Ministry of
New & Renewable
Energy,
New Delhi

Indian
Institute of
Technology
Mandi

# Short Term Course

## on

# Integrating Renewable Energy Sources Into Emerging Electric Power Systems

## May 16–20, 2011



### Sponsored by:
**Ministry of New & Renewable Energy, New Delhi**
**Indian Institute of Technology Mandi**

### Organised by:
**Indian Institute of Technology Mandi**
**Mandi-175001, HP, India**

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## IMPORTANT DATES

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|---|---|
| Last date of receiving application | April 18th, 2011 |
| Notification about selection | April 19th, 2011 |

Note: Selected candidates will be informed by fax / email, if provided.

## MANDI AND ITS CLIMATE

Mandi is a small scenic beautiful town at the center of Himachal Pradesh. A few hours before the Himalayan resorts Kullu and Manali in Himachal Pradesh, once considered *'the end of the habitable world'*.

The town has both mythological and historical significance and boasts of a unique temple architecture. It is also referred to as *Chhota Kashi* as there are many ancient temples in the city and on the banks of river Beas. The river Beas flows through the town and hills, which makes this town more scenic.

*Weather at Mandi:* The weather at Mandi in May is expected to be pleasant.

The maximum and minimum temperatures during May month are 38.8 & 23.30C, respectively. The months July to September are the season for rainfalls.

*How to Reach:*

**Road:** Mandi is well connected by road to other places. From Chandigarh (200 km) one can travel by road to Mandi via Bilaspur. This would take about 5-6 hours. Shimla, Pathankot, Delhi, Dharamsala and Manali are all connected to Mandi by road. Mandi is actually the heart of Himachal since all buses passing from north to south and from east to west touch Mandi, making reaching Mandi a not so challenging option.

**Air:** The nearest airport is Bhuntar (Kullu) about 57-km from Mandi.

**Train:** The nearest railway stations are Joginder Nagar and Shimla by narrow gauge train, Chandigarh and Kalka by broad gauge train which are connected by regular bus services. From Pathankot the narrow gauge railway connects Joginder Nagar, which is 55-km from Mandi.

Information about the Institute as well as general information is available at institute website: http://www.iitmandi.ac.in/ireps

## HOW TO APPLY

The duly filled Registration form along with the Registration fee should be sent to:

IREPS-2011
Dr. B.S. Rajpurohit & Dr. Trapti Jain (Coordinators, IREPS-2011)
Indian Institute of Technology Mandi
Mandi - 175001, H.P., India
Contact : +91-1905-237917 (O)/ 08894580096 (M)
Fax : +91-1905-237942
Email : bsr@iitmandi.ac.in,   traptij@iitmandi.ac.in
Website : http://www.iitmandi.ac.in/ireps

## INTRODUCTION

Grid integration is one of the major concerns in the recent years as the penetration level of Renewable Energy Sources (RES) is increasing and also expected to increase in future. Due to the increased interconnections and loading of the network with liberalization and environmental pressure, the power systems have already become complex and facing many challenges in their optimal, secure and efficient operation

India has already taken the first step in the direction of RES by unbundling the power system to bring competition with the introduction of renewable energy sources. Future power system structure, operation, control and management will be quite different from the existing one as it will foresee large market players, more renewable energy sources and demand response programs.

The main objective of the course is to enhance the knowledge of the participants in the area of the grid integration of RES. This is a unique, national level opportunity which delves into the high-level, strategic issues relating to the integration of renewable energy and examines practical strategies that energy generators, project developers and grid operators can implement to overcome obstacles posed by local planning schemes and regulations, and, importantly, *how this can be done in a cost-efficient and timely way*. The course will provide a platform to an in-depth discussion on the various challenges and their possible remedies in RES initiatives which will benefit participants from academic and R&D institutions, engineers of utilities and policy makers.

## SCOPE OF THE COURSE

The course will introduce fundamentals of various RES and its integrating techniques suitable for the emerging electric power systems. The various issues, problems and challenges of the electric grid operation, management and control will be described with penetration of RES. The course will address the question '*What are the optimum solutions for integrating renewable energy sources into emerging electric power systems?* To deliver commercially viable renewable energy in sufficient quantities, the solution must overcome a number of regulatory, technical planning, and commercial issues relating to connection and integration. The solutions using the advanced technologies/ methodologies will be discussed. Several technical studies based on the recent research work will also be presented. The main topics which will be covered in the course are the following:

Renewable energy sources: Concepts, Status, and Challenges
Grid Integration of RES: Key Issues, Challenges and Solutions
Power Systems Operation with RES
Power Electronics Application to RES
Power Quality Issues with RES
Research Challenges with Wind, Solar, Hydro, etc
Mathematical/Intelligent techniques and Applications to RES
Hybrid Operation and Storage techniques with RES
Energy Management, Scheduling & Forecasting Techniques
Competitive Power Markets and Renewable Energy Sources

## ABOUT IIT MANDI

Nestled in the Sivalik Range of the Himalayas, away from the bustle of the metropolis, a new abode of learning, IIT Mandi, has germinated.

**Focus:**
The focus of the IIT Mandi is on spearhead cutting edge research and development of technologies needed by the world in the years to come. Research groups will work together in creating and harnessing the newest technologies needed to serve the people of the region and the country, and to tackle problems of global importance. In order to achieve excellence and high impact locally and globally, IIT Mandi is focusing on strongly foster inter-disciplinary R&D. With a view to innovating sustainable technologies for widespread use, IIT Mandi encourages strong Humanities and Social Sciences participation in technology R&D.

**Thrust Areas:**
· Information and communication for sustainable development
· Green energy technologies
· Integrated mountain development
· Agricultural and food processing technologies

**Mission:**
· To create and impart knowledge through team effort and individually for the benefit of society.
· To produce professionals capable of creating knowledge and conceiving, designing and developing products and processes for the benefit of our society, through team effort and individually.
· To impart the ability to analyze problems of the society and devise globally recognized innovative approaches and solutions.
· To inculcate a spirit of entrepreneurship.
· To work intensely with industry in pursuit of the above goals.
· To train teachers capable of inspiring the next generation of engineers and researchers.
· To be an efficient and decentralized organization with overriding respect for ability and merit.

## TARGET AUDIENCE

The course is open for faculty/students of educational institutes, practicing engineers from utility, industry and other organizations.

## FACULTY

The faculty for the course will be drawn from IIT Mandi, other institutions and organizations.

## REGISTRATION FEE

The registration fee for academic participants is Rs. 2000/- and participants from utilities, industries and other organizations will also be allowed to attend the course by paying the registration fee of Rs 4500/- per participant.

Registration fees will cover course fee, course material, working lunch, refreshments and accommodation (sharing basis at Hostels) during course period only. Registration fee does not include the travel expenses of the participants.

All payments should be made through DD/Cheque drawn in favor of "**IREPS-2011**" payable at Mandi, HP, India.