

# Report on Study Tour for Best Practices in RE Evacuation

The Best Practices Study Tour cum Training and Capacity Building Programme on Renewable Energy Evacuation and Data Communications Infrastructure for Indian energy stakeholders was successfully organized by the Indo-German Energy Forum (IGEF) in association with the Central Board of Irrigation and Power (CBIP) from 9<sup>th</sup> to 12<sup>th</sup> May 2017 in Bengaluru and Madurai. The tour brought together 50 participants representing eight states namely Maharashtra, Gujarat, Karnataka, Telangana, Haryana, Uttar Pradesh, Himachal Pradesh and Madhya Pradesh. The delegates represented members from State Transmission Utilities, State and Regional Load Dispatch Centres, State Electricity Regulatory Authorities, Central Power Agencies like POWERGRID, POSOCO, NTPC, NHPC and PGCIL. Representatives of apex bodies like Central Electricity Authority, Niti Aayog as well as private sector entities like Steag Energy Services Limited, Aurasys GmbH, Tata Power Limited and so on actively participated in the Study Tour. The Study Tour commenced with a Technical Workshop on 9<sup>th</sup> May in Bengaluru at KEB Engineer's Association, adjoining the KPTCL's SLDC office.

Mr. K K Arya, Member (Power Systems and Hydro), Central Electricity Authority inaugurated the workshop and addressed the audience. He spoke about challenges like grid security on account of large RE power in-flow and discussed strategies required for RE balancing such as increased pumped storage for hydro projects and so on. Mr. Arya also highlighted the need for investments in transmission planning. With addition of capacities to the grid, there will be a need of approximately INR Two lakhs sixty thousand crores worth of investments only in transmission infrastructure. It is expected that the India's peak load in next 5 years –by 2022-- will be 235 GW and total installed capacity will be 535 GW grid vis-à-vis the current peak load of 155 GW on a total installed capacity of 326 GW.

Mr. Jawaid Akthar, IAS, Managing Director Karnataka Power Transmission Corporation Limited delivered a special address highlighting the RE Evacuation in Karnataka state. Mr. Akthar highlighted that Karnataka state has successfully evacuated 7200 MW of RE last fiscal and has a target of reaching 13000 MW of RE in the state by 2022. KPTCL had commissioned a study to find out the absorption capacity of RE in the state and it was found out that 18000 MW can be achieved with requisite balancing coming from hydropower. He also mentioned the fluctuations in the grid were arising because of increase in the penetration of renewables and therefore asked the participants of the study tour to brainstorm on new Renewable energy absorption patterns, study their cost and technical implications and suggest strategies for safe grid solutions wherever required.

The inaugural programme included presentations by:

1. Mr. S.K.Soonee - Former CEO, POSOCO

His presentation was on the "Technical and Regulatory challenges of RE Integration and Evacuation in India", where he discussed in detail about the growth potential of renewables. He explained the technical, regulatory and legal processes involved for a smooth transition to a large scale RE power in India. There were details about Indian power system, power market, Indian grid with its international connection, roadmap for renewable energy mission and legislative & regulatory framework which were discussed with the participants. He spoke about different stakeholders showing interest in large scale integration of renewables which has led several agencies in India to conduct studies to provide insights and perspectives on this topic. He concluded with the development of a new market design to overcome the challenges of RE integration.

2. Mr. T R Ganesh, Southern NLDC, Bangalore, (POSOCO)

Mr Ganesh presented the concept of REMC (Renewable Energy Management Centre), its bidding procedures, its requirement, role and functional scope of different stakeholders, funding pattern and conceptual architecture. The services which are included in REMC tenders are majorly - installation, testing commissioning, annual maintenance contract, FSP services and weather service contracts for internal forecasting tools.

3. Mr. R. Thyagaraj, KPTCL

Mr Thyagaraj shared the positive and innovative aspects of Karnataka transmission networks as one of the smart transmission grid. Karnataka has SCADA connection at all generation stations with an uptime of 98.98% and sub-stations along with special protection and automation systems. They have real-time monitoring systems for every single input of renewable generation over SCADA at STU pooling points, for renewable injections on 11kV and above. The status of KERC's implementation regulations for wind and solar was also discussed.

4. Mr. Asim Ahmed, RE Connect Energy

His presentation focused on the fluctuating nature of electric demand and increasing penetration of renewable energy which can become a complex operational issue for grid operators and utilities. Currently the national benchmark for the acceptance of tolerance level of solar forecasting is 7%, while RE Connect is running around 5.5%.

5. Mr. Gowrishankar Ramanan, iPLON India Pvt Ltd

His presentation focused on the "O&M challenges in Solar PV plant" while mentioning the value-added services iPLON brings in products like SCADA, cloud based monitoring and hybrid systems. He identified the opportunity for earning potential revenues through smart O&M services and spoke about the need of monitoring the power reduction in the solar PV plants with technology based controls Vs manual control. Using new technologies for O&M services like drone based and sharing/utilization of data were the key messages.

6. Ms. Ramya Parijat, KFW

Ms. Parijat presented the "Green Energy Corridor-KFW Experience", --German government providing concessional loans of up to one billion EUR through KFW for interstate and intrastate transmission infrastructure. She highlighted the growing Indo German cooperation in energy sector and the ongoing activities under Indo German Financial cooperation energy portfolio in renewable energy generation, energy efficiency and transmission & distribution sector. She stated that in total seven loan agreements amounting 988 Million EUR have been signed till date for inter and intra state transmission projects. She also informed the participants that currently KFW is looking for potential partners and new proposals from relevant stakeholders for new inter or intra state transmission projects for financing volume up to 400 Million EUR.

#### 7. Mr. Kiran Rasane, Siemens

Mr. Rasane presented an overview and applications of Spectrum Power- micro grid management systems. These systems have applications in controlling and optimization of solar, wind and energy storage, load & voltage control, demand responsiveness and controls islanding and resynchronization to grid. These systems are used for generation and load management, forecasting applications and micro grid optimization for micro grids. These applications are the need of the hour and should be used by the stakeholders at different verticals.

#### 8. Mr. Sunil Sharma, GIZ

Mr. Sharma presented an overview of the bilateral technical cooperation in the framework of Green Energy Corridor. He highlighted the importance of REMC, different stakeholders involved and the working packages of GIZ under this project. He also mentioned about GIZ's role in developing solar power forecasting infrastructure at NIWE (National Institute of Wind Energy). GIZ is also organizing an International Conference on "Large scale grid integration of Renewable Energy in India" from 6-8th September, 2017 in Delhi.

On 9<sup>th</sup> May 2017 the participants visited 648 MW Adani Green's Solar Power Station in Kamuthy, which is the world's biggest Solar Power Plant, operational since September 2016. The participants were welcomed by Mr. Santosh Mall, Head, Kamuthy Solar Power Plant. All participants visited the power plant in two groups and saw the different types of solar cells, modules, series and parallel combinations of cells, connections of Inverters, dry cleaning of panels etc. while interacting with the experts present on the site.

There was a presentation on "Utility Scale Solar Power Plant Project Execution and O&M" by Santosh Mall. The presentation explained the working of the Solar Power Plant, importance of solar power and PV solar technology, classification and its operation and maintenance challenges. The second presentation was given by Shri Sandeep Dixit Head APTRI, Adani Power on "Grid integration of large RE based power plants: Impact analysis of the increasing RE penetration and data analytics". It was a pictorial representation of the technology used in the power plant. Major technology suppliers data of the plant were also shared. After the interactive presentations, the participants visited the SCADA control room where a short demonstration was given by Shankar Narayanan System

Operators – SLDC on SCADA remote operation, and the monitoring of substations. The visit concluded with a trip to the Viewer gallery tower from where one could get a bird's eye view of the solar plant. There was also a visit to TAN-TRANSCO Switchyard to see the evacuation system.

On 11<sup>th</sup> May, the participants travelled to Kaithar to visit the 400 MW Wind power plant of Suzlon India Private Limited. After a warm welcome at the site, different operational parameters of a 2.1 MW wind generator were shown to the participants and all the technical details were discussed with the participants on site. Three presentations were given by SUZLON on all the wind and solar power plants they run in the country and the latest technologies used by them. Senior officials of Suzlon also shared their experiences with the participants. Forecasting techniques used by Suzlon were also discussed by Shri Venkatesh. OMS-SCADA Forecasting Techniques and Grid Integration Issues were also discussed by Suzlon and Manikaran Analytics Limited representatives.

There was also a presentation on framework of forecasting, scheduling and imbalance handling for RE generating stations by Mrs. Minaxi Garg, AGM POSOCO New Delhi. In her presentation she explained the potential and installed capacity of Solar and Wind power in the country, provisions in Electricity act 2003, tariff policy 2016, guidelines of MOP regarding RPO , CERC framework for scheduling, forecasting and deviation settlement, model regulation on scheduling and forecasting, the technical and regulatory challenges of RE integration and evacuation in India.

After the Q&A session and vote of thanks by Sh Naresh Panchal VP and head Suzlon power infrastructure, participants shared their feedback, recommendations and expressed their views on the way forward for future programs by IGEF and CBIP.

The Study Tour was a huge success as the feedback from the members have been very positive. The tour was well planned and included topics of interest for all. The knowledge and experiences shared will surely benefit each and every participant in their respective areas of work. The delegates appreciated guided site visits and interactive presentations by technical experts.

In total, there were fifteen technical presentations covering both public and private sector experts on RE forecasting and Scheduling, Tools and Techniques and Models, Operationalization of Renewable Energy Management Centres, SCADA operations and RE Flows, Solar Remote Monitoring, and Green Energy Corridor Financing. All the 15 presentations are available on the IGEF website: [www.energyforum.in](http://www.energyforum.in)

In continuation to the successful BP study Tour, a WhatsApp group has been created by and for the participants to keep in touch in order to share technical issues on RE Integration, latest updates and know-how. The WhatsApp group has the same enthusiasm as was among the participants during the study tour which is depicted with interesting information flow related to the energy sector by one and all.