Typical applications of PV Hybrid systems

Solar PV-Wind, PV-Diesel, PV-Bio mass – System

Sizing and designing examples: Domestic loads, Water pumping, Lighting (using CFLs, White LEDs) - hybrid systems, village power packs – Installation practices

Indirect methods of Solar Energy conversion and Concepts of DDG

Wind energy and Biomass System, Interconnection of multiple renewable sources, Opportunities in Rural Electrification and De-centralized Distributed Generation

Economics, analysis and Project Planning

Life Cycle Cost analysis – Environment impacts of PV – Green buildings – Potential for GHG emission reduction of installed PV systems - stand alone, Grid connected, etc.

Preparation of detailed project reports, Stipulations under Solar Cost Benefit Analysis, and Tariff fixation in cases of Decentralized Distributed Generation

Project planning, DPR Preparation, Project execution and Monitoring Practices

Trouble shooting and Operation and Maintenance practices

Best Practices in Operation and Maintenance of Solar Power generation Plant, Testing of equipment and material, calculation of performance, etc

General Management:

Change Management, Time Management & Business Communication, Work Life Balance

Case Studies of Tariff, DPR and Ultra Mega Solar Power Projects in India

Project and case studies:

Based on the topic a case studies and projects will be offered to participants to give more practical exposure.