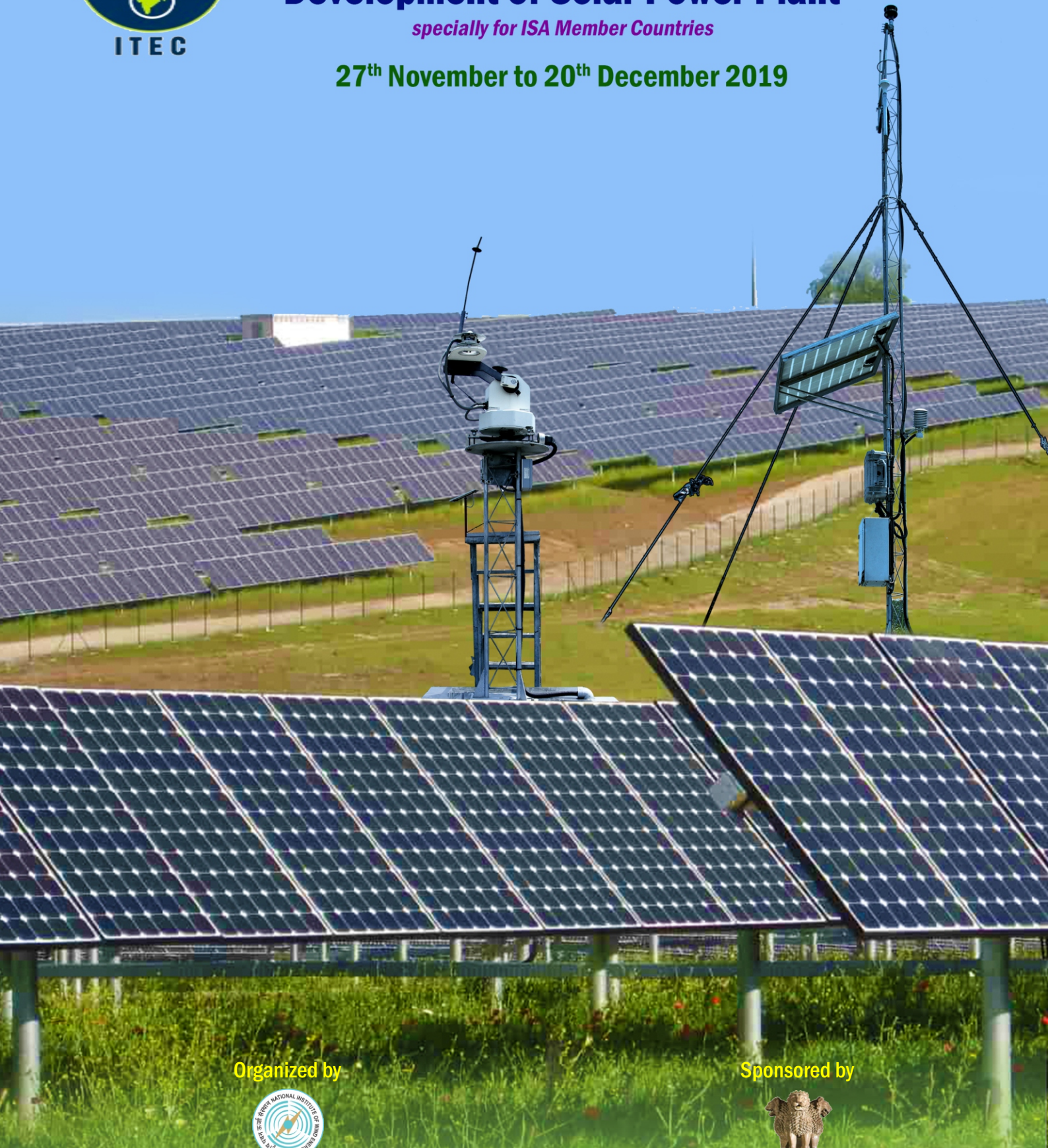




**Special International Training Course on  
Solar Resource Assessment and  
Development of Solar Power Plant**

*especially for ISA Member Countries*

**27<sup>th</sup> November to 20<sup>th</sup> December 2019**



**Organized by**



**NATIONAL INSTITUTE OF WIND ENERGY**

Ministry of New and Renewable Energy, Government of India  
**Chennai**

**Sponsored by**



**MINISTRY OF EXTERNAL AFFAIRS**

Government of India  
**New Delhi**



## Introduction

Renewable Energy, particularly, Wind & Solar has become the mainstay in the present day energy mix in the grid and has achieved grid parity in terms of cost as well as technical requirement. Worldwide growth of solar energy, through solar photovoltaic power is riding high with global cumulative achievement of 486 GW. China leading with 175 GW of installed capacity, followed by Japan 56, USA 51, Germany 46 and India 28 GW. The countries across the world has formed International Solar Alliance (ISA) to ensure smooth transition to solar energy. With ever-increasing penetration of solar energy in to the grid, it is imperative to develop skilled manpower to meet the growing requirement of the solar industry.

The National Institute of Wind Energy (NIWE), Chennai an autonomous institution of the Ministry of New and Renewable Energy (MNRE), Government of India, primarily for the development of wind power in India, is making its presence felt in the solar energy applications too. NIWE has established world's largest network to measure solar and weather parameters to develop bankable and investor grade data for the benefit of solar industry in the country through Solar Radiation Resource Assessment (SRRA) project. Realizing the immense potential of solar energy in India, MNRE implemented SRRA project through NIWE. As part of the project NIWE established world's largest solar radiation monitoring network, spread in 125 locations across India. Prior to 2011, availability of ground measured solar radiation data was limited to the data compiled & published by India Meteorological Department (IMD) stations and satellite data as part of weather forecasting & modelling. The data collected by IMD is generally used for weather forecasting & modelling. This data was thus inadequate and not suitable for solar power applications. As solar power plants are capital intensive, accurate measurement of incoming radiation is very critical in assessing site suitability, feasibility and analysis of plant performance vice versa incoming solar radiation and the energy yields of solar power plants vary not only according to plant design & technology but also to local weather and environmental conditions.

In order to provide bankable, investor grade data, for the benefit of solar power developers, NIWE launched the national program in 2010 and established world class network of SRRA stations across the country and providing the reliable solar and weather data required for solar developers and financial institutions etc since, 2012. A typical SRRA station is made grid independent by providing solar power, consists of two towers of 1.5 m and 6 m tall. The 1.5 m tall tower is equipped with a solar tracker, one Pyrheliometer and two pyranometers (one with shading disc) to measure direct, global and diffused irradiance respectively. The 6 m tall tower houses meteorological sensors for measuring ambient temperature, relative humidity, atmospheric pressure, wind speed & direction, rain fall and a state-of-the-art data acquisition system. The solar sensors are traceable to World Radiation Centre/World Radiometric Reference (WRC/WRR) and the meteorological sensors are traceable to the World Meteorological Organization (WMO) respectively. In order to maintain the quality of data, BSRN QC procedures

are adopted and as per the international standard practices, the solar sensors are calibrated every two years in the in house calibration facilities set up in three locations, Chennai, Tiruvallur and Delhi using World's best Primary and Secondary standards. In view of best international practices followed by NIWE, four SRRA stations are included in the BSRN Global Net Work for the first time in India and second country in Asia after Japan to join the exclusive global club. Around 64 member countries of this prestigious club share the data for climate change activities. Using the data generated from these SRRA stations, NIWE launched Indian Solar Radiation Atlas, Wind-Solar Mobile Apps, besides assisting policy makers, funding agencies, solar developers, consultants, satellite data providers and RE power forecasters etc. The project was commenced disseminating generated solar data from January 2012 and NIWE has developed Quality Control protocol based on Baseline Surface Radiation Network (BSRN) standards to maintain the quality of the data and maintaining all the stations as per the international standards. During last few years, NIWE has gained expertise in solar data analysis, site feasibility studies, potential solar mapping, calibration of solar sensors, energy estimations, SPV power plant installation and O&M activities etc.

Decades of concerted efforts have started to yield gratifying results and today, India's installed solar power reached 28,180 MW (7.89%), of the total Indian energy mix of 3,56,817 MW and stands fifth worldwide, in terms of installed solar PV power. With the vast expertise gained in the wind and solar energy sector, NIWE has all the capabilities to disseminate the knowledge it gained to foster growth of solar energy across globe especially to the member countries of International Solar Alliance. In this context, a four week specially designed International Training Course on "Solar Resource Assessment & Development of Solar Power Plant" is scheduled by NIWE with the sponsorship of Ministry of External Affairs (MEA), Government of India, under ITEC program. NIWE to its credit has successfully conducted about 100 training courses on Wind and Solar for National and International participants and trained over 3000 national and 1000 International participants across the globe.

## Objectives

- The prime objective is to transfer knowledge and special skills to the international participants.
- To build skilled human resource so that there will be advancement of solar energy in the participating country.
- To provide an invaluable platform for exchange of professional and cultural experiences among diverse participants.
- To leverage the research that continues to shape this rapidly evolving discipline.

## Course Syllabus

The course content for the training has been carefully thought out syllabus with specific subject experts giving lectures and going through specific case studies such that, at the end of the course, considerable useful knowledge transfer is perceived.

The course will address the following aspects:

- Basics of solar energy
- Basics of solar radiation
- Solar radiation resource assessment
- Solar radiation database
- Solar resource mapping
- Site feasibility studies
- Economic analysis & project cost estimation
- Preparation of Detailed Project Report

- ☞ Site assessment & planning
- ☞ Solar Photovoltaic plant design, installation, commissioning and testing
- ☞ Energy yield estimation & performance ratio
- ☞ Technical audit & performance guarantee test
- ☞ Environmental safety aspects
- ☞ O & M aspects of SPV plants
- ☞ Project management
- ☞ Hands on experience on PV related software
- ☞ Solar off-grid systems
- ☞ Solar roof top/ground tied systems
- ☞ Solar thermal technology
- ☞ Energy storage systems
- ☞ Solar powered vehicles
- ☞ Solar water pumping systems
- ☞ Solar water heating systems
- ☞ Floating solar power plants
- ☞ Solar forecasting

Additional lectures would also be organized while visiting solar power plants and manufacturing facility to give a complete picture of the know-how and how to go about setting up a coordinated solar energy programme.

Participants will also have opportunity of hands on experience on Solar Energy Systems and Software

## Training Methodology

- (a) Class room lectures including exercises and case studies using software to stimulate active participation and dialogue.
- (b) Hands-on working on solar energy systems.
- (c) Study visits to operating solar power plants and solar panel manufacturing facilities to enhance effective transfer of knowledge.

## Venue

The venue for the programme will be the **Conference Hall** of **National Institute of Wind Energy**, Chennai, India.

## How to Apply?

1. Those who are interested to apply for this training Course are required to visit the website [www.itecgoi.in](http://www.itecgoi.in).
2. Click on the **NEW USER** for filling up the online application form. It will take you to the streams to be chosen where you have to choose 'Environmental and Renewable Energy Course' and then select 'National Institute of Wind Energy'.
3. It will take you to the institute page where you have to click on the '**apply**' link provided in Special International Training Course on "Solar Resource Assessment and Development of Solar Power Plant" and follow the instructions.

## The Programme

The course duration will be **24 days from 27<sup>th</sup> November to 20<sup>th</sup> December 2019**.

## Resource Persons

The resource persons for the training course will be NIWE engineers, industry professionals, academicians and other national experts who have significantly contributed for solar energy development in the country.

## Target Participants

The course will be useful for anyone involved in solar energy or those who are looking for an introduction. Persons from the following fields will find this course very relevant.

- Academic and R & D Institutions ● Power Industry
- Manufacturers ● Suppliers & Distributors ● Utilities
- Consultants ● Project Developers
- Government Organization ● NGOs & Green Engineers

## Reason to Attend

The course will offer a good foundation on the principles of engineering behind solar energy technology and power generation & distribution along with financial viability and entrepreneur opportunities. The course would facilitate an invaluable forum for dialogue and open exchange of views and experiences with Indian scientists and professionals. The course would give a picture of complete know-how and pave the way to go about setting up financially viable solar power projects.

## Eligibility

- ☞ Applicants should be from any one of the ITEC countries. List of ITEC countries can be found in [www.itecgoi.in](http://www.itecgoi.in).
- ☞ **Diploma or Degree** in any **Science or Engineering** streams and rural mechanics and electricians with Knowledge in English.
- ☞ Age should be between **25 to 45 years**.

## Course Fee

There is **NO COURSE FEE** and is fully funded by Ministry of External Affairs (MEA), Government of India under ITEC programme. The funding includes **to and fro air fare, local travels, accommodation, living allowance and book allowance**. Accommodation provided will be of international standards.

## Instructions

- ☞ Applicants are required to apply for ITEC training programme by filling up the online application form and take a print out of filled form. This form is to be submitted to the nodal/designated Government Department / Agency of applicant's country.
- ☞ Nodal / designated Department / Agency is, in turn, required to forward the applications to the Embassy / High Commission of India, accredited / concurrently accredited to the nominating country along with undertaking by candidate and certification from employer (Part-II of Application Form).
- ☞ Candidates may check the status of their application by logging-in at [www.itecgoi.in](http://www.itecgoi.in). The credentials for log-in may be noted while filling up the application form.

## Course Coordinator

**Dr. P. KANAGAVEL**

Director & Head

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## ABOUT NIWE

National Institute of Wind Energy formerly Centre for Wind Energy Technology shortly known as NIWE is an autonomous R&D institution established at Chennai in 1998 by the Ministry of New and Renewable Energy (MNRE), Government of India. It is a premier institution with highly experienced professionals having expertise in all related disciplines of wind energy sector. NIWE is a forward looking and practical institution always well placed to take the next logical steps towards advancing wind technology in the right direction. With its progressive approach to all wind energy related science and technology from onshore to offshore, NIWE assures assistance from resource assessment (both wind and solar, RE forecasting for Energy production) to project implementation. As an integral part of NIWE, a world class accredited services providing Wind Turbine Test Station (WTTS) is established at Kayathar, Tamil Nadu. Perhaps, NIWE is the only Testing and Certifying agency in the country.

NIWE has been vested with the responsibility to provide complete scientific and technical backing to all stakeholders in the field of wind energy and has stated its commitment through its quality policy.

### QUALITY POLICY

**NIWE is committed to achieve customer satisfaction, loyalty and confidence by providing credible, prompt and complete solutions of international quality to all the stakeholders in the wind energy sector.**

**NIWE, strives to be technical focal point of excellence for the present and future. NIWE shall stay at the forefront of Wind Turbine Technology application by continuously improving its expertise.**



## NATIONAL INSTITUTE OF WIND ENERGY

**An Autonomous Research and Development Institution**

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