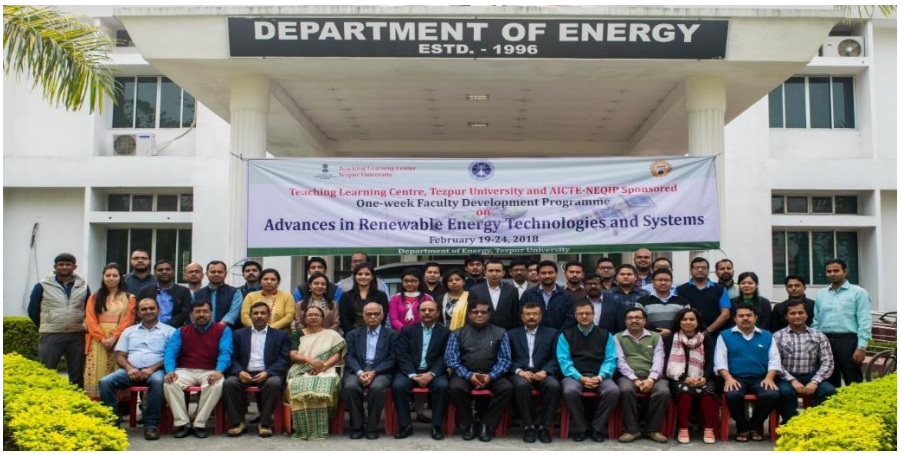
Report on
One-week Faculty Development Program on
Advances in Renewable Energy Technologies and Systems
February 19-24, 2018

This one-week Faculty Development Program (FDP) in collaboration with Teaching Learning Centre (TLC), Tezpur University, supported by AICTE-NEQIP was organised successfully with participation of different stakeholders. The FDP addresses the various aspects of Advances in Renewable Energy Technologies and promotes student centric effective teaching-learning pedagogy among the participants. This course was aimed for teachers who are teaching various disciplines of science and engineering subjects in colleges or Universities. There were 42 number of participants registered for this programme from different Universities and Colleges of Assam, Meghalaya and Arunachal Pradesh and 40 number of participants successfully completed the programme. Prof M M Sharma, Vice-chancellor (acting), Tezpur University inaugurated the programme. In his inaugural address, Prof Sharma stressed upon the paradigm changes from black board based teaching to modern ICT base teaching and the importance of using online tools for teaching and evaluation in present days. Prof Biswajit Ghosh, Professor and Dean of Engineering Sciences, The Neotia University, Kolkata was the Chief Guest in the inaugural function. Prof Ghosh spoke about the importance of energy education in the country. Prof Khanindra Pathak, IIT Kharagpur was the Guest of Honour in the inaugural function. Prof Pathak deliberations creates the curiosity on pedagogical approach in teaching among the participants. Prof M K Sharma, Director, Teaching Learning Centre, Prof C L Mahanta, Dean, School of Engineering and Prof R Kataki, Head, Department of Energy also graced the inaugural function of the programme.

Prof M K Sarma, Prof C L Mahanta, Prof K Pathak, Prof M M Sharma, Prof B Ghosh, Prof R Kataki (L to R)

Resource Persons from reputed academic institutions like IIT Kharagpur, IIT Guwahati, The Neotita University, North Eastern Hill University, Shillong and Research laboratory like

National Institute of Solar Energy, New Delhi, and Industry like Central Electronics Limited, Sahibabad and faculties of Tezpur University having expertise in the different relevant areas related to the programme deliver the lectures in this Faculty Development Programme.



Group photo with the participants

In the first technical session of the first day of the programme, Prof B Ghosh spoke on Renewable Energy and Sustainability. This session focussed on the relationship between the access to energy through renewable energy base systems with the sustainability. In the next sessions of the day, Prof K Pathak delivered talks on pedagogical aspects of teaching and how the technological enabled learning environments become more effective towards student centric teaching learning. In the activity sessions, Prof Pathak guided the participants to develop curriculum of their choice and also helps the participants to familiarize with the outcome base learning methodology.

In the second day of the programme, Prof R Kataki from Department of Energy, Tezpur University delivered talk on Pyrolysis of Biomass and elaborate the various experimental results and the new research areas in this emerging field. Prof D Deka from Department of Energy, Tezpur University spoke on advances in liquid fuel generation from biomass. The deliberation focussed on the recent work related to catalysis development for bio-diesel production and algal biofuel. Dr Sadhan Mahapatra from Department of Energy, Tezpur University discussed on the physics of biomass gasifier reactor design. The deliberation primarily focussed on the generation of clean producer gas from open top downdraft gasification systems. The various solar energy radiation measurement instruments and solar energy base systems were demonstrated to the participants. Participants were also learned the measurement protocol of solar radiation and systems. A 50 m^3 biogas plant installed at Patkai Men's Hostel was also demonstrated to the participants. This biogas plant uses the kitchen waste of the hostel and the produced gas is used for cooking in the hostel. The system

shows the application of conversion of waste to useful gases. Two types of biomass gasification systems namely open top gasification systems and closed top gasification systems were demonstrated to the participants. In last session of second day, Dr Nabin Sarmah demonstrated various tools that are commonly in use for the pedagogical aspect to move from the physical classroom to the smart classroom to online classroom. Dr. Sarmah also demonstrated the tools for web presence of the teacher and tools in use for video lectures.

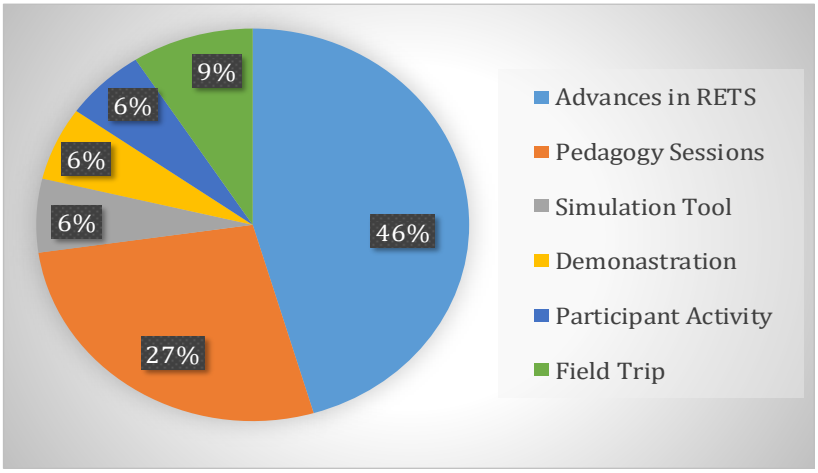
In the third day of the programme, Dr Nabin Sarmah delivered a talk on off-grid and grid connected Photovoltaic systems. In this deliberations, Dr Sarmah discussed in details the various system configurations, technical specifications of each component and various applications of off-grid PV systems. The system design criteria of grid connected systems was also discussed in details. Dr Mahapatra delivered lecture on Decentralized energy systems and simulation tool HOMER. The village load assessment procedure is discussed and various renewable energy systems configuration based on the cost of energy generation approach is analysed based on the simulation tool HOMER. HOMER simulation tool demonstrated for various scenario and hands on experience is also carried out with the participants. Participants were taken to a field trip to 5 MW grid connected PV systems near Balipara. This is the largest PV power plant is in operational in Assam. Site engineer shows the plant operation to all the participants. Participants were also quite excited to have real experience of knowing all technical details of the power plant.

Field Trip to 5 MW grid connected Photovoltaic Power Plant at Balipara

On the fourth day, S K Singh, senior scientist from National Institute of Solar Energy, New Delhi delivered two lecturers on solar thermal energy. Various experimental work related to refrigeration, air-conditioning by using solar thermal energy explained in details. Participants also quite excited to learn various experiments by using solar thermal energy. Dr Sanjai Kumar

from Central Electronics Limited, gave two lectures on solar cell physics and fabrication of solar module in industry. In this lecturers, basic of solar cell, various module technologies, fabrication techniques of modules, module production cost in India and other countries are discussed. Dr Sadhan Mahapatra presented a talk on the Simulation tool PVsyst to the participants. This simulation tool is quite useful to analyse the energy generation from off-grid or grid connected PV systems. Participants was curious to know on the operation of this simulation tool.

In the fifth day, Prof D C Baruah from Department of Energy presented a talk on GIS base Biomass Energy Mapping. He shows how the GIS can be effectively use to map any kind of renewable energy resources in any location. Dr B Kakati delivered a talk on advances in Fuel cell and hydrogen energy research. In the afternoon session, Prof J K Deka from Department of Computer Science Engineering, IIT Guwahati gave two lecturers on Pedagogy aspects of teaching and curriculum development. Prof Deka shows the techniques to develop curriculum, program educational objectives and program outcome of a sample course. On the last day, Prof V S Mohalkar gave a talk on bioethanol production and Dr Samrat Paul on advances materials for energy applications.



Different Sessions in the Programme

This FDP emphases on stimulating inquisitiveness in the students during the process of acquiring and assimilating new scientific knowledge and concepts, rather than treating students as a passive recipient of lecture driven classes. The programme delivers the concept of integration of ICT in the teaching-learning process and training in research-based strategies in teaching process. Similarly, the exposure to tools like open source courseware, simulation tools, and scientific approaches of planning and execution of experiments are also delivered in

the programme, to enhance the student's ability to understand the subjects or create the curiosity on the subjects.

More than 50% of the total hours spent in the programme is devoted to the pedagogy sessions, demonstration, simulation tools, field trip etc. Participant's feedback also reveals that the programme is perfect blend of technical knowledge on the advances in renewable energy technologies, pedagogy sessions, demonstration and field trip.

Prof V K Jain, Vice-chancellor, Tezpur University in the Valedictory Function (second from Left)

Prof V K Jain, Vice-chancellor distributed the certificate of completion to the participant

Prof V K Jain, Vice-chancellor of Tezpur University joined in the valedictory programme to distribute the programme completion certificate to the participants. Prof Jain in his inaugural comments stressed upon on the new methods for delivering lecturers and also the importance of online course like MOOCs, NPTEL etc in the College/University teaching. Three participants also put forward their feedback in the valedictory programme. Prof Jain distributed the programme completion certificate to 40 number of participants. Prof C L Mahanta, Dean,

School of Engineering, Prof M K Sarma, Director, Teaching Learning Centre and Prof R Kataki, Head, Department of Energy also grace the valedictory programme.

This Faculty Development Programme (FDP) fulfils its prime objectives to bring the faculties of different engineering, science and allied subjects onto one platform to update with the advances in the renewable energy technology and applications, effective teaching learning practices, integration of ICT in the teaching-learning process, expose to tools like open source courseware, simulation tools, and scientific approaches of planning and execution of experiments.