**CONCEPTS TO COMMISSIONING OF SOLAR POWER PLANTS**

**Duration: 5 Weeks**

**AIM:**

Electricity has been the backbone infrastructure facility of any country with its manifold applications covering almost every aspect of human life style, resulting in galloping demand requiring huge generating capacity in addition to enough reserve margins in the system.

Fuel choice itself is a vital consideration in creating power stations, in as much as, every unit that is generated pollutes the atmosphere further, unless CDM practices and clean and Green Power Generation is resorted to, to the hilt. But non-availability of such fuels in the required quantities, operational constraints leading to poor efficiency and low plant load factor, seasonal generation at high costs, inadvertent supply at voltages beyond the reach of load dispatching are some of the problems associated with clean power technologies, making them unsuitable for firm power supply.

Despite the above cited inefficiencies, encouragement to Non-Conventional Energy based Power Plants is essential for safe guarding environment from total degradation. Further, Fossil fuel stocks are fast dwindling and there is a need to identify alternative sources of power supply in order to maintain per capita consumption of the humanity.

Against this scenario, the Solar Power Plants provide a better opportunity as this source is endless if only the cost of generation can be brought down to affordable level. 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.

**OBJECTIVES**

* To familiarize on the developments in solar power generation technologies
* To make participants aware about design concepts and O&M Practices of solar power generation
* To discuss Best Practices in O&M and protection for solar power plant

**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, Stirling and Breyton cycles, Solar thermal power generation, Solar steam engine and turbines, parabolic trough power plants, Issues and challenges in solar thermal power systems etc

**Design of Solar Thermal Power Generation System**

Tower concept of Solar 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

**Field visits:**

Visits to solar power plants and Cell, panel manufacturing units