pavan

नीवे NIWE
ISO 9001 : 2008

ISSUE- 53 April - June 2017 Newsletter of NATIONAL INSTITUTE OF WIND ENERGY, Chennai http://niwe.res.in

www.Facebook.com/niwechennai
www.Twitter.com/niwe_chennai

EDITORIAL

India is aiming at integrating 35 % renewable energy into the grid by 2020. The Ministry of Power has set up a Technical Committee to study the options available at hand in terms of balancing energy sources and energy storage devices to facilitate this challenging task. The experiences of the RE rich states will help in evolving an action plan for this. At NIWE, we are working on reliable prediction of power from RE sources to enable absorption of this quantum of clean energy. NIWE with its experience of forecasting wind power for Tamil Nadu during the previous year is working on fine-tuning its model with real time measurement of wind power generation and met mast measurements from wind farms. Power forecasting for three other wind rich states are in the offing. A capacity building for solar power forecasting is also being undertaken and with this NIWE aims at becoming a Centre of excellence for RE power forecasting. With the mass influx of renewable power the quality needs to be controlled. The first step would be enforcing Low Voltage Ride Through (LVRT) as per guidelines issued by CEA. NIWE proposes to build a national facility to offer economical LVRT services to the manufacturers. An active involvement of all the stakeholders, including IWTMA will help us identify takers for this large-scale facility.

We have also added a 2 MW wind turbine to our existing fleet of machines at WTRS, Kayathar. NIWE today has machines ranging from 200 kW to 2 MW in all possible configurations established as a national facility for research. A pilot Virtual Power Plant (VPP) combining various distributed energy sources is being planned at our field facility to demonstrate the supply and demand flexibility through centralized control of various RE sources. The 'Internet of Things'(IoT) concept of VPPs allows balancing of power with wide range of options like delivering peak power when needed and storing surplus power at other times.

Offshore wind is another area which has seen lot of activity recently. India is set to make a beginning in this sector, when the world's first offshore wind farm 'Vindeby' is retiring from service after 25 years of operation. Offshore wind technology has come a long way ahead from the days of the Vindeby wind farm. The 450 kW wind turbines installed not far away from the shore at water depths of 7m exporting 5 MW of power has generated enough data to instill confidence in the wind farm planners. Today we have wind farms consisting of 7 MW wind turbines installed deeper into the sea at water depths of 30- 40m. The recent 'far below expectation' average bid prices for a offshore wind farms block in Germany could be an indicator of the technology's future growth potential. The low prices quoted at the auctions were perhaps unique to the German case. A demo project may help India to understand the techno-economics vis-à-vis the European scenario. Indian coastal waters hold good potential as indicated by desktop studies conducted by FOWIND and FOWPI and met mast measurements by NIWE at Dhanushkodi. As a way forward NIWE is working to carry out on-site measurements to validate the site-specific met-ocean conditions predicted by the numerical models, as this will also serve as the basis for detailed design of foundations and WTG. NIWE is seeking cooperation of entities like ONGC whose platforms can be utilised for such off shore measurements. An active participation from the private players is also solicited. The measurements will be the first step in earmarking offshore wind zones along the Indian coast and realising the first offshore wind power project in the coming years.

Dr. Rajesh Katyal, Director General (AC)

Contents

Editorial Board

Wind Resource Assessment & Offshore

Geo-tagging of Wind Turbines installed across the Country

MNRE/NIWE has identified an estimated wind power potential of 302 GW at 100m agl, assuming a capacity utilization factor greater than 20%. As on date, the wind turbine installed capacity in India stands at 32000 MW. These installations are mainly spread across the States of Tamil Nadu, Andhra Pradesh, Telangana, Karnataka, Gujarat, Rajasthan, Maharashtra, Madhya Pradesh and Kerala. India has a lot of untapped wind power potential, and a target to achieve 60 GW by 2022.

In view of the increasing installations of wind turbines in the country, there is a need to geo-tag all the wind turbines installed in the country under which static information will be collected and collated in a common registry to further explore the uncovered areas and shall also be useful for Repowering/Intercropping studies. The data needs to be collated at a single point, which will help in better monitoring and benefit the technology in the long run.

As per the "Guidelines for Development of Onshore Wind Power Projects" released by Ministry of New and Renewable Energy (MNRE) vide F. No. 66/183/2016-WE dated 22.10.2016, National Institute of Wind Energy (NIWE) has been nominated to develop and maintain an online registry to geo-tag the wind turbines and collate these performance related data sets.

In line with this, NIWE has intended a format and the same has been circulated among the SNAs & other utilities for providing the needful information for online registry of Wind Turbines at NIWE.

Estimation and Validation of Wind Power Potential at 100m level of 7 States in India

NIWE has established 75 nos. (10 in Andhra Pradesh, 12 in Gujarat, 12 in Rajasthan, 13 in Karnataka, 8 in Maharashtra, 8 in Madhya Pradesh and 12 in Tamil Nadu) of 100m Wind Monitoring Stations (WMS) in 7 States of India.

Three year continuous data acquisition from 8 WMS (3 in Andhra Pradesh, 1 in Gujarat, 2 in Maharashtra & 2 in Karnataka), two year continuous data from 46 WMS (9 in Karnataka, 3 in Madhya Pradesh, 7 in Gujarat, 11 in Tamil Nadu, 2 in Maharashtra, 6 in Andhra Pradesh & 8 in Rajasthan) and one year continuous data acquisition from 15 WMS (1 in Andhra Pradesh, 4 in Gujarat, 2 in Madhya Pradesh, 3 in Maharashtra, 2 in Karnataka, 2 in Rajasthan and 1 in Tamil Nadu) has been completed successfully.

Continuously monitoring and real time wind data acquisition from 2 stations in 2 States is in progress. Monthly Data Analysis, verification and preparation of Interim reports for 2 stations are in progress.

Dismantling of Sensors and Mast from 60 nos. of WMS have been completed and balance 13 WMS are in progress.

WRA in Uncovered / New areas 2016-17

Installation and commissioning of one 100m WMS in Chhattisgarh has been completed and data acquisition is in progress. Presently, 20 wind-monitoring stations are operational in 7 States under various wind monitoring projects funded by MNRE as well as various entrepreneurs.

100m Wind Monitoring Station in Chattisgarh

Wind Resource Assessment Studies (Consultancy Projects)

The following consultancy projects have been completed and reports have been submitted during this period:

- Verification of procedure of wind monitoring for 13 sites
- Re-evaluation of Annual Energy production for the proposed 49.5 MW wind farm project
- Wind Power Density Map at 50m AGL for 1 site
- Energy Estimation for the proposed 36.6 MW wind farm projects

Continuous monitoring and real time wind data acquisition from 10 stations in 2 States is in progress. Monthly data

analysis, verification and preparation of Interim reports are in progress.

OFFSHORE ACTIVITIES:

NIWE-FOWPI Met - ocean workshop:

NIWE and First Offshore Windfarm Project of India (FOWPI) have been jointly working on strengthening the country's offshore wind energy sector with capacity building activities and providing technical assistance in preliminary implementation of first off-shore wind farm project of India, on a seabed area of 70 sq.km. with a tentative capacity sizing of 200 MW near the Gulf of Khambhat, Gujarat. Metocean Studies has been carried out by COWI A/s under FOWPI project for the proposed site area of 70 sq.km. in Zone B (identified under FOWIND project). NIWE and FOWPI jointly conducted Metocean workshop at NIWE on 2nd June 2017, to share the outcome of the Metocean studies, with the stakeholders. The workshop facilitated the transfer of knowledge and technological know-how from the EU experience in offshore wind energy sector and its adaptability to the Indian context. It was attended by 50 participants from various government organizations and wind turbine manufacturers.

Director General (AC), NIWE presented a lecture on "Offshore Wind Energy in India" and Dr. M. V. Ramana Murthy, Project Director, ICMAM has delivered lecture on "Installation of first offshore wind measurement platform at Gulf of Khambhat". Ms. Cecile Leemans, Program Manager, Foreign Policy Instruments, European Union talked about the status of offshore wind in Europe. Mr. Per volund, Market Director, COWI A/s gave an overview of the FOWPI project.

Metocean experts Mr. Jesper Skourup, Chief Specialist, COWI Denmark and Mr. PN Ananth, Head of Marine Department at COWI India Private Limited presented the details of the studies.

The session ended with discussions and networking lunch.

Facilitation of Clearances for offshore studies and surveys by Private players

M/s Samiran Udaipur Windfarms Limited a subsidy of Suzlon has approached NIWE for facilitating necessary clearances for installing LiDAR-based wind monitoring station at Gulf of Kutch, near Jakhau off Gujarat coast.

NIWE has forwarded their applications to the concerned Ministries for Stage I clearance / NOC. M/s Samiran Udaipur Windfarms Limited will soon deploy its offshore wind measurement platform in Gulf of Kutch.

NIWE-FOWPI Metocean workshop

Testing & Forecasting

TESTING (Large Turbine Testing)

Type Testing of XYRON 1000 kW wind turbine at Richadewda, Ratlam District, Madhya Pradesh of M/s. Xyron Technologies Ltd. The measurement work is under progress.

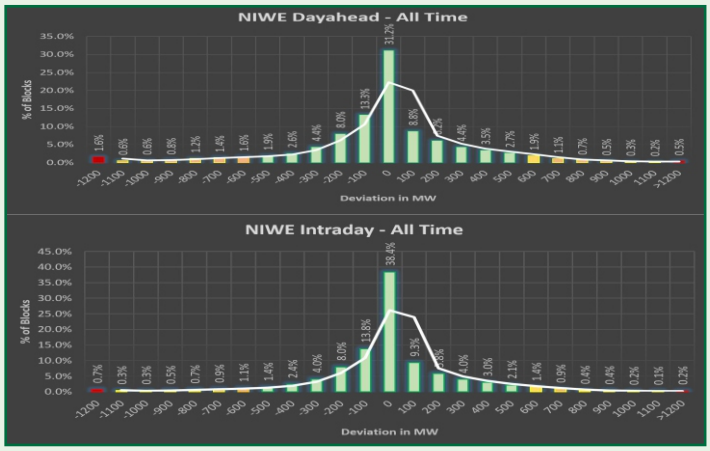
Earth Pit Resistance Measurement

FORECASTING

- The MoU/NDA signed between NIWE & GETCO dated 21st June, 2017 for initiating a Pilot Project on Wind Power Forecasting for the entire state of Gujarat.

MOU/NDA signed between NIWE & GETCO for initiating a Pilot Project on Wind Power Forecasting for the entire state of Gujarat

- Draft MoU between MNRE & ISRO-SAC for Development of Wind Power Forecasting has been vetted by the legal counsel. The draft MoU has been sent to customer for review and comments.
- Communication initiated with IWPA regarding extension of the project "Wind Power Forecasting Services" as NIWE is offering WPF services to IWPA since 2015 for the entire state of Tamil Nadu.
- Works are in progress with ISI, IIT & Anna University for collaboration to fine-tune the NIWE's indigenous wind power forecasting model.
- Actual Data Report for the months of April & May, 2017 has been sent to IWPA.
- The fine-tuning of NIWE indigenous forecast model is under progress.
- Error Analysis report for Vortex Dayahead and Intraday forecast value for each substation has been carried out.



- Project Assistant and Vortex official visited Tirunelveli Zone substation regarding metering set up and real time actual generation data during 19th to 21st June 2017.

- Forecasting error analysis has been done upto June 2017.

Small Wind Turbine Testing

- Type Testing of model Vaata Smart, Vertical Axis WT (5.5 kW) at Karungulam of M/s. Vaata Smart Ltd. Test Plan is completed. NIWE is awaiting for instrumentation.

- Type testing of SM2 (1kW) at Wind Turbine Research Station, Kayathar, Tuticorin District, Tamil Nadu of M/s. Windstream Energy Technologies India Pvt. Ltd. The instrumentation work is completed.
- Type Testing of Nalwin 600 W at Wind Turbine Research Station, Kayathar, Tuticorin District, Tamil Nadu of M/s. Aparna Renewable Energy Sources Pvt. Ltd. The customer yet to install turbine controller at site. NIWE is awaiting a schedule for instrumentation from the customer.

Visitor

Mr. Albert Bosch, Engineer, M/s. Vortex, Spain visited NIWE for discussion with Forecasting officials to take necessary corrective actions to improve the accuracy of forecast during 9th to 21st June 2017.

New Infrastructure

Low Voltage Ride Through (LVRT) testing facility is being proposed. Necessary specifications along with procedure have been sent to IWTMA for comments.

Standards and Certification and Research & Development / Scientific & Technical Research

- Certification project viz., "Inspection for the Manufacturing Evaluation at a wind turbine tower production unit" taken up by NIWE - TUVR Certification Group is under progress.
- An agreement has been signed with M/s. RRB Energy Limited to take up the project on renewal of Certificate of 'V 39-500 kW with 47m Rotor diameter' wind turbine model as per TAPS-2000 (amended). Carried out review / verification of various documentation in connection with renewal of Certificate of 'V 39-500 kW with 47m Rotor diameter' wind turbine model. Based on the review / verification, renewed Certificate has been issued to M/s. RRB Energy Limited.

Issuing renewed Certificate to M/s. RRB Energy Limited

- Organized three days Awareness – cum – Internal Auditor Training Program on ISO 9001:2015 during 3rd to 5th May 2017 conducted by M/s. DNV GL – Business Assurance India Private Limited for NIWE Staff.
- Based on the request received from M/s. RRB Energy Limited, initiated renewal of Certificate of "Pawan Shakthi – 600 kW" wind turbine model of M/s. RRB Energy Limited. An agreement has been signed with M/s. RRB Energy Limited to take up the project on renewal of certificate of "Pawan Shakthi – 600kW" wind turbine model as per TAPS-2000 (amended). Review / verification of various documentation in connection with renewal of certificate of "Pawan Shakthi – 600kW" wind turbine model is under progress.
- Interactions with officials of M/s.TUV Rheinland (India) Private Limited & M/s. TUV Rheinland Industrie Service GmbH in connection with certification co-operation works are ongoing.

Awareness – cum – Internal Auditor Training Program on ISO 9001:2015 for NIWE Staff

- The continual improvement and maintaining the quality management system are ongoing.
- Reviewed the R&D proposals received from various organizations, academic & research institutions. Discussed the said proposals in the internal R&D Committee meetings organized at NIWE, Chennai. Based on the decision taken during the said internal R&D Committee meetings, review comments have been sent to respective organizations / institutions seeking revised R&D proposals.
- Communication has been sent to various wind turbine manufacturers, seeking industry support for identifying

new research thrust areas in connection with R&D proposal.

- Co-ordination with Bureau of Indian Standards (BIS) in connection with standards related works are ongoing.
- The continuous technical support is being provided to MNRE for their various queries related to Type Certification documentation in connection with Revised List of Models and Manufacturers of wind turbines.
- Co-ordination with wind turbine manufacturers in connection with documentation to be submitted as per MNRE guidelines on prototype wind turbine models after issue of letter in connection with grid synchronization of prototype wind turbines are ongoing.

Wind Turbine Research Station

- The total comprehensive preventive Operation and Maintenance works of various nature for the 9 nos 200 kW MICON Wind Electric Generators and of 9 nos 400V/11KV Transformers and yards, including 11KV transmission lines of the WEG`s were successfully completed in all aspects and all the machines are being kept ready for the uninterrupted operation during the windy season 2017.
- Works on Grid Integration of 75 kWp Solar PV power plant with one of the 28 years existing 200 kW MICON wind electric generator was completed and the hybrid power (solar + wind) injection to the Grid using existing land, transformer and transmission line etc. will be monitored during the windy season 2017.

Visitors

The following visits were coordinated and facilities of Small & Large Wind Turbine Testing, R&D and WRA showcased:

- 40 Students of Mechanical and Electrical & Electronics Department from Indian Institute of Technology, Chennai on 9th April 2017.
- 26 students and 4 staff members of Electronics and Communication Engineering Department from Kalasalingam Institute of Technology, Krishnankoil, Virudhunagar, Tamil Nadu on 22nd May 2017.

Visit of Special Dignitary

Shri. Rajeev Kapoor I.A.S., Secretary, MNRE, New Delhi visited the R&D facilities of WTRS/WTTS, Kayathar and inaugurated Grid Integration of 75 kWp Solar PV power plant with one of the 28 years existing 200 kW MICON wind electric generator using existing land, transformer and transmission line etc. on 8th April 2017.

Inauguration of Wind - Solar Hybrid Power Plant at Kayathar

Information, Training and Customized Services

Training Courses

The Unit has prepared reports and the expenditure details to close the following training courses conducted during February and March 2017.

- 21st National Training Course on "Wind Energy Technology" held during 20th - 24th March 2017.
- Capacity Building Training Programme on "Design, Installation and Maintenance of Small Wind Turbine" held during 27th February - 8th March 2017.
- 19th International Training Course on "Wind Turbine Technology & Application" held during 1st - 28th February 2017.
- Special International Training Course on "Wind Turbine Technology & Application" held during 1st - 24th February 2017.

The preparatory works have been initiated towards successful conduct of the following international training courses to be conducted during the financial year 2017-18.

Sl.No.	Description	From	To	Duration
Specially for ITEC partners countries				
1	Special International Training Course on "Wind Resource Assessment and Wind Farm Planning"	05.07.2017	21.07.2017	17 days
2	20th International Training Course on "Wind Turbine Technology and Applications"	16.08.2017	08.09.2017	24 days
3	Special International Training Course on "Design, Installation & Maintenance of Small Wind Turbine"	25.10.2017	10.11.2017	17 days
4	21st International Training Course on "Wind Turbine Technology And Applications"	31.01.2018	23.02.2018	24 days
Specially for African countries				
5	Special International Training Course on "Wind Turbine Technology and Applications"	22.11.2017	15.12.2017	24 days

Apart from the above confirmed training courses, the following proposals are under progress;

National Training Courses

- 22nd National training course on "Wind Energy Technology" from 18th to 22nd September 2017.
- 23rd National training course on "Wind Energy Technology" from 12th to 16th March 2018.

International training courses

Customized training course for Energy faculties of Hydro Power and Renewable Energy Department of Water Resources University, Vietnam.

Special training courses for

Agency for Non-Conventional Energy & Rural Technology (ANERT), Dept. of Power, Kerala.

Indian Renewable Energy Development Agency (IREDA).

Student Visits

The visit of 60 students & 4 staff from VelTech Dr RR & Dr SR University, Chennai was coordinated with presentations and explanations on wind energy and it's status along with NIWE's activities & services. The campus renewable energy facilities were also explained / showcased in detail on 14th June 2017.

Students Internship

Dr. P. Kanagavel, Additional Director, ITCS has been made as Coordinator for the Students Internship, Projects and Apprenticeship activities at NIWE w.e.f. 28.04.2017 in addition to his existing port polios.

The following students were granted permission for In-plant Training / Internship:

- Ms. M. Madhumitha, I year B.E (EEE) student of National Institute of Technology, Tiruchirappalli has completed her In-plant Training on "Basic Features of Wind Energy" under the guidance of Mr. Anvar Ali, Director & Group Head, ESD Unit during 5th to 23rd June 2017.
- Mr. Arrvind, S., Mr. Shyam Sundar, H., Mr. Sujyesh Aanandh, M., and Mr. Subhash Chander, S., IV year B.E. (Mech.) students of Coimbatore Institute of Technology,

Coimbatore have done their In-plant Training on "Overview of Wind Energy System" under the guidance of Dr. P. Kanagavel, Additional Director, ITCS Unit during 1st to 9th June 2017.

- Mr. Kiran Bose, III year B.E. (Mech.), St. Joseph's Institute of Technology, Chennai has done his internship on "A Study on the Power Generation from Solar Panels in Various Conditions" under the guidance of Mr. Sasi Kumar, SRRA Unit during 5th to 10th June 2017.
- Mr. Vishal Murali, I year, M. Sc in Sustainable Energy Technology, Delft University of Technology, Netherlands has been permitted to do his internship on "Techno Economic Analysis on Offfshore Wind Mills" under the guidance of Dr. Rajesh Katyal, Group Head, WRA&O and Mr. Bastin, Assistant Director (Technical) during 10th July to10th October 2017.
- Foreign Student Project: Mr. Tchodou Samah Bawong, Design Engineer, Electrical, Directorate of Energy, Ministry of Mines and Energy of Togo has done a project on "Optimization of Electrical Energy Production by Wind Turbine is Less Windy Areas of Togo" during January to March 2017 under the guidance of Dr. P. Kanagavel, Additional Director, ITCS unit, which was sponsored by NAM S&T Centre, under Research Training Fellowship for Developing Country Scientists (RTF-DCS) for 2016-17.

Global Wind Day Celebrations 2017

Global Wind Day is a worldwide event that occurs annually on 15 June and NIWE being the technical focal point for the development of wind energy in the country has been celebrating the Global Wind Day on every 15th June since 2009. This year, the event was celebrated with an special lecture by Dr. S. Subba Rao, Former Chief Scientist and Head, Information Division, Central Leather Research Institute, Chennai. All the staff of NIWE have actively participated the celebration.

Glimpses of Global Wind Day

Engineering Service Division

15 kW SPV Power Generation:

The Power Generation of 15 kW SPV plant for the month of April to June 2017 is 2911 KWh and the Cumulative generation is 37.12 MWh.

30 kW SPV Power Generation:

The Power Generation of 30 kW SPV plant for the month of April to June 2017 is 5819 KWh and the Cumulative generation is 49.21 MWh.

Civil Works

The following civil construction works have been completed:

- Cement concrete road at entrance gate.
- Visitor's two wheeler parking shed near to the main gate.
- Material Store room at the rear side of Bio-Gas plant.
- Trench for rain water harvesting.

Solar Radiation Resource Assessment

Project Activities

- Calibration of 12 pyranometers & 6 Pyrheliometers from SRRA stations in the States of Andhra Pradesh, Karnataka, Kerala and Telangana were carried out under SRRA project.
- Calibration of 9 pyranometers & 1 Pyrheliometer were carried out under consultancy projects.
- Quality Controlled data of 5 SRRA stations were provided to 3 stake holders under SDSAP policy.
- A kick off meeting for the joint collaborative project on Solar Forecasting with GIZ officials and Overspeed GmbH German officials organized at NIWE, Chennai during 3rd & 4th April 2017.
- MEDA placed a work order for establishment of one SRRA station at Chandrapur on 5th April 2017.
- Start-up meeting with Fraunhofer IWES, Kessel and ICF Consulting India Pvt. Ltd. on Virtual Power Plant (VPP) organized at NIWE, Chennai on 11th May 2017.
- Final report on solar feasibility study at Anas, Himachal Pradesh sent to M/s. SJVN Ltd. on 12th May 2017.
- Project proposal for solar-wind hybrid feasibility study at Ramakkalmedu & establishment of two SRRA stations in Kerala submitted to ANERT on 12th May 2017.
- Meeting of NIWE and officials from Fraunhofer IWES, Kessel and ICF Consulting India Pvt. Ltd. on Virtual Power Plant (VPP) organized with Tamil Nadu SLDC & TNERC at SLDC and TNERC office, Chennai held on 12th May 2017.
- Matlab training program for the SRRA Project members taken up in association with KCG College of Engineering, Chennai during 16th to 18th May 2017.
- Dr. G. Giridhar & Prasun Kumar Das visited M/s. MOIL Ltd., Nagpur in connection with discussion on Consultancy work during 19th & 20th May 2017.
- Training program on solar forecasting by officials from Oldenburg University, Overspeed GmbH and GIZ at NIWE organized during 22nd to 27th May 2017.

Matlab Training

Virtual Power Plant Meeting

Invited lecture delivered / meeting attended by NIWE Official in external forums

Dr. Rajesh Katyal, Director General (AC) & Head, WRA & O

- Second Meeting of the Technical Committee constituted by CEA for study of optimal location of various types of balancing energy sources / energy storage devices to facilitate grid integration of Renewable Energy Sources (RES) and associated issues at Hotel Ambassador Pallava, Chennai on 9th May 2017.
- Attended and delivered a presentation in the FOWPI / Metocean Workshop organized at NIWE, Chennai on 2nd June 2017.
- Meeting for Engineering Assessment on Offshore LiDAR at IIT Madras on 7th June 2017.
- Hon'ble Ministers meeting at Thirupathi on 9th June 2017.
- Delivered a lecture on "Wind Resource Assessment and Offshore Wind" for induction program for newly recruited officials of IREDA at IREDA, New Delhi.

Dr.G.Giridhar, Deputy Director General & Head, SRRA

- Attended Kalam Innovation Award as a member of Expert Jury Panel at Sri Sairam Engineering College, Chennai on 8th April 2017.
- Invited as a Chief Guest and delivered keynote address in the two days Technical outreach Programme on "Implementation of Renewable Energy Technology for Rural Development" at Kumaraguru College of Technology, Coimbatore on 11th & 12th April 2017.
- Made a presentation in the International Conference "Energy Options for Tomorrow: Technology to Sustainability" in Kolkata organized by Neotia University, West Bengal during 17th to 19th April 2017.
- Meeting with SLDC, GERMI and GEDA officials at Vadodara and Gandhi Nagar respectively on solar forecasting activities in India during 24th to 26th April 2017.
- Meeting on SRRA with SECI, MNRE & NISE officials at New Delhi on 27th & 28th April 2017.
- Meeting with GIZ officials on solar forecasting at GIZ, New Delhi on 29th May 2017.
- Technical Committee meeting on SRRA held under the Chairmanship of Joint Secretary, MNRE at MNRE, New Delhi on 29th May 2017.
- Meeting with PSDF officials on Solar forecasting at POSOCO, New Delhi on 30th May 2017.

S.A.Mathew, Director & Head, Testing & Forecasting

- Meeting and introductory discussions on Solar Power Forecasting by Dr. Hans Peter Waldi, Overspeed, GmbH, Germany alongwith GEC, GIZ officials at NIWE, Chennai on 3rd April 2017.
- Consultation Meeting on Low Voltage Ride Through (LVRT) with IWTMA at NIWE, Chennai on 3rd May 2017.

S.A.Mathew and **A.G.Rangaraj**

- Meeting regarding collaboration to improve the accuracy of the forecasting model at Indian Statistical Institute (ISI), Chennai on 2nd May 2017.
- Meeting regarding Wind Power Forecasting with TANGEDCO officials at NIWE, Chennai on 11th May 2017.
- Meeting regarding corrective actions to improve the accuracy of forecast with M/s. Vortex, Spain official at NIWE, Chennai on 15th May 2017.
- Meeting regarding Wind Power Forecasting with National Centre for Medium Range Weather Forecasting (NCMRWF) at New Delhi on 16th May 2017.
- Task Force Core Committee Meeting at TNEB Office, Anna Salai, Chennai on 30th May 2017.
- Meeting regarding draft MOU to be signed between MNRE & ISRO-SAC for Development of Wind Power Forecasting at Ahmedabad on 22nd June 2017.

A. Senthil Kumar, Director & Head, S&C and R&D / S&T

- Attended presentation on "Solar Assisting Vapour Absorption Chiller for Solar Air conditioning" delivered by Shri R. R .Desai, Thermax Ltd, Pune held at NIWE , Chennai on 5th April 2017.
- Meeting held with Mr. Sujit Gulati, IAS, Additional Chief Secretary, Energy & Petrochemicals Dept, Gujarat & GC Member, at NIWE, Chennai on 8th April 2017.
- Second internal committee meeting for reviewing & evaluating R&D proposals received by NIWE at NIWE, Chennai on 16th May 2017.

K. Boopathi, Additional Director

Meeting with SAC & GEDCO officials in connection with Wind Power Forecasting at Ahmedabad on 5th & 6th April 2017.

Dr. P. Kanagavel, Additional Director

- Attended the Summit on 'Green Jobs for Future: Towards Skilling India Goals 2030', organised by Skill council for Green Jobs (SCGJ) at India Habitat Centre, New Delhi as the Principal Representative of NIWE for SCGJ on 19th April 2017.
- Meeting of Public Relations (PR) Heads of all the CPSU/Statutory bodies under the Ministries at Shram Shakti Bhawan, New Delhi on 20th April 2017.

- Delivered a lecture on "Motivational Aspect of Becoming an Engineer with Renewable Energy Awareness" at Veltech Dr. RR & Dr. SR University on 16th June 2017.

A.G. Rangaraj, Deputy Director (Technical)

- Delivered a presentation about wind power forecasting in power ministers conference at Ashoka hotel, New Delhi on 4th May 2107.
- Alongwith Vortex official attended the meeting regarding improving the forecasting accuracy at TANGEDCO office, Chennai on 14th June 2017.

J. Bastin, Assistant Director (Technical) &
B. Krishnan, Assistant Director (Technical)

1st meeting of Samudhra conducted by SAC ISRO in connection with the Ocean related areas on 2nd May 2017.

S. Arulselvan, Assistant Engineer

- Meeting held with Mr. Sujit Gulati, IAS, Additional Chief Secretary, Energy & Petrochemicals Dept, Gujarat & GC Member, at NIWE, Chennai on 8th April 2017.
- S&C and R&D / S&T Engineer attended the meeting of Technical Committee on study of optimal location of various types of balancing energy sources / energy storage devices to facilitate grid integration of RE sources conducted by CEA held at Chennai on 9th May 2017.
- S&C and R&D / S&T Engineers attended the second internal committee meeting for reviewing & evaluating R&D proposals received by NIWE at NIWE, Chennai on 16th May 2017.

Prasun Kumar Das, Assistant Director (Technical), Contract

- Parliamentary Committee meeting at Agartala on 19th April 2017.
- Meeting with GIZ officials on solar forecasting at GIZ, New Delhi on 29th May 2017.
- Technical Committee meeting on SRRA held under the Chairmanship of Joint Secretary, MNRE at MNRE, New Delhi on 29th May 2017.
- Meeting with PSDF officials on Solar forecasting at POSOCO, New Delhi on 30th May 2017.

R. Karthik, Assistant Director (Technical), Contract

Meeting with Space Application Centre (SAC) officials on solar forecasting data sharing at Ahmedabad during 4th to 6th April 2017.

R. Sasikumar, Consultant

- Meeting with ANERT officials at Trivandrum on solar power project and on SRRA on 7th April 2017.
- Visited Badi Sid and Jodhpur, Rajasthan to discuss with SECI Badi Sid solar power plant officials and RRVPNL officials during 11th to 13th April 2017.
- Meeting with SLDC, GERMI and GEDA officials at Vadodara and Gandhi Nagar respectively on solar forecasting activities in India during 24th to 26th April 2017.

Publications

G. Arivukkodi has presented a technical paper on "Comparison of measured and modeled wind turbine noise in Indian terrain" under the session International Perspectives at the biennial international conferences (seventh conference of the series) on Wind Turbine Noise, organised by INCE-Europe at Willem Burger Complex at De Doelen in Rotterdam, The Netherlands during May 2-5, 2017. She also underwent short course on wind turbine noise which focused on the wind turbine noise and its propagation on 1st May 2017.

Tchodou Samah Bawong, P. Kanagavel, G.Arivukkodi, Quantitative Evaluation of Wind Potential at 10m on seven sites in Togo, International Journal of Advanced Research in Education & Technology (IJARET), Vol.4, Issue 2, pp-223-231, April - June 2017.

Staff Recruitment

Recruitment

Mr. V.K. Sreeram

has been appointed as Executive Assistant in F&A Department in Purchase section on 15th May 2017.

Recruitment

Mr. R. Sundaresan

has been appointed as Executive Assistant in F&A Department in Administration Section on 19th June 2017.

Training / Conferences / Seminars attended by NIWE Officials

Five days training program

S.A. Mathew and **M. Anvar Ali** have attended Five days training program on indigenous solar power forecasting models by SRRA in association with GIZ, New Delhi at NIWE, Chennai during 23rd to 27th May 2017.

Training of Nacelle

M. Saravanan, S.Paramasivan, A.R. Hasan Ali, M. Karuppuchamy attended installation, commissioning, documentation and training of Nacelle based LIDAR installed on INOX R&D wind turbine by Mr. Sergio Martinez Aliaga of M/s. WINDAR Photonics, Spain at Wind Turbine Test Station (WTTS), Kayathar during 10th to 13th May 2017.

Performance Evaluation Training

Prasun Kumar Das and **three Project Assistants** attended a 5 days training program on "Performance Evaluation and O&M of Solar Thermal Systems" at NISE, Gurugram during 20th to 24th April 2017.

Windergy India 2017

Dr. Rajesh Katyal, S.A. Mathew and **A. Senthil Kumar** attended International Conference and Exhibition "Windergy India 2017" at New Delhi held during 25th to 27th April 2017.

ISO Training

A. Senthilkumar, M. Anvar Ali, S.A. Mathew, K. Boopathi, J. Bastin, B. Krishnan, R. Vinodkumar, S. Arulselvan, A.G. Rangaraj, M. Saravanan, S. Paramasivan, A.R. Hasan Ali & M. Karuppuchamy have attended the 3 days awareness cum internal auditor course on ISO 9001:2015 by M/s. DNV GL at NIWE, Chennai during 3rd to 5th May 2017.

Metocean Studies carried out under FOWPI Project

S.A. Mathew, A. Senthilkumar, S. Arulselvan and **M. Anvar Ali** have attended one-day workshop regarding "Metocean Studies carried out under FOWPI Project" organized by Windforce Management Services Private Limited, Gurgaon, Haryana at NIWE, Chennai on 2nd June 2017.

Installation & Commissioning of Nacelle based LIDAR installed on INOX R&D wind turbine by Mr. Sergio Martinez, Windar Photonics, Spain at Wind Turbine Test Station (WTTS), Kayathar

Newsletter of NATIONAL INSTITUTE OF WIND ENERGY, Chennai pavan Issue-53, April - June 2017

First Offshore Wind Monitoring Station in India- Gulf of Khambhat

Dr. Rajesh Katyal, Director General (AC), Group Head, Wind Resource Assessment & Offshore

Introduction

India has about 32 GW onshore wind installation. Most of the high wind regimes in plain terrain suitable for wind turbine installation have almost been exhausted. The land procurement, Logistic management and power evacuation are posing a serious concern for fostering the growth of onshore installations. Hence, it is envisaged as essential and necessary to explore possibilities for deploying wind turbines deep into the sea, called as offshore wind farming. Surface of seas and lakes are generally smooth, as such the roughness of seascape is very low. The temperature variations above the surface of sea are much smaller than above land. Thus the winds available on the sea are higher (as show in Figure 1 below), less turbulent and possess higher density when compared to land (typical values are about 10-12% above sea). The wind turbines located at sea are therefore expected to have higher generation leading to higher capacity factor and longer life.

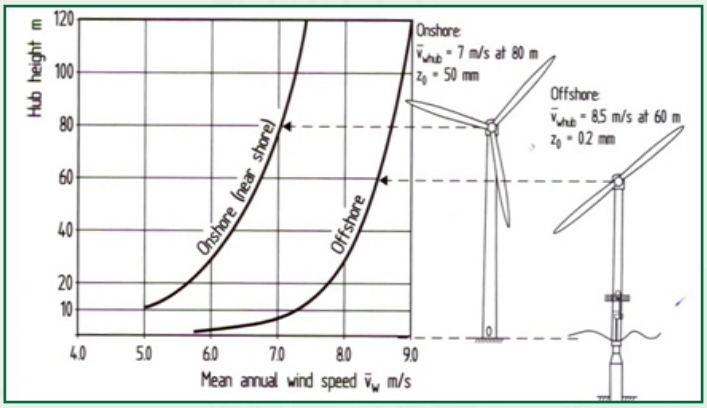


Figure 1 Logarithmic wind profile for onshore and offshore wind turbines

In the recent years, the offshore wind industry has grown beyond Europe to North America and East Asia, and the future of the sector looks promising. The total offshore installation across the world is 14,384 MW with UK leading with total installed capacity of 5156 MW followed by Germany and China at 4108 MW and 1627 MW respectively. India is blessed with a coastline of 7600 km surrounded by water on three sides and has bright prospects of harnessing offshore wind energy. The Preliminary assessment along the Indian coastline through met mast measurements and satellite data assessment shows reasonable potential. The Government of India notified the National Offshore Wind Energy Policy in October 2015 to provide a policy framework for the exploitation of offshore wind energy and NIWE has been identified as the nodal agency for development of offshore wind energy in the country. Since the assessment of potential along offshore has mainly relied on modeled wind data based on onshore wind measurements and satellite data, there is a need to validate this with real time measurements. The present focus of NIWE is to carry out offshore wind resource assessment studies off Gujarat and Tamil Nadu coasts in zones identified through desktop studies.

Indian Efforts

The MNRE has made consistent efforts to create a conducive environment for the development of offshore wind in the country. During the preparation of the Indian Wind Atlas, RISO DTU Denmark, along with NIWE indicated some offshore wind potential in the eastern shore compared to the western shore of South India. A preliminary estimation of the offshore potential was carried out by Scottish Development International (SDI) and NIWE for Tamil Nadu region in 2010. NIWE has also installed masts along the coastline for preliminary estimates on the offshore potential. Besides this, agencies like Indian National Centre for Ocean Information Services (INCOIS) have given some estimates based on the secondary data available with them.

The consortium led by Global Wind Energy Council (GWEC) is implementing the Facilitating Offshore Wind in India (FOWIND) project. The other consortium partners include the Centre for Study of Science, Technology and Policy (CSTEP), DNV GL, the Gujarat Power Corporation Limited (GPCL) and the World Institute of Sustainable Energy (WISE). National Institute of Wind Energy (NIWE) joined the consortium as a knowledge partner. The project focuses on the States of Gujarat and Tamil Nadu for identification of potential zones for development through techno-commercial analysis and preliminary resource assessment. As per the pre-feasibility studies carried out by FOWIND with mesoscale model data, eight offshore zones were demarcated each in the states of Gujarat and Tamil Nadu, as given in Figure 2 & 3 below:

Figure 2 Eight Identified zones in the State of Gujarat

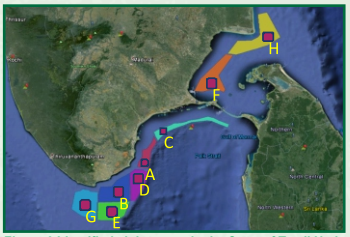


Figure 3 Identified eight zones in the State of Tamil Nadu

Offshore wind resource assessment at Gulf of Khambhat

Measurement platform

It was decided to validate the potential at the demarcated zones by putting wind monitoring stations. The data collected would also be useful in International Competitive Bidding Process for developing wind farms in Gujarat and Tamil Nadu. One location was identified along the Gujarat and Tamil Nadu coasts for measurements.

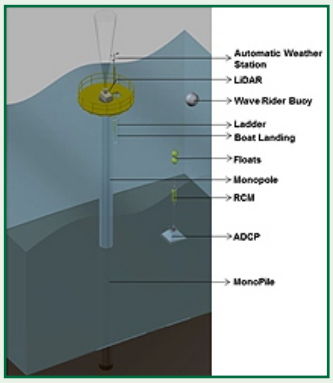


Figure 4 Conceptual Offshore Wind Monitoring Station

NIWE along with the support of ESSO-NIOT prepared a detailed project report for establishment of LiDAR-based offshore wind measurement platform off Pipavav in Gulf of Khambhat, Gujarat Coast at one of the zones identified by FOWIND, off Gujarat coast.

The observation platform has two components, superstructure (Support Platform) and substructure (Monopile). The support platform is made of central circular beams supported on monopile. The LiDAR support platform is 5m in diameter weighs about 5 tons and coated with epoxy paint. The support platform has handrails to a height of 1.5 m.(refer 4)

Fabrication at Mumbai Yard

The structure was fabricated at a private yard in Reti Bunder of Navi Mumbai. The structure was made up of 2 parts, Substructure Monopile, and Super Structure Platform. Refer Figure 5a and 5b.


Figure 5(a) Monopile


Figure 5(b) Platform

Substructure Fabrication:

The monopile was fabricated into 3 pieces and added together to form a total 47.5 m (refer Figure 6). Then the substructure was painted with epoxy primer and corrosion resistant coating to sustain the harsh offshore environment. Inspection of the same was done by the NIWE – NIOT team during fabrication and the Dye Penetration test was carried out to check the welding joints. Refer Figure 7.


Figure 6 Fabrication of Sub-Structure


Figure 7 Dye Penetration test


Figure 8 Epoxy Coating for Corrosion Resistance

Platform Fabrication:

The platform of 5m diameter was fabricated to house the Wind Measuring Instrument LiDAR and its allied components. The platform has a manhole for accessibility and Derrick to transfer materials to the top. The platform has handrails for a height of 1.2m which will protect the LiDAR and for the safety of the person working on the platform. Refer Figure 9.


Figure 9 Platform for housing LiDAR

Ancillaries

Ladder, Boat landing, and other necessary ancillaries were fabricated separately and the same was welded after successful installation of Substructure into the sea.

After the fabrication of complete structure, the monopile, platform, ladders, and boat landing was loaded in the Jack up Vessel and proceeded for installation. Refer Figure 10.


Figure 10 Structure Loaded on the Barge

Installation of Structure

A three-member team from NIWE - NIOT was present during the installation and the installation has been initiated during the mid of March 2017. The team has started monitoring the atmospheric and ocean conditions for planning installation activities. After getting sufficient idea about the site conditions, the Pile erection was started and the water depth was 15m and wave height was approximately 1m. The barge with structure approaching the site from the western coast is shown in figure 11.

Figure 11 Approaching the site

Monopile Installation:

The monopole has been fitted with protrusions (50mm X 75mm X 150mm) at spacing of 450mm along the length of the monopile, which was used for lowering the monopile by using the hydraulic driving rigs. The hydraulic driving mechanism started pushing the pile and the pile was going down without any obstructions. After 15m lowering in the water, the bottom of pile hit the soil and relatively higher pressure exerted by the hydraulic rigs. Upon more penetration into the tighter soil, the pressure in the hydraulic rigs was gradually increased.

Figure 12 Hydraulic Rig Arrangement

After 15m of penetration into the seabed, while applying sufficient pressure, there was no more penetration as the soil is exerting greater resistance. Hence it is decided to increase the penetration with hammer blows. A special hammer weighing 7 Tonne with the guiding mechanism was fabricated for driving the pile in hard strata. The hammer was lifted with a 75 tonne crane and about 25 blows were applied on the top of the pile. But due to higher soil resistance, the penetration was at the same level i.e 15m. It was observed that the pile was stable.

Figure 13 Hammering the Monopile

After successful installation of Monopile, barge was released from the monopile, which is shown in figure 15.

Figure 14 Installed Monopile

Figure 15 Monopile Released from Barge

Ladder Installation:

After successful installation of Monopile, welding of ladders, Fenders, Boat landing was carried out. The Ladder installation activities were initiated as the ocean conditions are favorable to start the work. Ladders were lifted with the help of the crane and the same is hold on the top of the pile with temporary holders. After positioning properly, welding of joints were done till evening.

Figure 16 Ancillaries Installation

Ancillaries

Fenders for boat landing arrangement were welded to the monopile also the protective casing around the ladders were welded. The Arrangement of Fixtures for LIDAR, Sensors, Batteries, data loggers, solar panels were suitably fabricated on the platform.

Platform Installation

After making necessary arrangements, the platform of 5m diameter was lifted with the help of the crane and the same is being positioned on the top with the help of a metal guide. The platform was the fastened by the techni-cians. Solar panels, Batteries, Data logger, charge controllers have been lifted to the platform and the fixed on the platform. LiDAR has been successfully fixed on the platform. Refer figure 17.

Figure 17 Lifting of Platform

The structure (Monopile & Platform) was installed successfully during the end of March. The Platform has also been fitted with a conventional anemometer and wind vane for redundancy. The completed structure is shown in figure 18 &19.

Conclusion

The first of its kind offshore structure (Monopile & Platform) has been successfully installed at Gulf of Khambhat 23kms from the Pipavav Bhandar and the process of mounting LiDAR is underway and is expected to be completed before the onset of mon-soon season by mid of October and thereafter measurements will commence for a period of 2 years to better understand the wind potential of Gujarat coast and this will provide useful pointers to foster the growth of offshore wind turbines in the country.

Figure 18 Finishing minor weldings

Since NIWE is entrusted to do studies and surveys for demarcation of potential zones as per the notified offshore wind energy policy, installation of LiDAR-based wind monitoring station in Tamil Nadu coast near Tuticorin is also planned. Also, Geophysical and Geotechnical investigations have to be done at the appropriate time to invite potential developers for ICB.

Soon India will have pilot wind farms in Indian seas.

Figure 19 Completed Structures

Published by :
NATIONAL INSTITUTE OF WIND ENERGY (NIWE)
An autonomous R&D Institution under the Ministry of New and Renewable Energy (MNRE), Government of India
Velachery - Tambaram Main Road, Pallikaranai, Chennai - 600 100.
Phone : +91-44-2246 3982, 2246 3983, 2246 3984 Fax : +91-44-2246 3980
E-mail : info.niwe@nic.in URL : http://niwe.res.in www.Facebook.com/niwechennai www.Twitter.com/niwe_chennai