

## Objectives of the Workshop

The electrical power system is in the process of moving away from fossil fuels to environmentally friendly renewable energy resources. The change is mainly due to (a) the increasing demand for electric power by both developed and developing countries, (b) many developing countries lacking the resources to build power plants and distribution networks, (c) some industrialized countries facing insufficient power generation and (d) greenhouse gas emission and climate change concerns. Renewable energy sources such as wind turbines, photovoltaic solar systems, solar-thermo power, biomass power plants, fuel cells, hydropower turbines, and hybrid power systems will be part of future power generation systems.

The exploitation of renewable energy sources (RESs) may be problematic due to their variable and intermittent nature. In addition, sudden change of a load, or the occurrence of a line fault can cause sudden momentary dips in system voltage. The energy storage can compensate for the stochastic nature and sudden deficiencies of RESs for short periods without suffering loss of load events and without the need to start more generating plants. Another issue is the integration of RESs into grids at remote points, where the grid is weak, that may generate unacceptable voltage variations due to power fluctuations. Upgrading the power transmission line to mitigate this problem is often uneconomic. Instead, the inclusion of energy storage for power smoothing and voltage regulation at the remote point of connection would allow utilization of the power and could offer an economic alternative to upgrading the transmission line.

Currently, India is one of the fastest growing economies in the world, with current electricity generation capacity of ~345 GW to meet the needs of over 1.25 Billion population. The rapid adoption of clean energy technologies with 175 GW RE target and India's National

Energy Storage Mission has created remarkable potential towards energy storage which is up to 15-20 GW by 2020, as per India Energy Storage Alliance. This workshop aims to review state-of-the-art development of energy storage technologies to provides a gainful insight into the working and development energy storage system.

## Course Content

The major contents of the program are:

- ❖ Overview of Energy Storage Technologies
- ❖ Integration of Energy Storage
- ❖ Policy and Regulatory Framework
- ❖ Battery storage and Electric Vehicle Integration
- ❖ Battery Testing and Fault Analysis
- ❖ Thermal Energy Storage
- ❖ Hydrogen Storage
- ❖ Plant visit and Hands on Experience

## Resource Persons

The panel of internationally renowned experts/ academics would be drawn from IISC/IITs/NITs, and Senior Executives from Industry/ Government.

- ❖ PLUSS India Pvt Ltd, Gurugram, Haryana
- ❖ TU Delft, Netherland
- ❖ Indian Institute of Technology, Jodhpur
- ❖ The Energy and Resources Institute, New Delhi
- ❖ Malaviya National Institute of Technology Jaipur

## Target Audience

The program is targeted towards Faculty Members from academic institutes, Industry Professionals & Consultants, Researchers & Students.

**Malaviya National Institute of Technology Jaipur**

**Centre for Energy and Environment**

**AICTE sponsored workshop on**

**Energy Storage: The Future of Energy**

**11<sup>th</sup>-15<sup>th</sup> March, 2019**

**Registration Form**

Full Name: \_\_\_\_\_

Designation: \_\_\_\_\_

Organization: \_\_\_\_\_  
\_\_\_\_\_

Qualification: \_\_\_\_\_

Specialization: \_\_\_\_\_

Mailing Address: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Pin Code: \_\_\_\_\_ Phone(M): \_\_\_\_\_

Email: \_\_\_\_\_

Accommodation required?

Yes / No

Date: \_\_\_\_\_

Signature of Participant

### **About MNIT Jaipur**

Malaviya National Institute of Technology Jaipur (Deemed University) is one of the premier NITs, established by Ministry of Human Resource Development (MHRD), Government of India (GOI). The institute, prior known as MREC Jaipur was established in 1963 as a joint venture of the GOI and Government of Rajasthan. Later in 2002, the college was given the status of National Institute of Technology, and on 15 August 2007, pro- claimed Institute of National Importance through Act of Parliament. Its campus spreads over 325 acres of lush green area in the central location of Jaipur. It offers undergraduate and postgraduate courses to about 4500 students, in leading fields of engineering, technology, architecture, management, & sciences. Through the internationally renowned faculty, laboratories with state of art equipment and excellent infrastructure, the institute is actively engaged in research, consultancy, and developmental activities.

### **Centre for Energy and Environment**

Centre for Energy and Environment was established in 2012 to enable sustainable and cost effective innovations and develop interactive facilities pertaining to the multi-disciplinary areas of renewable energy and environment. Currently Centre has 35 MTech students and registered 25 PhD scholars. Four Ph.D. has been awarded since inception of the centre and 5 M.Tech. batches have passed out with flying colors. Currently centre has 8 ongoing projects worth INR 4 crores and 62 lakhs from different National and International funding agencies; including Indo-UKRIE, Indo-Austria, ISHRE, DBT, DST, and MNRE.

Centre has established 6 ultra-modern functional labs with state of art and sophisticated instruments. A vast collaborative framework with reputed universities world over, the department offers ample opportunities for individual growth.

### **Registration**

The participants are requested to register online by using the following link:

<https://docs.google.com/forms/d/1I776RxqK65ajhRiYG44qTGHaxXw4Vy0fmQkAVLNw1A/edit>

### **Accommodation/TA/DA**

Limited accommodation is available in the Guest House /Hostels of the MNIT for outstation participants on nominal chargeable basis with an advance request and on first come first serve basis. The participant will not be paid any TA/DA.

### **Organizing Committee**

#### **Patron**

Prof. Udaykumar R Yaragatti, Director, MNIT Jaipur

#### **Coordinators**

Dr. Rohit Bhakar

Prof. Jyotirmay Mathur

Dr. Kapil Pareek

Dr. Amartya Chowdhury

Dr. Sunanda Sinha

### **Address for Correspondence**

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## **AICTE sponsored workshop on Energy Storage: The Future of Energy**

**11<sup>th</sup> – 15<sup>th</sup> March, 2019**



### **Sponsored by**



### **Organized by**

**Centre for Energy and Environment  
Malaviya National Institute of Technology,  
(Under Ministry of HRD, Govt. of India)  
J.L.N. Marg, Jaipur-302017, Rajasthan.**