

वार्षिक रिपोर्ट ANNUAL REPORT 2015-16



नीवे NIWE

राष्ट्रीय पवन ऊर्जा संस्थान NATIONAL INSTITUTE OF WIND ENERGY

An Autonomous R & D Institution, Ministry of New and Renewable Energy, Government of India
नवीन और नवीकरणीय ऊर्जा मंत्रालय, अनुसंधान एवं विकास स्वायत्त संस्थान, भारत सरकार

INDIAN WIND ATLAS LAUNCH भारतीय पवन-ऊर्जा एटलस का लोकार्पण



Hon'ble Minister of State with Independent Charge for Power, Coal and New and Renewable Energy **Shri. Piyush Goyal** launched **Indian Wind Atlas** on **2nd September 2015** at Habitat Centre, New Delhi
श्री पीयूष गोयल, विद्युत, कोयला एवं नवीन और नवीकरणीय ऊर्जा मंत्रालय के राज्य मंत्री (स्वतंत्र प्रभार) के कर कमलों द्वारा 2 सितंबर 2015 को नई दिल्ली, हैबिटेट सेंटर, में भारतीय पवन-ऊर्जा एटलस का लोकार्पण

INDIAN SOLAR ATLAS LAUNCH भारतीय सौर-ऊर्जा एटलस का लोकार्पण



Shri Tarun Kapoor, I.A.S., Joint Secretary launching the **Indian Solar Atlas** on **3rd June 2015** at Hotel Habis, Chennai

श्री तरुण कपूर, भाप्रसे, संयुक्त सचिव, के कर कमलों द्वारा 3 जून 2015 को हैबिस होटल, चेन्नई में, भारतीय सौर-ऊर्जा एटलस का लोकार्पण

Governing Council - NIWE

CHAIRMAN



Shri. Upendra Tripathy, I.A.S.,

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Shri. Kuljit Singh Popli

Chairman and Managing Director,
Indian Renewable Energy Development
Agency Limited, New Delhi -110066



Shri. S.K. Soonee

Chairman, R & D Council, NIWE and
CEO, Power System Operation
Corporation Limited, New Delhi 110016



Shri. Madhusudan Khemka

MD, ReGen Powertech Pvt Ltd.

Chairman, Indian Wind Turbine Manufacturer's Association



Shri. Sarvesh Kumar

President & COO, RRB Energy Ltd.

MEMBER SECRETARY



Dr. Sheno

Director, National Institute of Ocean Technology
Chennai 600100

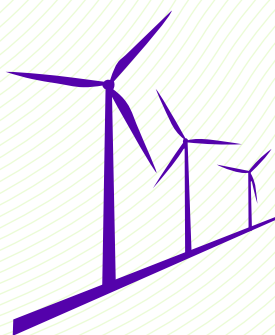


Dr. S. Gomathinayagam

Director General, National Institute of Wind Energy
Chennai - 600100

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DIRECTOR GENERAL'S REPORT



National Institute of Wind Energy (NIWE)] has been formally dedicated to the Nation by Shri Upendra Tripathy, Chairman, Governing Council-NIWE & Secretary, MNRE with enhanced role as a National Institution from the earlier perception of C-WET on 18th February 2016. Boot strapping towards 175 GW of renewable energy with wind needing only 30 GW to be added in the next 5 years by 2022 to meet the target of 60 GW, NIWE is fully geared to enable the sector contribute to the goal of the Nation, in addition to providing the solar resources to enable meeting 100 GW solar target.

This year NIWE has crossed several mile stones which were in progress such as releasing a comprehensive well ground truthed Web-GIS based Solar Atlas of India prepared in collaboration with GIZ Germany, release of Web-GIS based Indian Wind Atlas with Capacity Utilisation Factors and indicative potential at 100 m level, launching of wind power forecasting and scheduling services with Vortex, Spain collaboration and launching of International Accredited Certification Services for wind turbine generators with TUV Rheinland, Germany as visible output of Indo-German partnership at REINVEST-2015.

NIWE also has developed "ALSA : Automated Load Spectrum Analysis" in-house code using MATLAB platform. ALSA ver1.0 has been validated with RISO as well as "BLADED" software programs to provide detailed analysis as per earlier technical specifications (TS) of present reporting standard IEC 61400-13:2015.

Year after year, NIWE's experience has been gainfully sought after by the Industry and all the new Stakeholders including the independent power producers, for NIWE's value added services.

Wind resources have been measured at 808 stations till 31.03.2016 cumulatively and 237 stations have been found to have wind power density (WPD) in excess of 200 W/m², 65 wind monitoring stations are in operation in 14 States and 1 Union Territory. As an outcome of NIWE's international interaction at the RE-INVEST meet, Wind Power forecasting services was launched by the Ms. Varsha Joshi I.A.S, Joint Secretary, MNRE on 13th May 2015 at NIWE, Chennai. NIWE has received the SKOCH Award for the year 2015, the highest independently instituted civilian honours in India, for Wind Power Forecasting. Skoch Award is distinctive for its approach in selection of awardees.

Solarisation (wind-solar grid connected hybrid) of a Wind Turbine at WTRS, Kayathar is first of its kind effort in India for old WTGs.

Under TAPS-2000 (amended) scheme renewal of certificates of 3 wind turbine models have been completed. As mandated by Honble Minister of New and Renewable Energy, Internationally accredited certification services are made available in India by NIWE through a Tri-party Co-operation agreement among NIWE, M/s. TUV Rheinland Industrie Service GmbH, Germany and M/s TUV Rheinland (India) Private Limited.

Wind Turbines Sectional Committee (ET 42) has been formulated by BIS for the preparation of Indian standards on wind turbines. Two Indian Standards have been finalised this year viz. (i) Design requirements for wind turbine gearboxes (ii) Acoustic noise measurement techniques. Three RLMM Lists have been issued during this Year, consisting of 52 models from over 20 manufacturers.

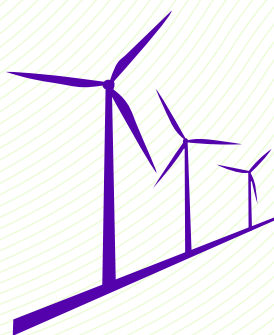
NIWE had organized three National training courses and two (ITEC/MEA) International courses. Global Wind Day was celebrated on June 15. NIWE as an Institution and individuals been received several awards.

Erecting a LiDAR in the sea, at Gulf of Khambhat, Gujarat is one of the objectives of 'FOWIND' project aimed at developing a roadmap for offshore wind development in India, along with NIWE.

Testing of 5 Nos. of small wind turbine ranging from 650 W to 15 kW have been taken up at WTRS Kayathar. A detailed report on performance of SWTs installed to establish the proof of concept of powering Telecom towers in Jaisalmer, Rajasthan, has been completed.

Review of nine of the MNRE funded projects on SWES systems was carried out by a team from NIWE / MNRE / External Experts during October 2015.

In summary the second Peer Review conducted on performance of NIWE has been recorded as "Excellent", with enhanced internal revenue per year from 2 crores to 12 crores per year, accumulated general reserve fund touching 40 crores from 8 crores and with over 25 of 43 regular staff acquiring higher qualification. NIWE as an Indian Institution unique in International collaboration and recognition is in good stead to leapfrog to the next level of Global Wind Energy Institute.



CHARTER

The National Institute of Wind Energy (NIWE) serves as the technical focal point for wind energy technologies and was established at Chennai during 1998 by the Ministry of New and Renewable Energy (MNRE). A Wind Turbine Test Station (WTTS) has also been established at Kayathar, Tamil Nadu, with the technical support and partial financial assistance from Danish International Development Agency (DANIDA), Denmark and Government of India.

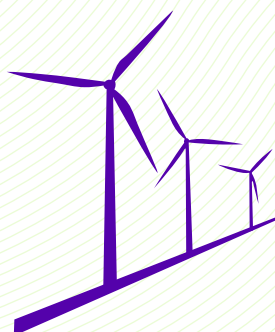
Mission

NIWE, a knowledge based institution of high quality and dedication, offers services and seeks to find total solutions for the major stakeholders across the entire spectrum of the wind energy sector. It will support the wind turbine industry in achieving and sustaining quality such that products of the highest quality and reliability are installed, harnessing maximum energy available in the wind. NIWE will strongly support the wind energy industry in developing the know-how and know-why and promoting export of products and services.

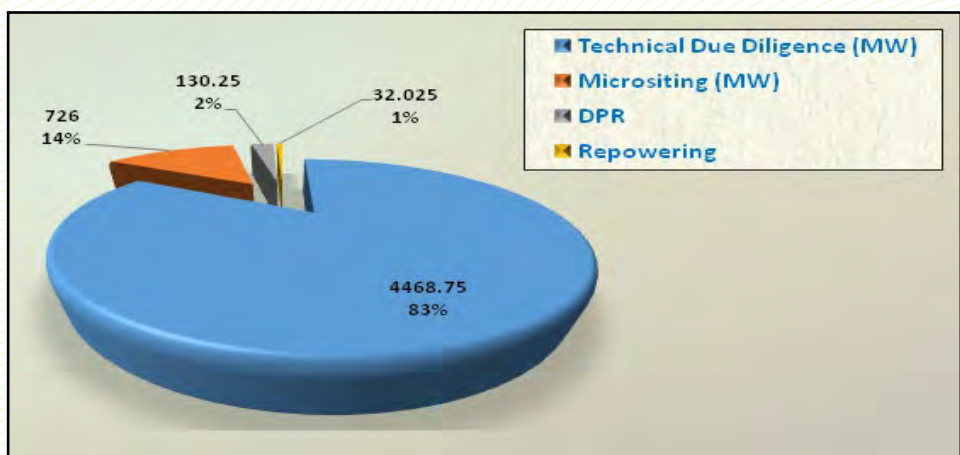
Objectives

- ◆ To serve as the technical focal point for wind power development in India, for promoting and accelerating the pace of utilization of wind energy and support the growing wind power sector in the country.
- ◆ To develop and strengthen the facilities and capabilities, evolve strategies, promote, conduct, co-ordinate and support research and development programmes to achieve and maintain reliable and cost effective technology in wind power systems.
- ◆ To analyze and assess wind resources, based on the data available from various sources and prepare wind energy density maps / wind atlas / reference wind data.
- ◆ To prepare and establish Indian standards on wind turbines and to develop and implement certification system in India.
- ◆ To establish world class facilities, conduct and coordinate testing of complete wind power systems and components according to internationally accepted test procedures and criteria, whereby the total performance that includes power performance, power quality, noise level, dynamics and operation and safety systems is tested according to agreed protocols.
- ◆ To accord type approval / type certification to wind turbines in accordance with Type Approval Provisional Scheme TAPS 2000 (amended).
- ◆ To undertake Human Resource Development programmes for the personnel working in the wind energy sector.
- ◆ To promote commercial exploitation of know-how, know-why results and offer various consultancy services to the customers.
- ◆ To promote the development and commercialization of any other wind energy systems including stand-alone systems.
- ◆ To carry out any other activity in the field of renewable energy for R&D as may be assigned to it by the Ministry of New and Renewable Energy (MNRE) from time to time.

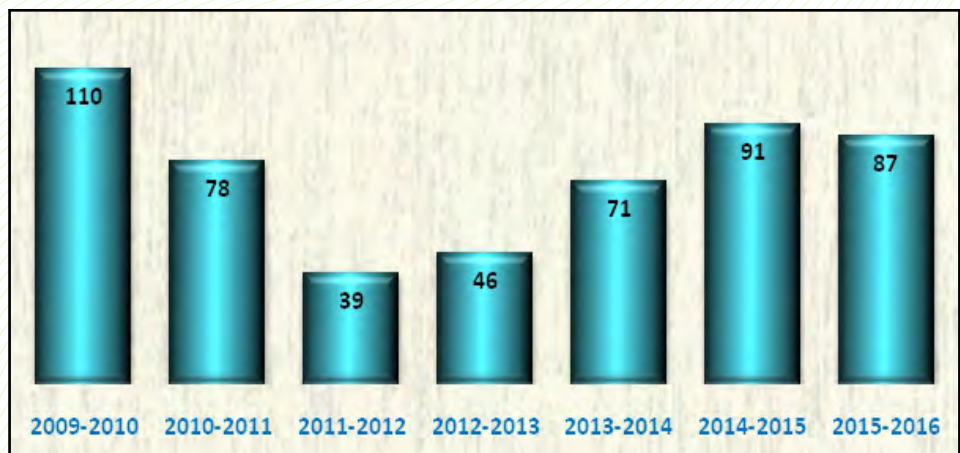




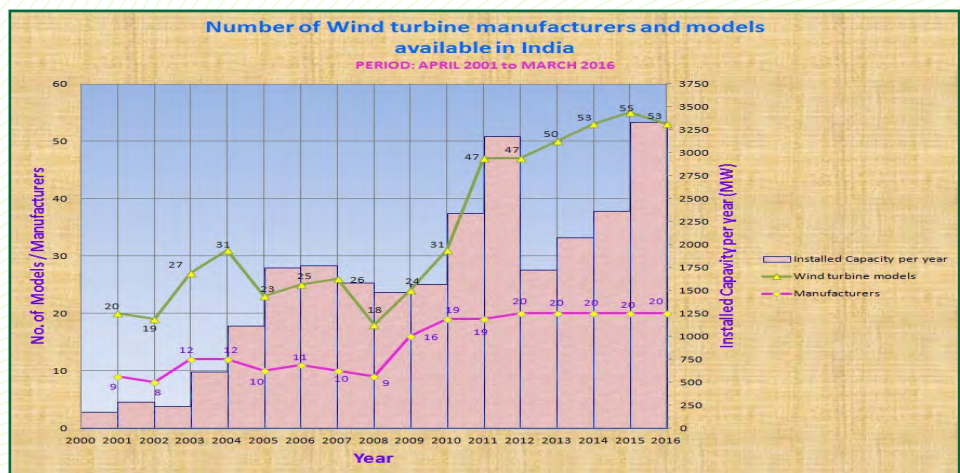
NIWE'S MISSION HIGHLIGHTS



Wind Resource projects in MW

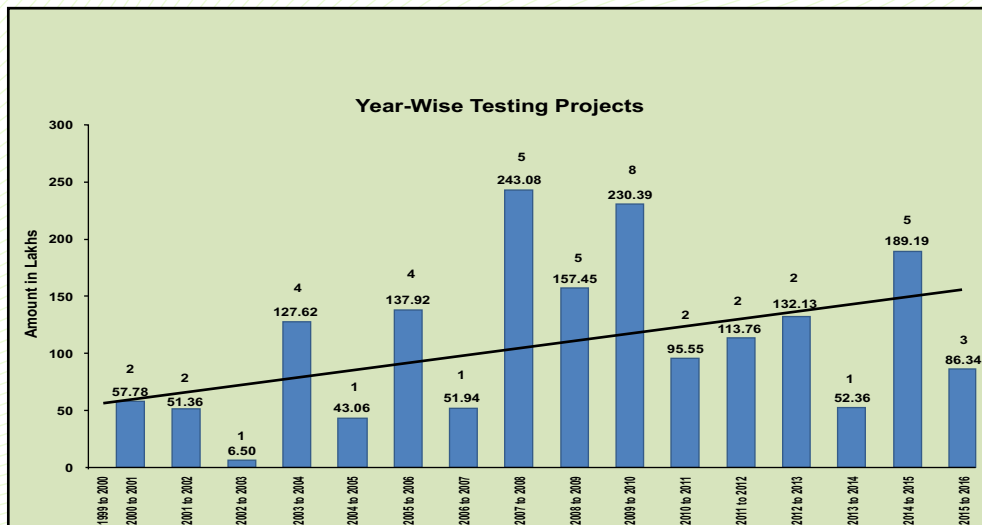


Verification of Wind Monitoring station projects



Wind turbine models / Manufacturers RLMM list

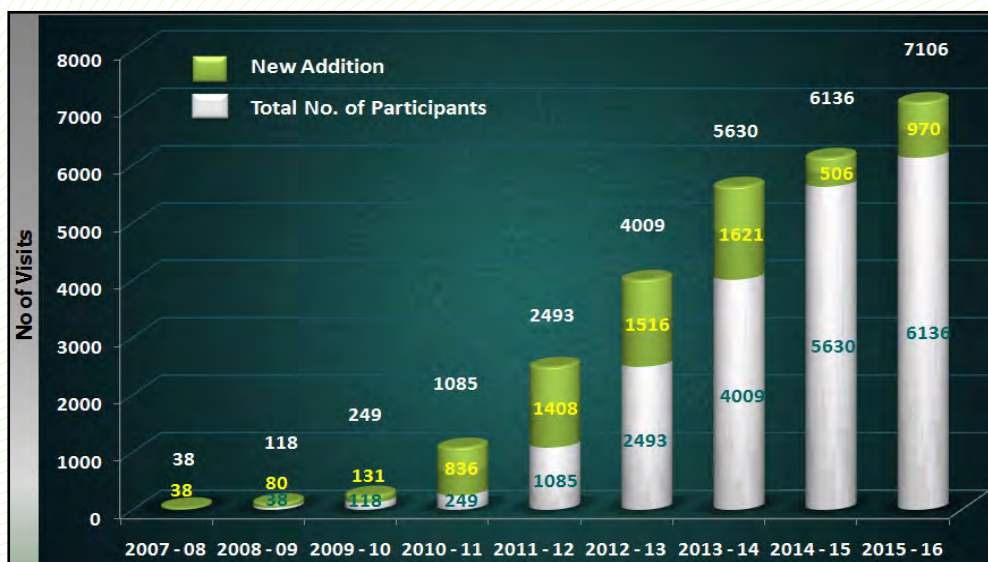
NIWE'S Mission Highlights



Wind Turbine Testing Projects



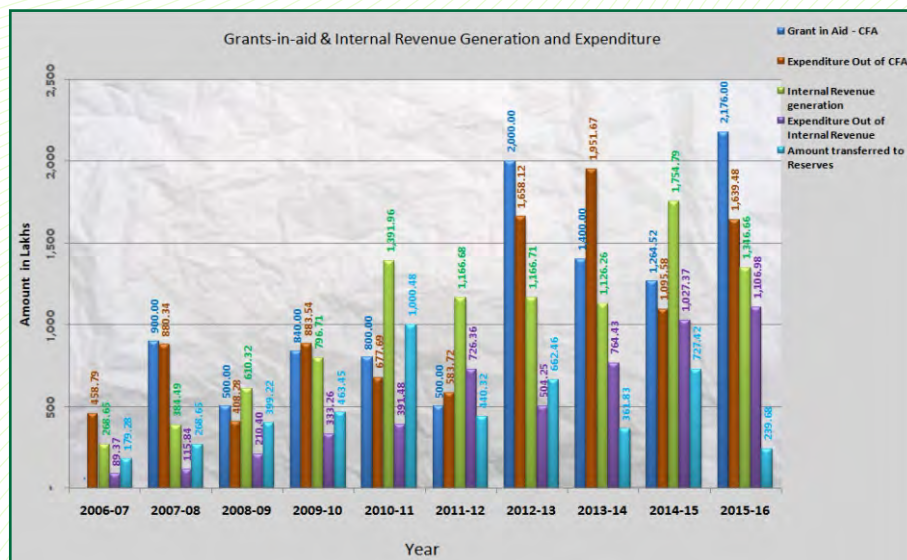
National & International Training Courses



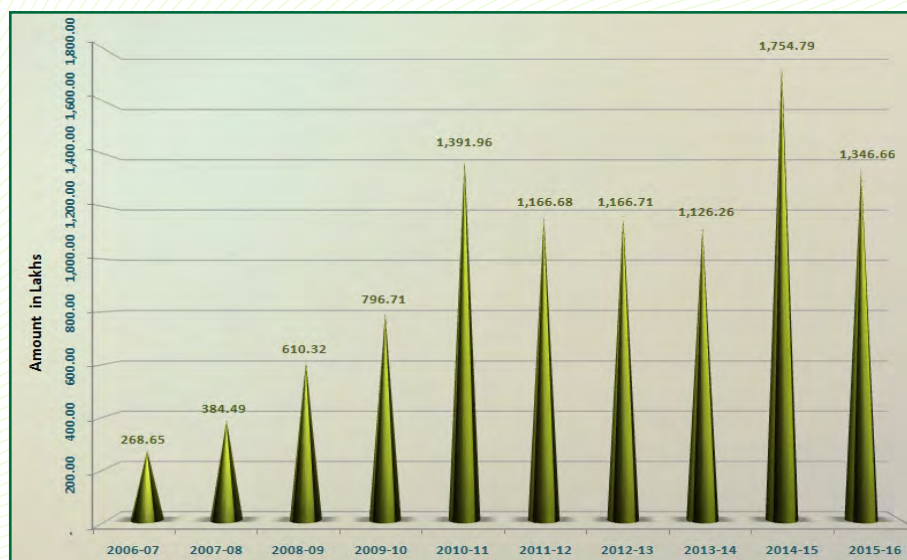
RE Awareness created among Students



NIWE Publications



Grants-in-aid & Internal Revenue Generation and Expenditure



Internal Revenue Generation

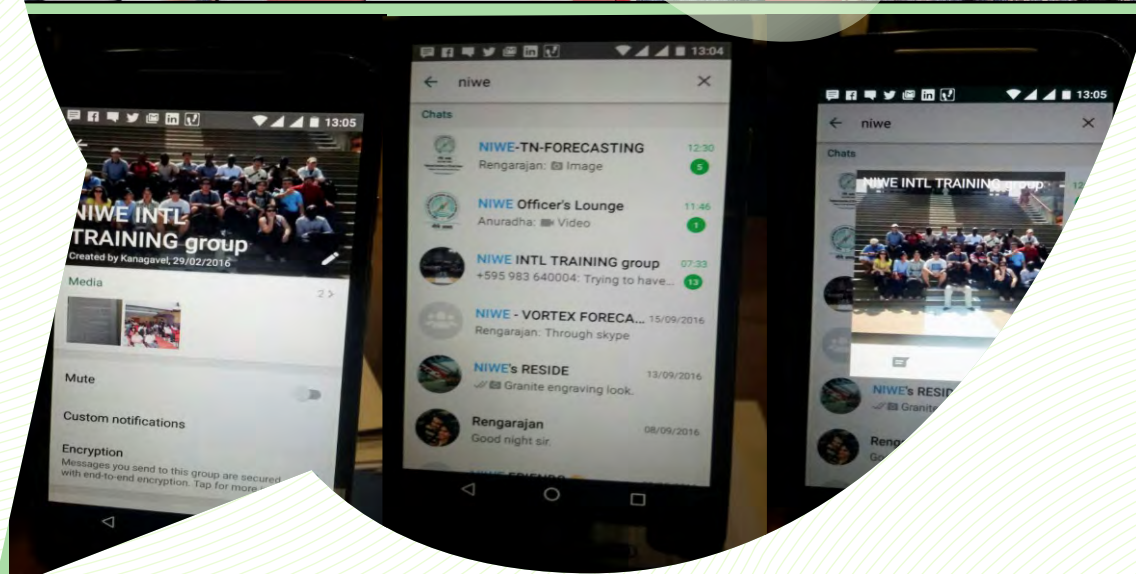
NIWE's INTERNATIONAL TRAINING ALUMNI GROUP

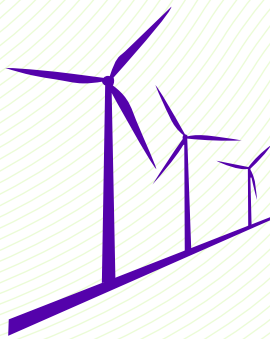
NIWE had successfully organized 20 International training courses and 21 National training courses, through which we have trained 382 international participants from 72 countries and more than 1000 national participants.

Shri. Upendra Tripathy, Secretary, MNRE had visited NIWE on 18th February 2016 and interacted with the participants of the 17th International Training Course held during 3rd February to 1st March 2016.

As suggested by Secretary, MNRE, an WhatsApp group having all the participants, Secretary, MNRE and NIWE officials as members, which enables all the participants to be aware of the NIWE events, trainings and also to create awareness about the latest developments in renewable energy and to be a platform to discuss and clarify the doubts with regard to renewable energy awareness world-wide. This group also enables the participants to have interactions with their fellow participants in their country to get to know each other and exchange their views / knowledge about the renewable energy.

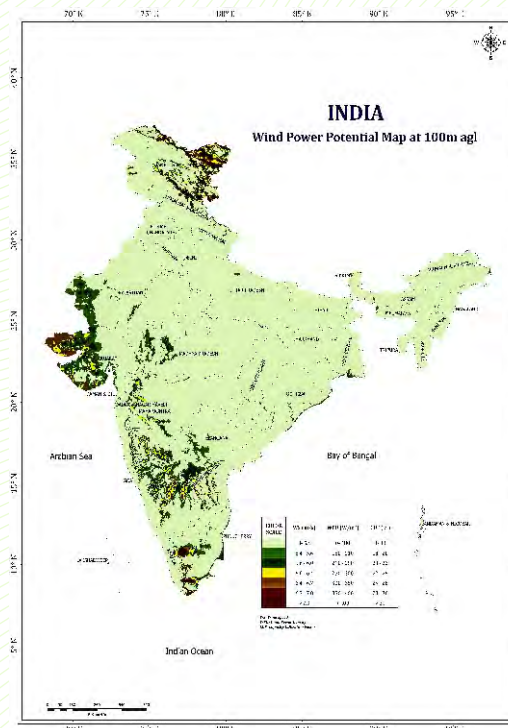
Similarly, separate Whatsapp Groups have been created for all the activities & services of NIWE i.e. forecasting, Small Wind Turbine and Offshore, etc.



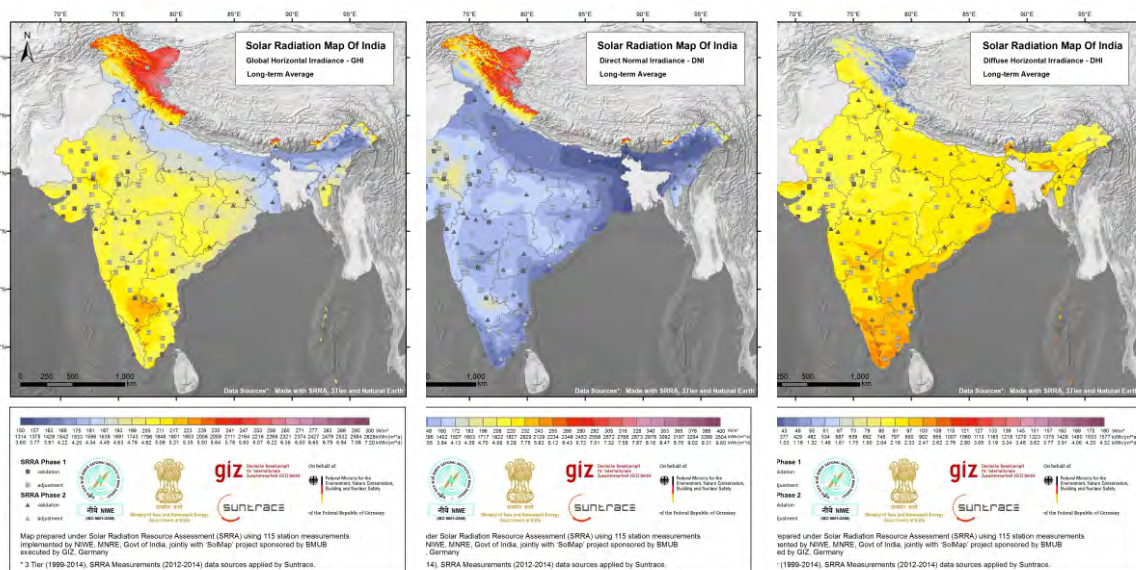


INNOVATION & IN-HOUSE CAPACITY BUILDING

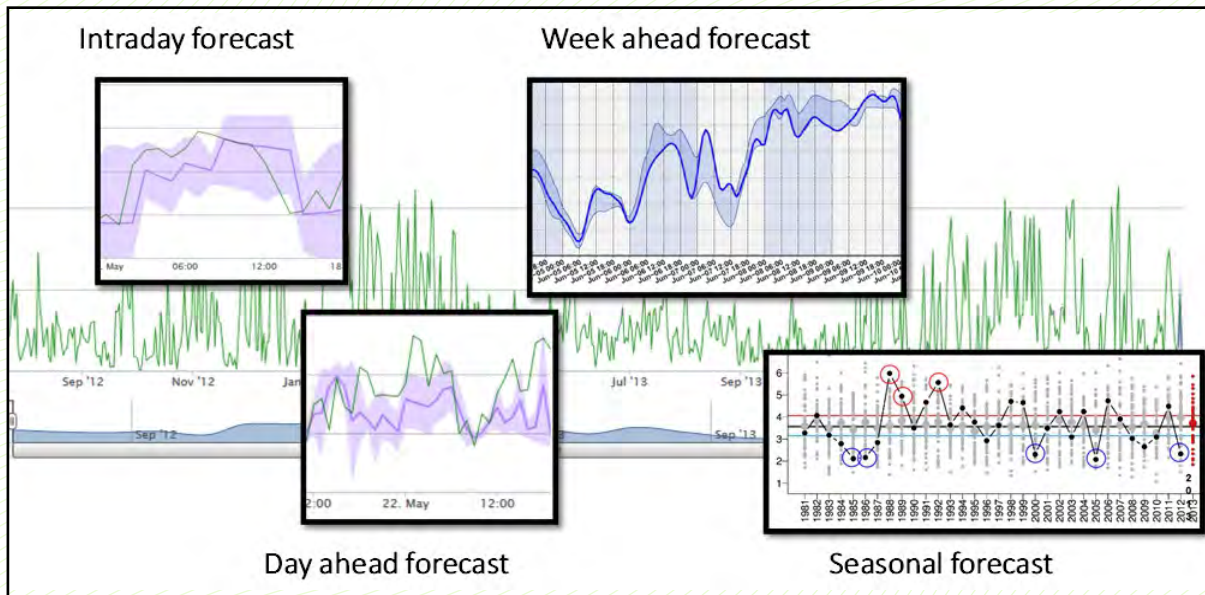
Web-GIS Interactive Resource Atlas: Wind



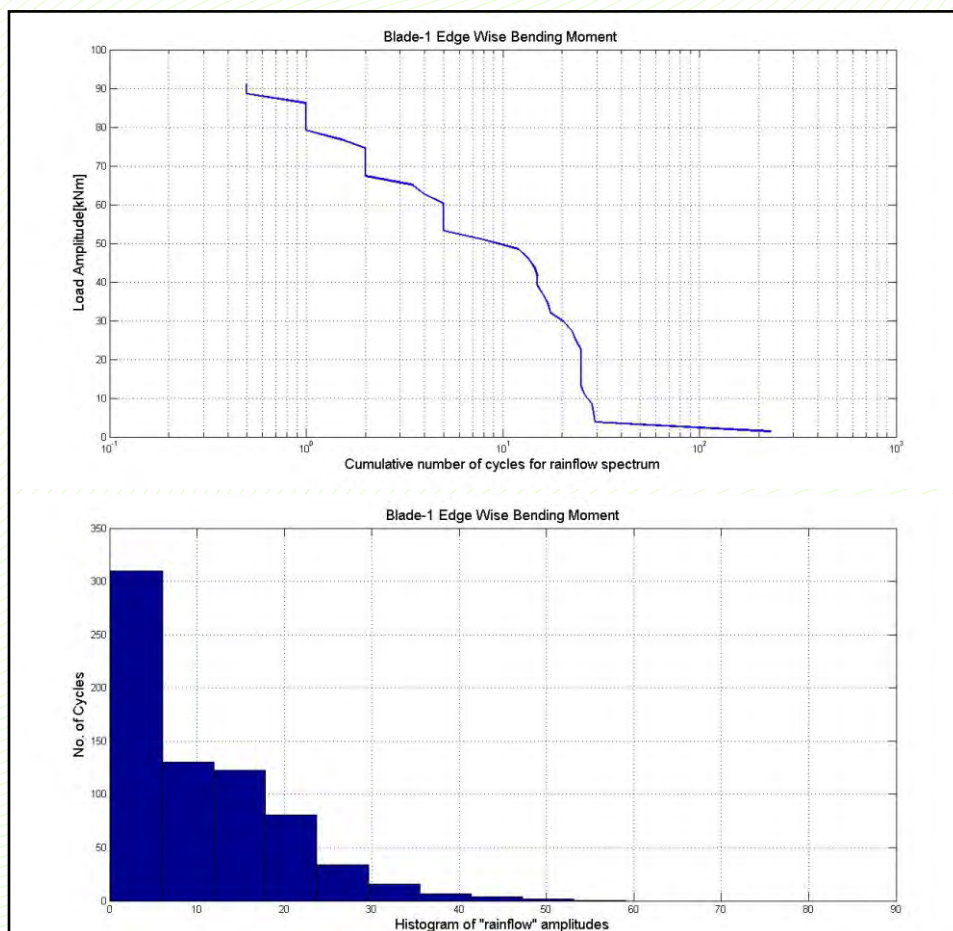
Web-GIS Interactive Resource Atlas : Solar



Wind Power Forecasting for Grid Operation

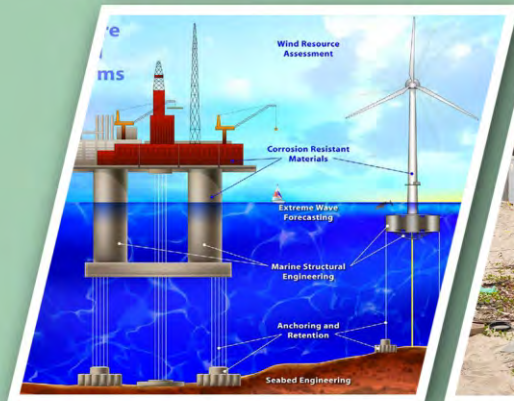


Automated Load Spectrum Analysis: Code Develop on a ALSA Ver1.0



TOWARDS MISSION AND OBJECTIVES

OFFSHORE, SMALL WIND HYBRID SYSTEM AND INDUSTRIAL BUSINESS



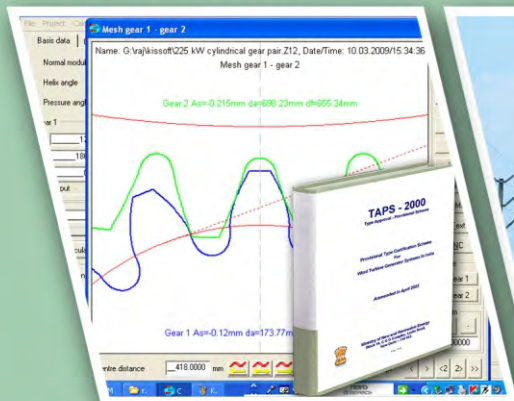
WIND RESOURCE ASSESSMENT



WIND TURBINE TESTING



STANDARDS & CERTIFICATION



WIND TURBINE RESEARCH STATION



INFORMATION, TRAINING AND CUSTOMIZED SERVICES



KNOWLEDGE SHARING AND MANAGEMENT

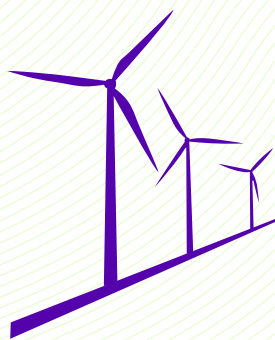


ENGINEERING SERVICES DIVISION



SOLAR RADIATION RESOURCE ASSESSMENT





OFFSHORE, SMALL WIND HYBRID SYSTEM AND INDUSTRIAL BUSINESS

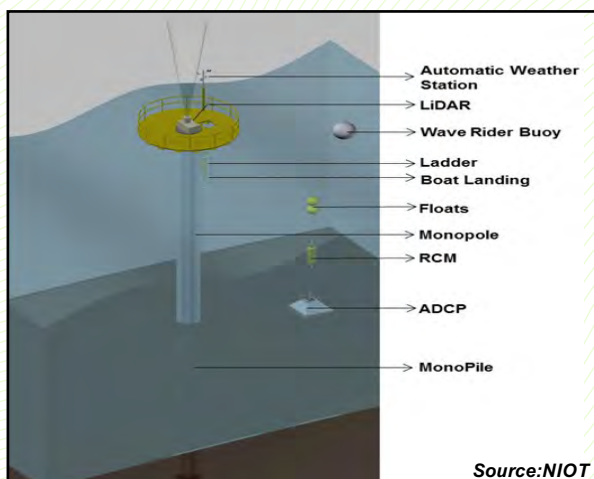
Offshore, Small Wind Hybrid & Industrial Business of NIWE has been continuously striving towards the development of offshore and Small Wind Turbines sector. NIWE, is developing the knowledge / Technology for the growth of the sectors.

As per the National offshore wind energy policy, NIWE is the notified nodal agency for offshore wind power development in the country as per the Indian Offshore Wind Power Policy and is carrying out pioneering work that will help India steadfastly join the ranks of Nation with offshore wind energy. NIWE, s presently engaged in wind resource assessment and preliminary oceanographic or bathymetric studies for demarcation of offshore wind energy off Gujarat & Tamil Nadu coast.

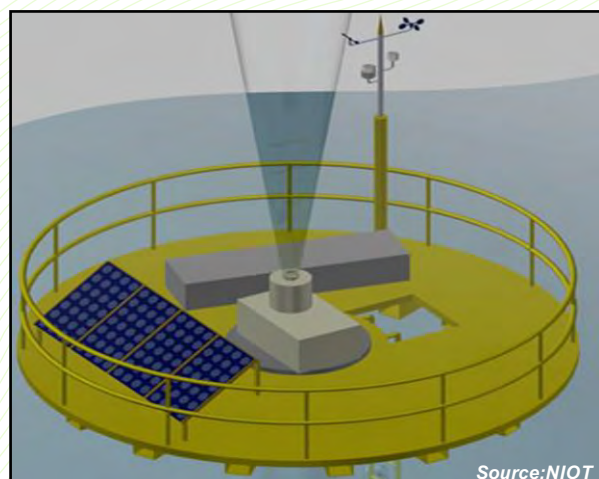
Testing and Empanelment of Small wind turbines is another focus area of NIWE and it gives assurance to the consumers / end users about performance of the products and their compliance with international standards.

Establishment of Offshore LiDAR at Gulf of Khambhat, Gujarat

NIWE is in the process of erecting a sub-structure platform for assessing the offshore wind by LiDAR measurement at Gulf of Khambhat, off Gujarat coast. This is an outcome of the NIWE's efforts complementing FOWIND project of

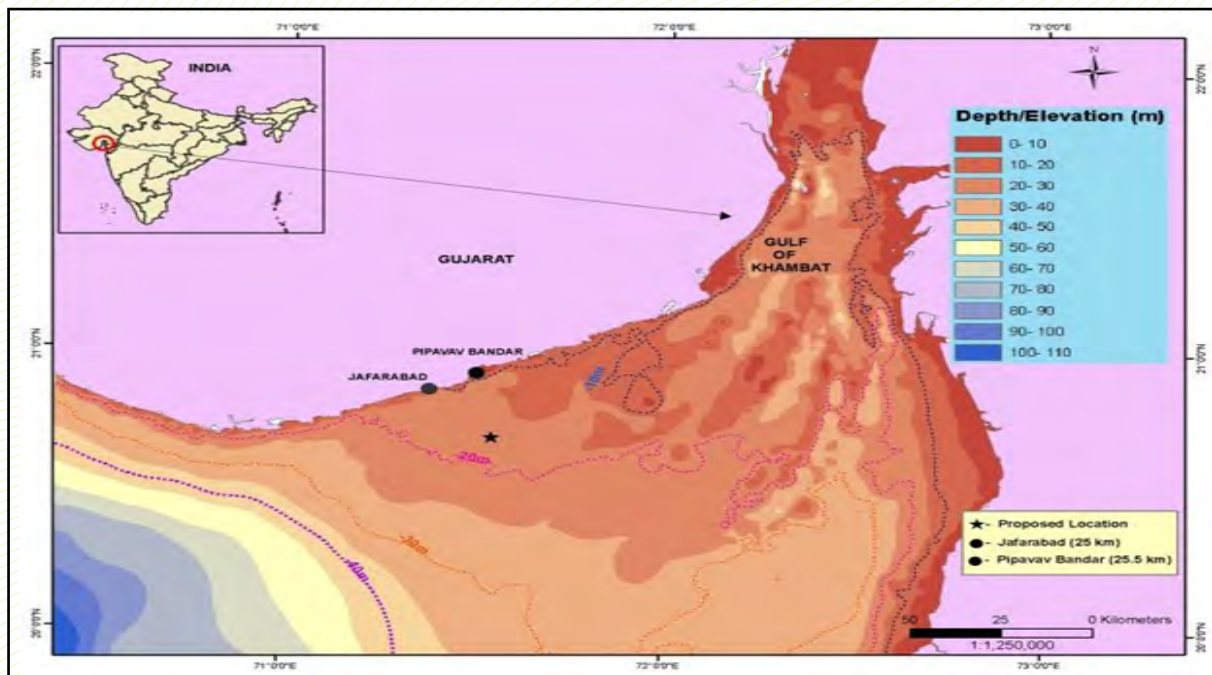


Sub-structure for mounting LiDAR



LiDAR Platform





Map showing selected location for offshore wind measurement using LiDAR

European Union, aimed at developing a roadmap for offshore wind development in India. The design and technical specifications for the offshore platform has been finalized in association with National Institute of Ocean technology, Chennai. The substructure work is in progress of contracted execution.

Under the MoU between European Union (EU) and NIWE, a Doppler Wind LiDAR system of WINDCUBE V2 make has been procured. Training will be imparted to NIWE staff for the LiDAR operations. The validation of LiDAR is planned with measured data from a 120m meteorological mast at NIWE's WTRS, Kayathar where the measurements are in progress.



Doppler Wind LiDAR system – WINDCUBE v2 Offshore

Offshore Geotechnical investigations near Tuticorin



Map showing LiDAR Location at Tuticorin, Tamil Nadu

NIWE, intends to establish a platform for assessing the offshore wind by LiDAR measurement near Tuticorin, and work on Offshore Geotechnical investigations near Tuticorin has been initiated. The objective of this investigation will be to ascertain the nature and properties of soil available at the proposed site at recommended depths of upto 30m in seabed (10m in the case of rock) for design of

Environmental impact Assessment for installation of LiDAR substructure

NIWE has prepared a rapid Environmental Impact Assessment report (EIA) for installation of the LiDAR substructure near Pipavav Bandar, in Gulf of Khambhat for offshore wind resource assessment. The EIA report has been submitted to the Gujarat State Coastal Maritime Zone for necessary environmental clearances. In addition, NIWE has also applied for requisite clearances from Gujarat Maritime Board (GMB) and is underway.



Proposed LiDAR location at LiDAR substructure near Pipavav Bandar in Gulf of Khambhat, Gujarat

NIWE has also initiated the process of obtaining clearances from the Ministry of Home Affairs, Ministry of Defence, Ministry of External Affairs and Department of Space for requisite clearances, in this regard. Clearances have been obtained from MHA, MEA and DoS. The requisite clearance from MoD is awaited.

Small Wind Turbine and Hybrid System

SWES Meeting for Empanelment

The MNRE has constituted a technical committee for review of empanelment of Small Wind Turbines. The meeting of the Committee was conducted on

2nd March 2016. The 13th List of Empanelment was finalized based on the recommendations of the Committee and hosted at NIWE's website.

Testing of Small Wind Turbine

Presently testing of 5 Nos. of small wind turbine ranging from 650 W to 15 kW is underway at WTRS, Kayathar. One Small Vertical Axis Wind Turbine of 15 kW (grid-connected), first of its kind to be tested by NIWE has been installed and commissioned.

Performance evaluation of small wind turbines deployed for telecom application

The MNRE is exploring ways to harness the untapped potential of renewable sources of energy for telecom applications and also identify the niche areas that will bring this technology to the forefront in meeting the energy demands at affordable costs. To strengthen the concept of installing small wind turbines on telecom towers and to encourage a significant deployment initiative to such markets, a team from NIWE visited sites where SWTs were installed on telecom towers in Jaisalmer District, Rajasthan and submitted a detailed report on performance of these systems.



SWT installed on Telecom tower

Techno-Economic Analysis of the scheme and diagnostic to study of small wind energy and hybrid systems

NIWE has prepared a report on Techno-Economic Analysis and diagnostic to study of small wind energy and hybrid system with an objective to evaluate the performance of the existing small wind energy hybrid systems installed in select States namely Maharashtra and Goa.

The outcome of the study will be useful in understanding the overall economics and the cost benefit of these systems. It is envisaged as essential and necessary that net metering and feed in tariffs need to be introduced for small wind turbines and solar hybrid systems in line with that has been done for the rooftop SPV systems.

Special training programme for field/ inspection engineers of TEDA on SWES"



Group Photo of Special Training Participants with NIWE officials

NIWE conducted a special training program for field engineers for TEDA on 30th November 2015. The training aimed to address the issues the field engineers faced in implementing the Small Wind Energy and Hybrid Systems. The training programme covered topics ranging from Wind resource assessment, technology, O&M issues and testing of small wind generators and was delivered by NIWE staff and external experts.

Regional workshop on “MNRE Scheme for Small Wind Energy & Hybrid systems” for Stakeholders

MNRE recently has amended the policy on Small Wind Energy System (SWES) wherein Telecom Sector is also considered for Central Financial Assistance (CFA). To foster the growth rate of SWES systems in telecom sector, NIWE in association with MNRE is planning to organise regional workshops/ meetings for wider dissemination of the recently amended MNRE scheme on "Small Wind Energy and Hybrid Systems (SWES)". The workshop has been organised by NIWE in batches at five locations as per the details given below:

Sl.No.	Venue	Stakeholders
1.	NIWE, Chennai	Tamil Nadu, Karnataka, Andhra Pradesh, Kerala
2.	Pune	Maharashtra, Goa, Gujarat
3.	Bhopal	Madhya Pradesh, Rajasthan, Chattisgarh
4.	Bhubaneswar	Orissa, West Bengal, Jharkhand
5.	Guwahati	North Eastern States



SWES Wokshop Participants held at Bhubaneshwar

The programme is designed and intended to make awareness for State Nodal Agencies, Financial Institutions / Bankers, Mobile tower operators and the local community users.

The first workshop was conducted on 28th March 2016 at Bhubaneshwar, Odisha and covered MNRE Scheme for telecom sector and both site selection for both WRA and SWES projects.

Review of MNRE: R&D Projects

The Ministry of New and Renewable Energy (MNRE) has identified thrust areas for R&D in small wind energy systems. Under this, nine proposals from academic institutions / manufacturers have been identified for funding. NIWE is lending technical support to MNRE in coordinating / assistance in execution of these projects. Review of the projects was carried out by a team from NIWE / MNRE / External Experts during October 2015 and mid course corrections were suggested to the project proponents. The details of the projects are as below:

A Novel Fused Converter for Wind-PV Hybrid System to Power Rural Telephony

The project being carried out in association with SSN College of Engineering, Chennai proposes to develop a novel single stage cost effective, simple and efficient fused converter topology for application wind-solar hybrid systems to power telecom towers. A parallel power transfer scheme from the renewable

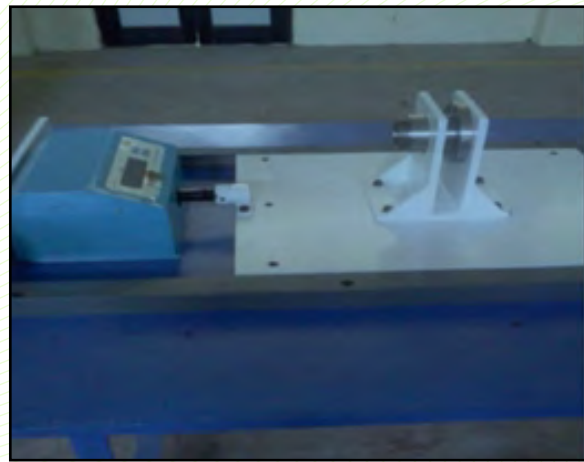
sources will help in improvement of efficiency of the system. Optimization of circuit components for telecom applications will also be investigated.

Development and Installation of Micro Thruster Augmented Wind Power Generator using a 200 kW Wind Turbine at NIWE Facility, Kayathar

This project has been proposed by Vellore Institute of Technology, Vellore. It aims at the development of 200 kW micro Thruster augmented wind power plant. The project uses the concept of a thrust augmented wind turbine to achieve operation at lower wind speed for better efficiency and getting higher capacity utilization.



Three different size Thruster fabricated



Thruster test rig setup

Investigations on Small Capacity Wind Turbine with Compressed Air Energy Storage System

The project in association with Institute of Energy Studies, Anna University, Chennai aims at using a compressed air energy storage with a wind turbine. Thermal Energy Storage (TES) system will be developed and integrated with the wind turbine system to improve the overall system performance.



PMC members visit to review the mid-term project progress at Anna University

Experiments will also be conducted to evaluate the performance with charging and discharging to determine the turnaround efficiency.

Design, Development of 3 kW Small Wind Aero-generator and Wind Charge Controller

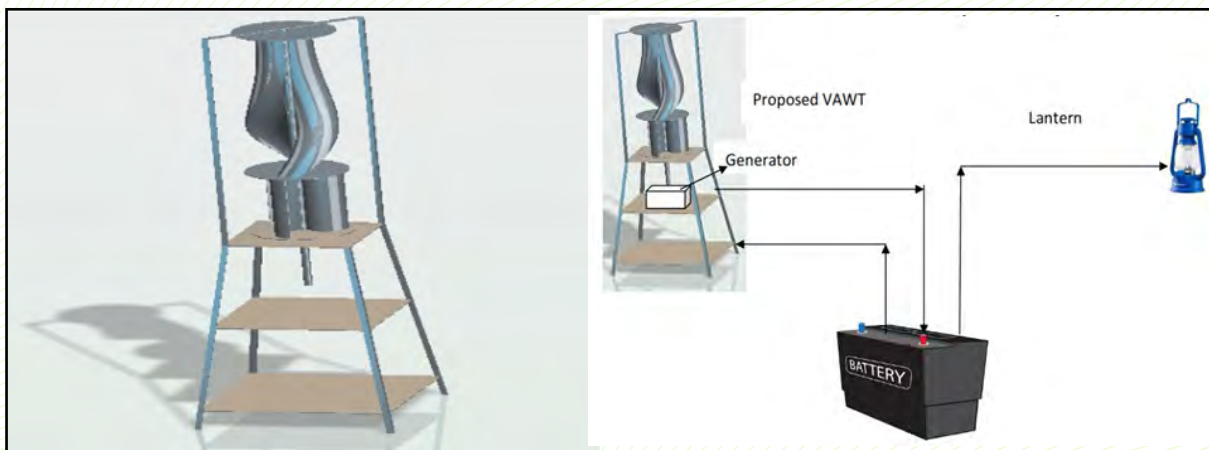
This project being undertaken by a small wind turbine manufacturer, M/s Spitzen Energy Solutions (India) Pvt. Ltd., Pune aims at design and development of 3 kW rating aero generator based on permanent magnet technology. The objective is to design aero generator, which will be suitable for operation (higher generation) at low wind speeds. Also a small wind charge controller will be developing a controller for operation in harsh environmental conditions (temperature, humidity, etc.) The controller shall have inbuilt energy meter to display all important parameters like current, battery voltage, Units generation (kWh) and instantaneous generation etc.



Wind Charge Controller

Design and Development of 1 kW Hybrid Vertical Axis Wind Turbine System for Low Wind Speed Regimes

The project in association with Hindustan Institute of Technology and Science, Chennai aims at designing and developing Hybrid Vertical Axis Wind turbine for low rated wind speeds (4-5 m/s) using Magnetic levitation technology. This type of hybrid vertical axis turbine is easy to carry anywhere. These turbines can be used to generate their own power for their daily energy requirement.

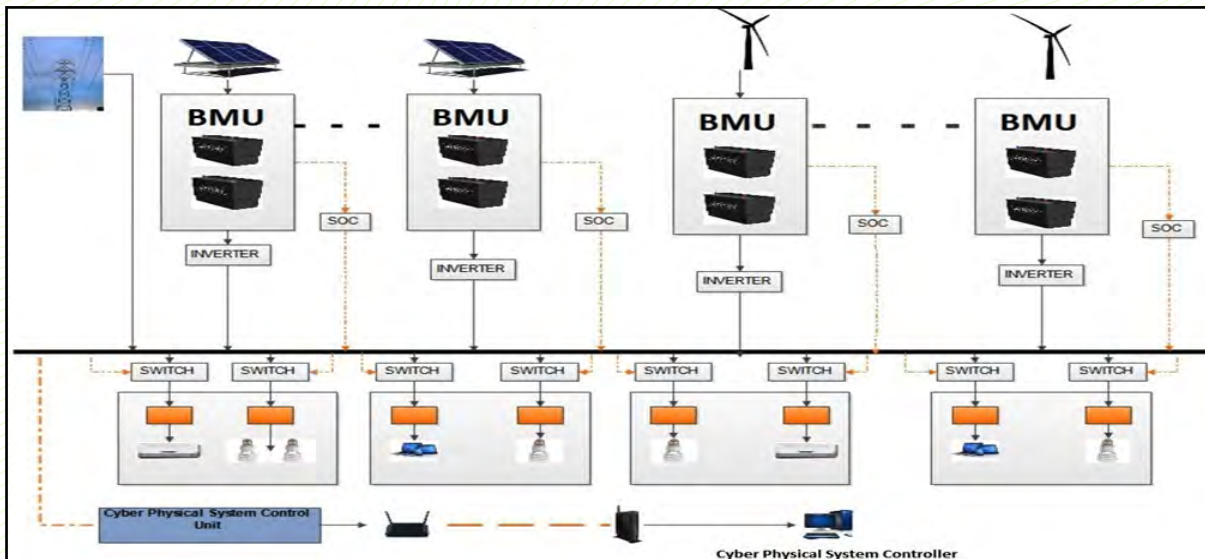


Hybrid Vertical Axis Turbine Model

Hybrid Energy Management using Cyber- Physical Controller for Real Time Energy Management System for Micro Grid Application

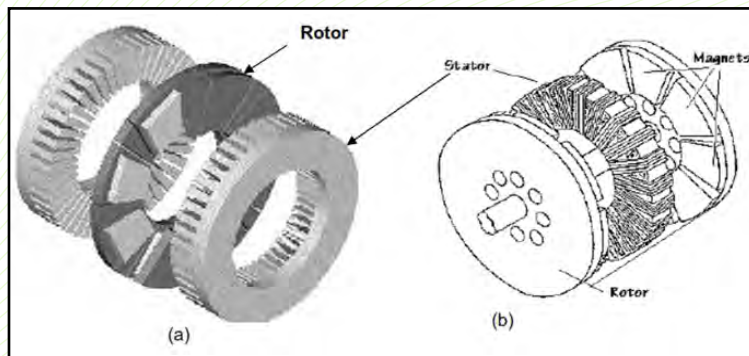
The project is being carried out by Hindustan Institute of Technology and Science, Chennai. The objective is the development of a new real time Energy

Management System (EMS) to improve energy utilization rate of solar and wind energy. The real time EMS of the micro grid will be achieved by design and implementation of cyber-physical controller based on improved minority game algorithm.



Hybrid Energy Management System

An Optimal Design of Axial Flux Permanent Magnet Generator for Low Speed Direct Drive Wind Turbine Applications



Architectures of Axial flux Permanent Magnet Generator
(a) Double Stator Single Rotor and (b) Double Rotor Single Stator

The axial flux permanent magnet generator will improve the efficiency and reliability with less maintenance and low cost.

Design and Development of Efficient Small Wind Mill of 5 kW Capacity For Generating Maximum / Optimum Energy

This project being undertaken by a small wind turbine manufacturer aims at developing a cost effective, reliable, efficient small wind energy system capable to deliver maximum energy per annum. The various aspects that will be addressed are selection of aerodynamic profile and material for the blade

suitable even for low wind speed regime, design and optimization of small wind energy system and its related structure with a design life of 20-25 years.

Design and Development of a Grid-interactive 3 kW Class Rooftop Wind Turbine based Hybrid Renewable Energy System

This project in association with Park College of Engineering and Technology, Coimbatore will attempt design and development of a grid-interactive 3 kW class rooftop wind turbine based hybrid renewable energy system employing net metering. Also CFD studies of skewed flow over buildings will be conducted for evaluation of suitable wind turbine for operation.

Future Plans

Offshore Activities

- ♦ Geotechnical investigations are planned to be carried out, off the Gujarat and Tamil Nadu coasts. This will help in ascertaining nature of properties of soil available at proposed offshore zones which is an essential report for International Competitive Bidding (ICB) for inviting offshore wind power projects in the specified blocks.
- ♦ NIWE will also prepare “Guidelines for Offshore Studies and Surveys” for private sector.
- ♦ Offshore wind measurements are proposed near Tuticorin off Tamil Nadu coast.

Small Wind turbine Testing and Documentation Review for empanelment is an ongoing activity of NIWE.

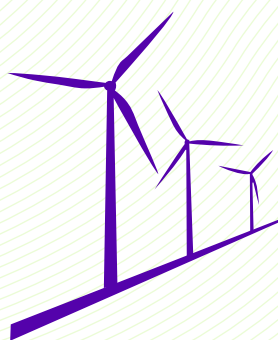
Workshop

NIWE has conducted a One-day inception workshop on “EU-Indo Joint R&D platform to support and promote offshore wind energy technology in the country” on 18th September 2015. The workshop was organized by FOWIND, GWEC and NIWE as its knowledge partner.

Visitor

Prof. Purnendu K. Das, Director, ASRANet Ltd., 5, St. Vincent Place, Glasgow, G1 2DH, visited NIWE to discuss the modalities related to the INDO-UK Collaborative Industrial Research and Development Programme.



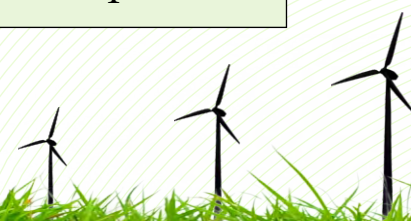


WIND RESOURCE ASSESSEMENT

NIWE has been involving in the realization of Nationwide Wind Resource Assessment (WRA) programme sponsored by the Government of India, in association with State Nodal Agencies. Further, in order to extend support to the industry and developers, NIWE takes up various projects such as validation studies, technical due diligence studies, micro siting exercises, Detailed Project Report preparation, Repowering analysis, etc. The Ministry of New and Renewable Energy [MNRE], Government of India has been sponsoring the WRA programmes to measure, analyze and publish wind data in country for the last two decades. Under these programmes, wind has been measured at 808 locations for periods ranging from one to five years. As on March 31st 2016, 65 stations are in operation in fourteen States and one Union Territory. During 2015-16 a total number of nine wind monitoring stations have been commissioned. Details of new Wind monitoring stations installed and in operation are given in the following table.

Status of Wind Monitoring Stations (2015-16)

S. No.	State	Number of Stations	
		Installed (new) during 2015-16	In operation as on 31.03.2016
1.	Andhra Pradesh	0	3
2.	Chhattisgarh	0	4
3.	Gujarat	0	6
4.	Karnataka	0	7
5.	Madhya Pradesh	1	2
6.	Maharashtra	0	6
7.	Meghalaya	4	4
8.	Odisha	0	1



S. No.	State	Number of Stations	
		Installed (new) during 2015-16	In operation as on 31.03.2016
9.	Puducherry	0	2
10.	Rajasthan	0	6
11.	Tamil Nadu	2 (R&D)	17
12.	Telangana	0	1
13.	Tripura	2	2
14.	Uttar Pradesh	0	3
15.	Uttarakhand	0	1
Total		9	65

Of the cumulative total of 808 stations established till 31st March 2016, 237 stations have been found to have Wind Power Density (WPD) in excess of 200 W/m² at 50m agl, 21 stations at 80m agl and 30 stations at 100m agl. Summary of WPD are given in the following tables respectively.

WPD Distribution at 20m to 50m agl (above ground level)

WPD range [W/m ²]	Number of stations
200-250	107
251-300	61
301-350	27
351-400	17
>401	25
	237

WPD Distribution at 80m agl

WPD range [W/m ²]	Number of stations
200-250	11
251-300	7
301-350	2
351-400	1
>401	-
	21**

** WPD calculated at 78m height for 4 sites.



WPD Distribution at 100m agl

WPD range [W/m ²]	Number of stations
201-250	17
251-300	10
301-350	2
351-400	-
>401	1
	30

WRA in the uncovered area

State wise details of the wind monitoring stations commissioned during 2015-2016 in the country under various WRA programmes are given in the table below. The wind monitoring masts / towers are of 50m, 80m, 100m and 120m tall and Sensors are placed at 10m, 30m and 50m (in 50m - mast), 20m, 50m, 78m and 80m (in 80m - mast) 10m, 50m, 80m and 100m-2 level (in 100m - mast) 10m, 30m, 60m, 90m and 120m (in 120m - mast) levels. [All the heights are above ground level].

**State wise installations of wind monitoring stations
established during 2015-16**

S. No.	Station	District	State	Commenced On	Height of the mast
R & D Project					
1.	Gandhigram Rural Institute	Dindigul	Tamil Nadu	03.11.2015	50m
2.	Aarupadai Veedu Institute of Technology	Kancheepuram		08.01.2016	
MNRE Project					
3.	Umtong	East Khasi hills	Meghalaya	28.03.2015	50m
4.	Wahjapung	Jainta hills		31.03.2015	
5.	Shikentalang	Jainta hills		03.04.2015	
6.	Rombagre	West Garo hills		29.02.2016	

S. No.	Station	District	State	Commenced On	Height of the mast
7.	Udaipur	South Tripura	Tripura	14.04.2015	50m
8.	Ambassa	Dhalai		20.04.2015	
9.	Jamgodrani hills	Dewas	Madhya Pradesh	09.05.2015	100m

NIWE has released partial funds to the following State Nodal Agencies to install wind monitoring stations during this financial year. Details are given in table below.

Fund released for State Nodal Agencies to install WMS during 2015-16

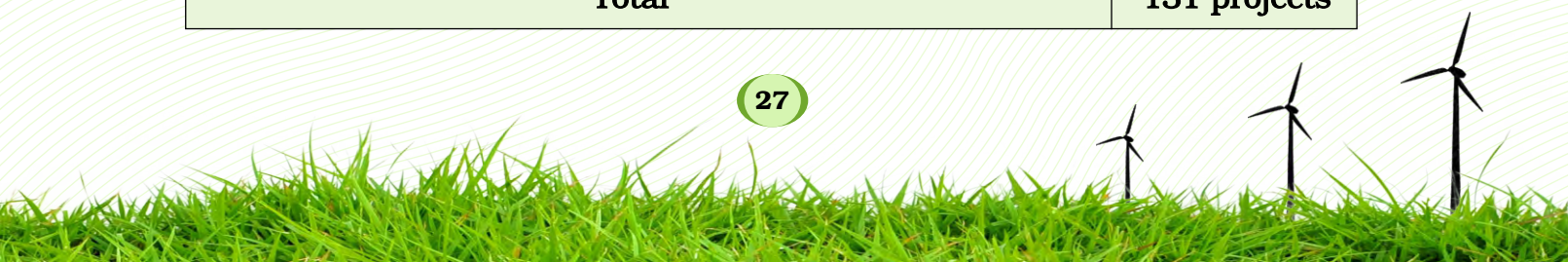
S. No.	State	No. of stations sanctioned	Mast height (m)	Amount (Rs. in Lakhs)
WRA in uncovered/new areas 2006-07 NE region				
1.	Assam	2	50m	0.65
WRA in uncovered/new areas 2010-11				
1.	Puducherry	2	80m	5.70
WRA in uncovered/new areas 2010-11 NE region				
1.	Assam	1	50m	0.61
WRA in new/uncovered areas during 2011-12 & 2012-13				
1.	Odisha	10	80m	22.00
WRA studies 2015-2016				
1.	Meghalaya	1	50m	0.50
Estimation & Validation of Wind Power Potential at 100m level in 7 States of India				
1.	Rajasthan	12	100m	14.79
2.	Andhra Pradesh	10	100m	13.35
3.	Tamil Nadu	12	100m	10.04
CONSULTANCY PROJECT				
SACON Bird Migration study project for Sálím Ali Centre for Ornithology and Natural History (SACON)				19.53
Total				87.17

Consultancy Projects

In addition to the wind monitoring projects funded by MNRE, NIWE has carried out 131 consultancy projects during the year 2015-16 towards supporting the industry and developers. These short-term projects were to provide micro siting services, Repowering services, preparation of Detailed Project Report and preparation of due diligence reports. In addition, technical services like verification of data collection procedure adopted by private firms was undertaken under the direction from the Ministry and 4 nos. of wind monitoring station have been commissioned under consultancy projects. Details of consultancy projects carried out during the financial year 2015-16 are given in the following table.

Consultancy projects taken up during 2015-16

Sl.No.	Project Scope	No. of Projects
1.	Verification of procedure of wind monitoring stations	87
2.	Wind Power forecasting services	1
3.	Technical Due Diligence	19
4.	Site visit on verification of procedure of wind monitoring stations	6 (44 sites)
5.	Consultancy services	2
6.	Micrositing and Energy Estimation	3
7.	Power Curve Energy Demonstration (PCED) test	2
8.	Wind Potential Pre-Feasibility study	1
9.	Preparation of WPD map	3
10.	Intercropping existing wind farm	1
11.	Preparation of Detailed Project Report (DPR)	2
12.	Wind Monitoring Study at 100m Height	1
13.	Repowering the existing wind farm	1
14.	Energy and PLF estimation	1
15.	Re-Evaluation of Annual Energy Generation	1
Total		131 projects



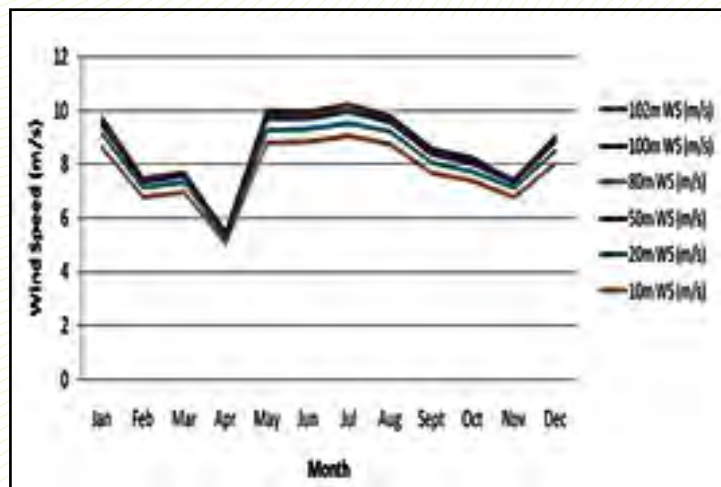
WRA Research Activities

Offshore Wind Resource Assessment at Dhanuskodi

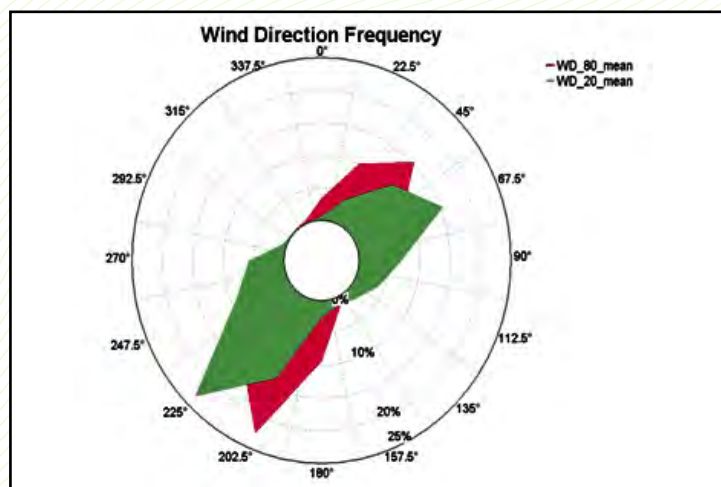
NIWE has carried out offshore wind energy potential pre-feasibility in South India in collaboration with RISO, DTU, the area from 77° to 80° Eastern longitude and 7° to 10° Northern latitude using Advanced Synthetic Aperture Radar (ASAR) techniques with Satellite images during the years 2002 to 2011. The ocean wind speed maps are retrieved and processed at RISØ DTU. The results shows wind energy density from 200 W/m^2 to 500 W/m^2 at 10m height above sea level. In order to validate the satellite study, a 100m lattice wind mast was installed and commissioned at the tip of Dhanushkodi, Rameswaram. Data from this wind monitoring station at 10m, 50m 80m and 100m is being collected since October 2013. The results seem to be promising and looks consistent in between years. A detailed data analysis report and the same will be released soon is under preparation by NIWE.



100m Mast at Dhanushkodi



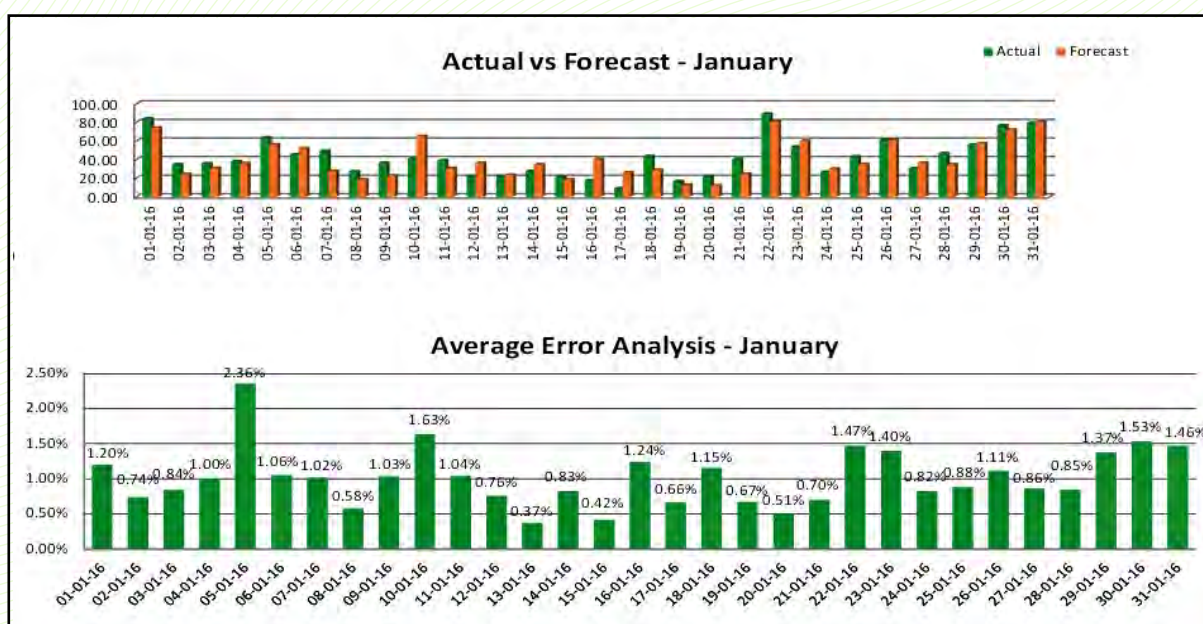
Annual average Wind Speed



Wind Rose

Wind Power Forecasting Services

1. The Wind Power Forecasting services was launched by NIWE on 13th May 2015 with a pilot project carried out at Ayyanaruthu substation with metered measurement at all wind feeders for error analysis.
2. Presently, NIWE is carrying out forecasting services in the state of Tamil Nadu for Indian Wind Power Association (IWPA) in collaboration with Vortex, Spain, as the realised objectives and outcome of a successful Indo-Spanish collaboration.
3. 110+ ABT meters were fixed in Group connect feeder of 90+ substations across the State, with close coordination of TANGEDCO, funded by IWPA (Indian Wind Power Association).
4. NIWE developed in-house algorithms to fine-tune the forecast result with the help of trending of Real time Generation data.
5. An automation system has been created to share the aggregated forecast results to Energy Secretary, Tamil Nadu, CE-NCES, CMD-TANGEDCO, Director-Operation, CE-Operation, RLDC, Chairman IWPA & other stakeholders through e-mail.
6. Interim reports have been prepared and sent to IWPA.
7. Initiated various activities to develop NIWE's own forecast model using numerical weather prediction technology.
8. NIWE developed a dedicated web portal for customised delivery of wind power forecasting.

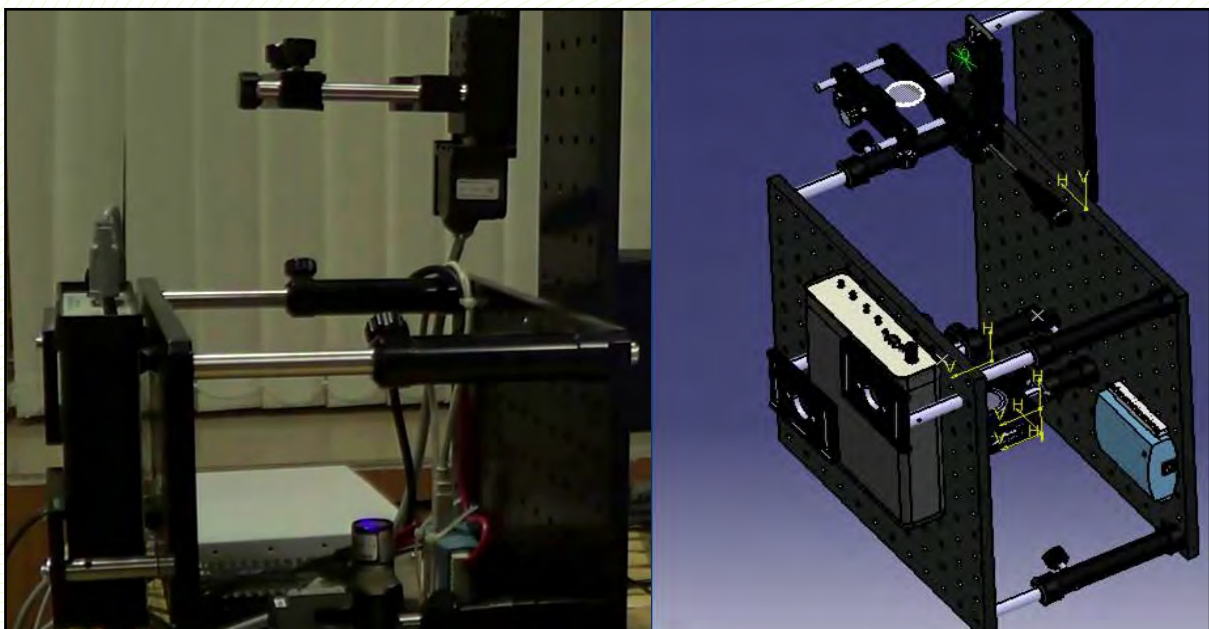


Error Analysis of January Data Forecasting (Actual vs Forecasting)

9. Identified an empirical relationship between mesoscale forecast data/actuals and developed various algorithms to refine mesoscale forecast results.
10. Initiated various activities to establish DBMS for storing & handling surplus quantity of data.
11. Aggregated level forecasting error analysis has been carried out for the forecast data being provided by M/s.Vortex. Based on the analysis, developed an in-house algorithm to refine the forecast result with actual generation data.
12. Establishment of operational wind power forecasting system at NIWE.

Design and Development of a Photonic System for Real Time Remote Monitoring of Wind and other Air Parameters

As a R&D project, Memorandum of Understanding (MoU) has been signed between NIWE and Gayatri Vidya Parishad – Scientific and Industrial Research Centre (GVP-SIRC) for “Design and Development of a Photonic System for real time remote monitoring of Wind and other Air Parameters”. The project involves demonstration of concept, proto-type development and field evaluation at NIWE's test site and a project monitoring committee has been constituted for reviewing the progress of the project. GVP has designed and developed a photonic system and the same is being validated with the 120m met mast and other remote sensing instruments results. Validated the system designed by GVP at Kayathar by NIWE scientists. The work is in progress as



SAMIRA – Indigenous Design: Photonic System

SAMIRA – Indigenous Design: Photonic System (LIDAR)

per schedule and the preliminary prototype of the photonic system has been developed. The field evaluation of the prototype has been completed in the month of June 2015.

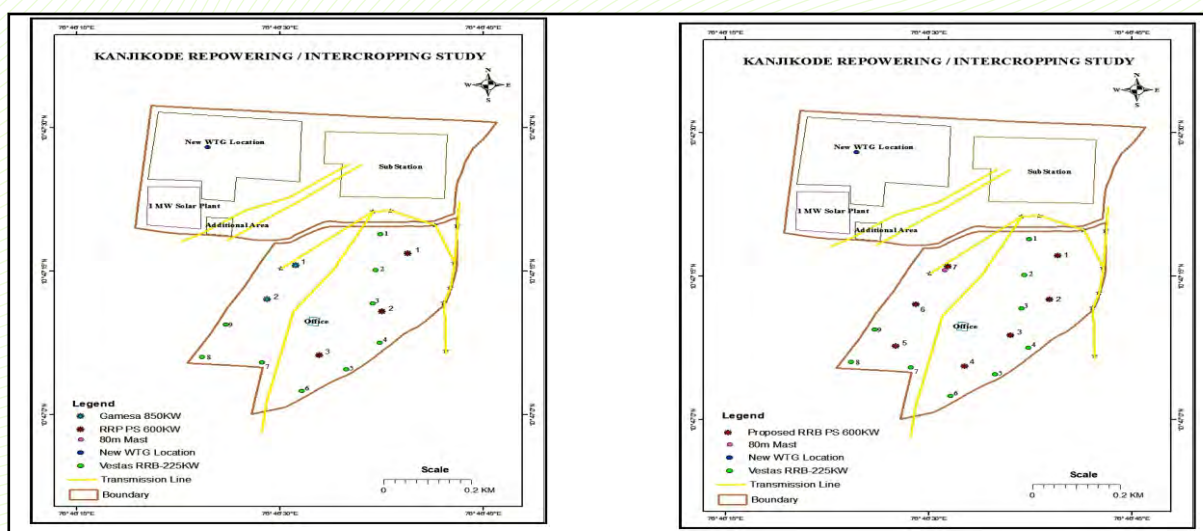
NIWE in collaboration with GVP-SIRC has been instrumented in getting the indigenous design of photonics system named 'SAMIRA' for real time remote monitoring of wind and other met. parameters. The concept of technology has been detailed through discussions and a preliminary validation study performed at Kayathar, Tamil Nadu with NIWE's 120m met mast. As part of second mile stone M/s. G.V.P. Scientific and Industrial Research Centre has submitted a report on SAMIRA "Vertical Wind Profiling System WITH Automated Collimation, Translation and Data Acquisition". At present, GVP has completed and developed a prototype of the system. The field evaluation of the prototype is in progress. As part of evaluation the system was demonstrated during 26th to 28th August 2015 at NIWE, Chennai.

Wind Measurement at 120m level

To understand wind shear profile and collect longterm wind profile for assisting wind power forecasting, five 120m tall guyed wind monitoring masts were installed and had been operational at Lamba (Gujarat), Akal (Rajasthan), Jagmin (Maharashtra), Jogimatti (Karnataka) and Kayathar (Tamil Nadu). Five years data collection in Lamba, Akal, Jagmin & Jogimatti has been completed and closed down. Data collection in Kayathar is under process.

Repowering of Existing Wind Farms

Commercial wind farms were established in India in early 1990s. During that time, the rating of Wind Electric Generators (WEG) available was in the range of

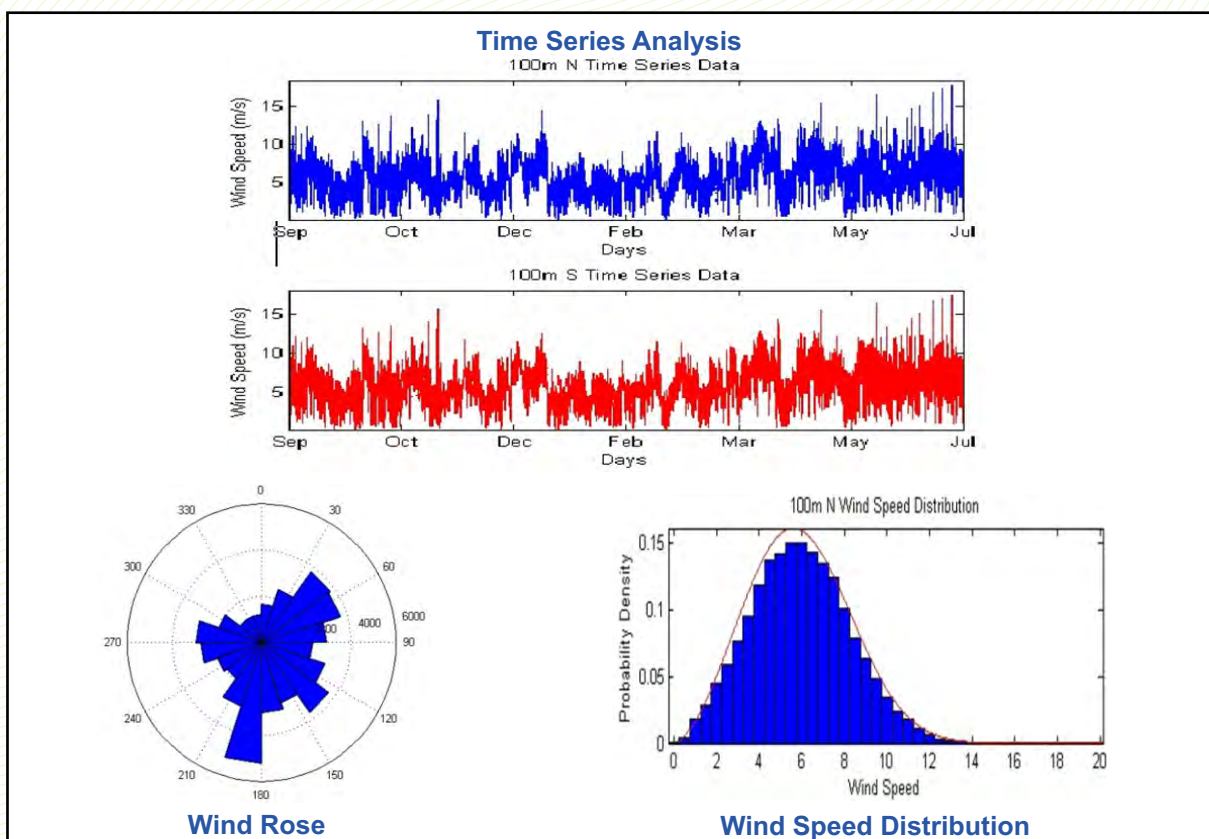


Kanjikode Repowering / Intercropping Study

225-250 kW, tower/hub height was about 30m and rotor diameter was of the order 30 meters. The energy generation per kW rating of these WEGs or Capacity Utilization Factor (CUF) was also less at around 15-20%. In present scenario, much larger capacity WEGs (multimega watt upto 2.5 MW) are available with taller tower (70 - 100m), higher rotor diameter (80 - 101m) with advanced design features. Consequently the CUF now available is almost double. Therefore, efforts have been initiated to remove old WEGs of lower rating and install larger WEGs having vastly improved design features and much taller towers to substantially increased energy generation per hectare of land area used. This process is known as “RE-POWERING”, which is the replacement of first-generation small-capacity wind-turbines with modern multi-megawatt wind-turbines. Initially, collection of required wind turbines related information in Tamil Nadu at various locations have been carried out and few of the wind farms analysis have been completed.

Assessment of Wind Power Potential at 100m level in India

As per the Indian Wind Atlas, installable wind power potential has been estimated as 49 GW at 50m agl and 102 GW at 80m agl with the assumption of 2% land availability in the wind farm potential area. In order to validate the potential at 80m agl, MNRE has sanctioned a project to carry out wind



measurement upto a height of 100m in 75 locations in 7 windy States of India.

Under this project, 75 nos. of 100m high lattice wind monitoring stations have been commissioned in the 7 windy States of the country, and data acquisition has been in progress. Data acquisition has been completed for 48 sites and closed down as on 31st March 2016. Continuously monitoring and receiving real time wind data from 25 stations in 7 States. Monthly data analysis, verification and preparation of interim reports are in progress.

The summary details are given in the following table.

Details of WMS commissioned/closed down at 100m level

S. No.	State	Total no. of WMS sanctioned/ commissioned	WMSs' having one year data	WMSs' having two year data	Closed down	Extended
1	Andhra Pradesh	10	10	9	6	4
2	Gujarat	12	12	7	6	6
3	Karnataka	13	13	12	11	2
4	Maharashtra	8	8	4	6	2
5	Madhya Pradesh	8	4	1	6	2
6	Rajasthan	12	10	7	8	4
7	Tamil Nadu	12	12	11	7	5
	Total	75	69	51	50	25

Launch of Wind Power Forecasting Services in India

Wind energy is one of the fastest growing renewable energy. But it is an intermittent source, since the wind speed is fluctuating, the output of a wind plant also fluctuates. The intermittency is the biggest challenge in integrating wind power into the electric grid. Though we are connecting this power to the grid, due to fluctuation and unpredictable nature of wind leads to grid operational issues and hence loss of billions of units of electricity. The fluctuations create costs for the electricity system and consumers as well as potential risks to the reliability of electricity supply. To mitigate this issue, one approach is forecasting future values of wind power production.

“A wind power forecasting is an estimation of the anticipated production from wind turbine/ wind farm/ wind power pooling stations in the near future”.



Under the Indo-Spanish Joint Programme for Technical co-operation in Renewable Energy, NIWE has collaboration with M/s. Vortex Factoria de Calculs, S.L., Spain with the objective to propose a holistic approach for forecasting wind and wind power from an installed capacity of more than 7000 MW of wind energy in Tamil Nadu as the ultimate deliverable to support the scheduling and dispatching process of electricity from the wind farm. Under this programme NIWE developing capacity building in wind power forecasting after rigorous exercise in forecasting including providing operating forecasting as per IEGC/CERC norms using generation based wind power forecasting. Now, NIWE is capable of offering the services to any wind farm operator/ wind power aggregator / Wind power pooling station including private and State owned substation to provide clear visibility on 15 minutes ahead / 1 hour / 3 days / week ahead wind power forecasting based on scientific relational study with updated model simulation with high performance computing per location / cluster of turbines etc. The method is an hybrid technique of NWP model Physical Statistical and Artificial intelligents based neural network learning algorithms using part generation data.

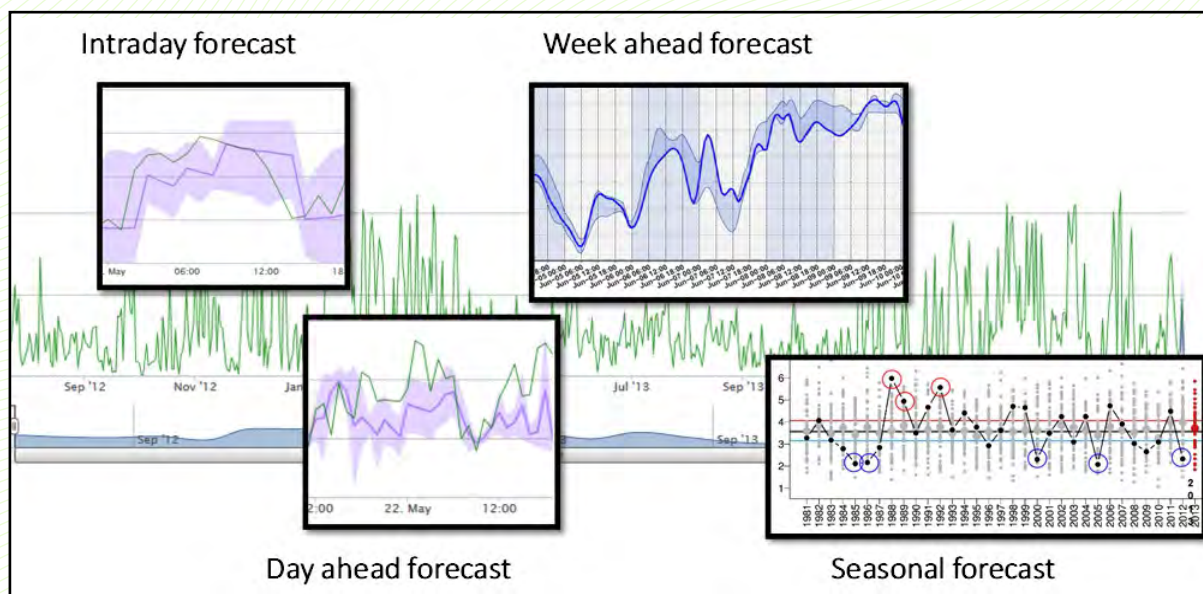
Wind Power forecasting services was launched by the Honorable Ms. Varsha Joshi I.A.S, Joint Secretary, MNRE on 13th May 2015 at NIWE, Chennai.

The launch of this service by NIWE will facilitate to provide forecast of wind power from wind farm / substation to support the scheduling and dispatching process of electricity for wind power generators to ensure higher level of wind energy evacuation.

This is an important milestone of achievement of the outcome of the discussions held at the RE-INVEST meet held during 15th to 17th February 2015 at New Delhi.



Ms. Varsha Joshi, Joint Secretary, MNRE launched the Wind Power Forecasting Services



Various types of Wind Power Forecasting (NIWE-Vortex)

Wind Atlas Launch

Under the direction of MNRE, NIWE has assessed India's wind power potential at 100m hub height with scientific rigor and based on authentic latest available data-sets of wind as well as land geospacially spread across India. This information is essential for the Policy makers, Private players, Government Agencies and other stakeholders of the industry to move towards achieving the ambitious goal of 60,000 MW of wind power by 2022 as envisaged by the Government of India. NIWE (formerly C-WET) had already performed the potential estimation study corroborating meso-scale derived wind maps and micro-scale measurements and released Indian Wind Atlas at 50m and indicative values at 80m hub heights with 5 km resolution in April 2010 in collaboration with RISØ-DTU, Denmark.

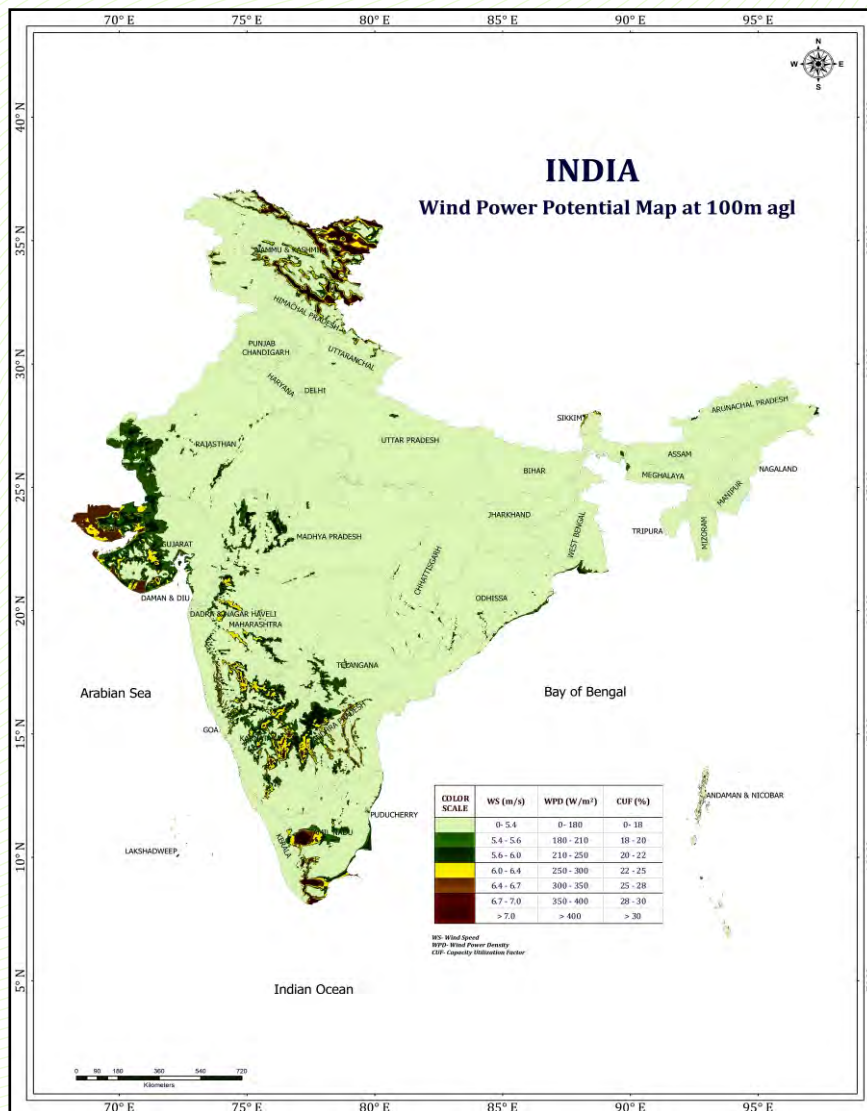


Launch of Wind Atlas



NIWE officials with Secretary & Joint Secretary of MNRE

NIWE has chosen advanced modeling techniques and revisited this study as per the guidance and directives of MNRE, with realistic and practical assumptions and estimated the wind power potential at 100m height as 302 GW. The present potential assessment has been carried out at a very high (10 times finer than 5 km) spatial resolution of 500m, using the advanced meso-micro coupled numerical wind flow model, and with the corroboration of almost 1300 actual measurements spread all over India, which can be stated as first of its kind. In addition, the study has been performed with actual land availability estimation using NRSC's 56m resolution Land Use Land Cover (LULC) Data (AWiFS) 1:250 K scale and with consideration of 6 MW / sq. km. Land features which are not suitable for wind farming have been excluded from the potential map with appropriate buffer/set-offs. In addition, other developments such as roads, railways, Protected Areas, Airports, etc., have been excluded. Land area with elevation more than 1500m and slope more than 20 degree have also been



excluded. The suitable land features have been grouped into 3 ranks (Rank I: Wasteland, Rank II: Cultivable Land and Rank III: Forest Land) and considerable weightage of 80% to Rank I, 30% to Rank II and 5% to Rank III has been assumed for the estimation. The map has been prepared Capacity Utilization Factor (%CUF) scale and only % CUF 20% has been considered for potential estimation.

State	Rank I	Rank II	Rank III	Total
Andhaman & Nicobar	4	3	1	8
Andhra Pradesh	22525	20538	1165	44229
Chhattisgarh	3	57	16	77
Goa	0	0	1	1
Gujarat	52288	32038	106	84431
Karnataka	15202	39803	852	55857
Kerala	333	1103	264	1700
Lakshadweep	3	3	1	8
Madhya Pradesh	2216	8259	9	10484
Maharashtra	31155	13747	492	45394
Odisha	1666	1267	160	3093
Puducherry	69	79	4	153
Rajasthan	15415	3343	13	18770
Tamil Nadu	11251	22153	395	33800
Telangana	887	3348	9	4244
West Bengal	0	2	0	2
Total in MW	153020	145743	3489	302251
Total in GW	153	146	3	302

Preparation of Wind Atlas at 100m level has been completed successfully and the same was launched on 2nd September 2015 at India Habitat Centre, New Delhi Hon'ble Minister of State with Independent Charge for Power, Coal, New and Renewable Energy and Mines along with Secretary, MNRE at the first. ever user interactive Web-GIS Wind Atlas launch for the public in the website.

Special Training Course

In order to create awareness among the NE region SNA officials regarding the different facets of Wind Resource Assessment and small wind energy and hybrid systems, two days special Training Course on "Wind Resource Assessment and Small Wind Energy & Hybrid Systems" exclusively for North-Eastern State Nodal Agency officials was organized by NIWE during 18th & 19th November 2015 at Guwahati, Assam.

The prime objective of this training course was to transfer knowledge and needed skills to the officials from State Nodal Agencies/ departments for effectively implementing the wind measurement programme and small wind energy & hybrid systems in their respective States and also, to provide an invaluable platform for exchange of professional experiences amongst diverse





Inauguration



Technical session in progress

participants from all parts of the NE Region. During the training, a brief insight was also provided to the SNA officials on concepts such as smart grid, Mini-grid, design aspects of wind turbines, SWES systems for telecom towers etc.

The training programme was inaugurated jointly by senior officials of MNRE and NE regional State Nodal agencies.

During the training, the GPS systems were bequeathed to each of the NE region SNA's which would be useful for field survey and collecting the geographical coordinates.

The training course was attended by 24 participants from 8 NER States (Assam, Manipur, Meghalaya, Mizoram, Arunachal Pradesh, Sikkim, Tripura and Nagaland). As part of the training course, the practical training was also provided on handling the GPS systems, Google Earth etc. The participants were very much satisfied and requested NIWE / MNRE to conduct more number of training course like this at on regular intervals.

Wind Power Forecasting Services / 42nd Skoch Award

Wind power producers in Tamil Nadu, the State with the largest installed capacity operating 7.5 GW of green power every day, are dreading a reprisal of the 2014 wind season, when nearly 2.5 billion units of power produced was lost to frequency-induced back-downs and measures to rationalize wind power procurement with other sources. The losses due to back-downs totalled 245 million units in 2014, translating into a monetary loss of Rs. 1,470 crores. In order to overcome this issue Indian Wind Power Association had approached NIWE. NIWE has been providing WPF (Wind Power Forecasting) service to SLDC which is helping Tamil Nadu's State-owned electricity generation and distribution utility, TANGEDCO, better manage the fluctuations in wind power output in the region while NIWE in collaboration with M/s. Vortex S.L, Spain, provides the much needed visibility to SLDC, through wind power forecasting.

As latest state of the art forecasting technologies, NIWE uses a hybrid of physical and statistical schemes along with machine learning algorithm. Both models are used worldwide on an operative basis and have been intensively validated. NIWE generates forecast information by calibrating physical input from global and mesoscale numerical weather prediction models against historical wind farm observations (real or synthetic time histories generated by NIWE) with the use of advanced statistical techniques. The NIWE's 10 days' forecast is being shared with SLDC, RLDC, IWPA and all other stake holders to utilize green power effectively since August 2015. TANGEDCO, has been very much benefited from the forecast provided by NIWE. The use of wind power forecasting system established by NIWE has helped to increase wind power evacuation by 20% (additional Rs.100-200 Crores profit to Indian wind generators) on a daily basis during the windy season. NIWE-Vortex forecast is first largest single regional forecast with 7.4 GW aggregation of Wind by any forecast service provider in the world. This project is one of the successful industry relevant deliverable from an International Co-operation between India and Spain.

Recently, NIWE has received a 42nd SKOCH Award for Wind Power Forecasting. Skoch Award is distinctive for its approach in selection of awardees. The Skoch Award is known to follow the most rigorous process of selection. The Skoch Awards celebrate human excellence and agents of change in Indian society. The Awards are based on the philosophy of spearheading positive socio-economic changes through recognizing persons who have contributed immensely to salutary transformations in society and governance by displaying exemplary leadership abilities. They are the highest independently instituted civilian honours in India. Since 2003, when these were instituted, the Skoch Awards have become the only independent benchmark of best



42nd Skoch Award

practices in India in the fields of governance, finance, banking, technology, corporate citizenship, economics and inclusive growth. These salute individuals, highlight projects and focus institutions that go the extra mile to make India a better nation. The Awards are conferred on the mighty and the ordinary alike.

Meeting on “Identification of Wind Potential Sites across the Country in collaboration with Power Grid Corporation of India Limited (PGCIL)”

The committee constituted by MNRE held on 4th November 2015 under the Chairmanship of Dr. S. Gomathinayagam, Director General, and NIWE, is to gather adequate inputs for planning necessary grid infrastructure for the potential sites. Dr. S. Gomathinayagam, DG, NIWE discussed about the current and future plans of power evacuation in India. He initiated that PGCIL must develop infrastructure in solar/wind potential area. Presentation on wind and solar resources available in the country were discussed. Then the committee, discussed on the possibilities of Power Evacuation from the various potential sites and certain issues related with strengthening of power grid facilities and the commercial viabilities for substation commissioning, etc. IWPA suggested that all the issues should have to be discussed at National level rather than Regional level. NLDC, POSOCO official explained the importance of LTA (Long Term Access) and requested PGCIL to consider wind farms starting from 50 MW to 100 MW, and small wind farms should be grouped together for common substations.

Based on the detailed discussion, committee concluded that power evacuation can be achieved in two phases;

Phase I: Developer should approach the State utility centers and State utility centers should take responsibilities in getting LTA approval from PGCIL.

Phase II: Developer along with State utility centers should approach MNRE and MNRE should identify the required sub stations to fulfill the country power requirement with MNRE suggestion, sub stations can be approved from PGCIL.

Technical Committee Meetings

- ♦ Technical Committee Meeting to evaluate & finalize the Potential Wind Map of India has been convened at NIWE, Chennai on 25th August 2015.
- ♦ Technical committee Meeting to evaluate the technical bids received and to finalize the supplier/vendor convened at NIWE, Chennai on 6th November 2015.



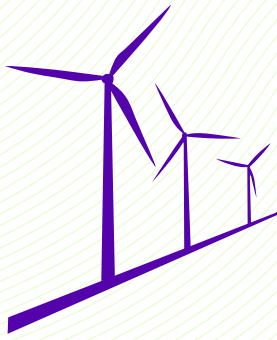


Meeting with PGCIL officials

- ◆ Technical committee Meeting to evaluate the technical bids received and to finalize the vendor towards design, fabrication, transportation, civil work & installation of 50m mast has been convened at NIWE, Chennai on 27th November 2015.
- ◆ Second Technical committee Meeting to evaluate the technical bids received and to finalize the vendor towards design, fabrication, transportation, civil work & installation of 50m mast has been convened at NIWE, Chennai on 8th January 2016.
- ◆ First Standing Technical Committee Meeting convened to formulate technical specification for 50m / 80m lattice mast, 10m / 20m tubular mast (for urban wind monitoring) including wind sensors & data loggers and LiDAR at NIWE, Chennai on 1st March 2016.

Other Programmes

- ◆ Workshop on “Renewable Energy scalability” convened at NIWE, Chennai on 13th May 2015.
- ◆ Meeting on REMC project & Wind Power Forecasting has been convened at NIWE, Chennai on 20th August 2015.
- ◆ Work related to Urban Wind Monitoring in Chennai, Coimbatore, Tirunelveli & Vellore region in coordination with educational institution/private/public sector companies has been initiated.
- ◆ Meeting to provide adequate inputs to Power Grid Corporation of India Limited for creating necessary grid infrastructure to develop Wind Power Projects across the Country convened at NIWE, Chennai on 4th November 2015.
- ◆ Advance level training on Wind Power Forecasting has been organized at NIWE, Chennai during 11th to 13th February 2016.



WIND TURBINE TESTING

NIWE's Wind Turbine Test Station (WTTS) near Kayathar in Tamil Nadu was established with the technical assistance of RISØ National Laboratory, Denmark under Danish International Development Agency (DANIDA) grant and with partial financial assistance and guidance from the Ministry of New and Renewable Energy (MNRE), Government of India. The Test Station has the following facilities:

- ♦ Availability of two test beds to test wind turbines up to a total capacity of 1650 kW, the capacities of which are expandable based on requests from potential customers.
- ♦ Readily available grid connection for each test bed.
- ♦ Readily available reference met masts in front of each test bed, designed to heights of 75m and 50m for acquiring meteorological data at the hub heights of the test turbines.
- ♦ Two control rooms, one for each test bed with state-of-art data acquisition systems and one office building.
- ♦ Availability of Industrial PC based data acquisition systems for measurements at the control room of each test bed.
- ♦ Availability of an office cum workshop building at WTTS with facilities of carrying out functionality check of instruments and sensors. The workshop is equipped with adequate space to accommodate a nacelle for instrumentation purposes.
- ♦ Availability of calibrated sensors and transducers as per the requirements of IEC standards which are stored as per the Quality management system procedures.
- ♦ Availability of 9 Nos of 200 kW Micon make wind turbine for development of new measurements techniques.
- ♦ In-house laboratory for calibration and functionality check-up of instruments.



- ♦ In-house laboratory for data warehousing, signal conditioning, equipments design, training calibration etc.

Detailed Work

NIWE has established a test facility at Wind Turbine Test Station (WTTS), Kayathar, where wind turbines can be tested according to International Standards. WTTS is presently equipped to undertake Type Testing (TT) of wind turbines and to conduct the testing of wind turbines as per the requests of customers / manufacturers and the following tests are normally carried out as per International standards IEC 61400-12-1, 13, 1.

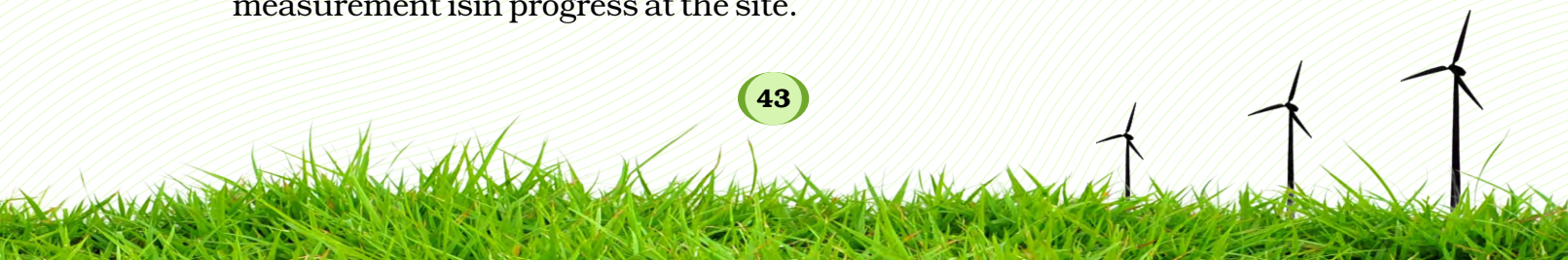
- ♦ Power performance measurement
- ♦ Yaw efficiency test
- ♦ Safety and functional test
- ♦ Load measurements
- ♦ User defined measurements

The above mentioned tests are also being carried out at field sites subject to the site, meeting the requirements of IEC Standards.

The testing facilities are certified as per the requirements of ISO 9001:2008 and accredited as per the requirements of ISO / IEC 17025:2005.

Important Events

- ♦ Preparation for Type Testing of Xyron 1000 kW wind turbine at Richadewda, Ratlam District, Madhya Pradesh of M/s. Xyron Technologies Limited.
- ♦ Type Testing of GVSL 1700 kW wind turbine at Kampaneari Pudhukudi (Village), Tenkasi (Taluka), Tirunelveli District, Tamil Nadu of M/s. Garuda Vayu Shakti Limited. The measurements have been completed and Draft Test Reports sent to the Customer.
- ♦ Power Curve Measurements of INOX 2000 kW wind turbine at Rojmal, Rajkot (Dist), Gujarat of M/s. INOX Wind Limited. The measurements have been completed and final test reports issued to the client.
- ♦ Type Testing of INOX 2000 kW wind turbine at Kidi village, Babra Taluk, Amreli (Dist), Gujarat of M/s. INOX Wind Limited. The continuous measurement is in progress at the site.



- ◆ Power Curve Measurement of ReGen 1500 kW wind turbine at Vagarai Village, Dindigul (Dist), Tamil Nadu near Dharapuram of M/s. ReGen Powertech Private Limited. The instrumentation work is under progress.



Type Testing of Inox 2000 kW WT at Kidi Village, Babra Taluk, Amreli (Dist), Gujarat

Achievement

- ◆ Successfully completed the first periodic Audit as per the requirements of ISO 9001:2008 by DNV-GL held on 28th July 2015 at WTTS, Kayathar and 29th July 2015 at NIWE.
- ◆ S.A. Mathew participated and member in the ET 42 Sectional Committee Meeting on maintenance of accreditation as per the requirements of IECRE and ISO / IEC 17025:2005 organised by Bureau of Indian Standards (BIS) held on 19th August 2015 at New Delhi.
- ◆ Successfully completed the desk top Audit by NABL as per the requirements of ISO/IEC 17025:2005 on 19th January 2016.
- ◆ Received Leadership Appreciation for the Testing Services from a member of the Indian Wind Industry during March 2016.
- ◆ The re-certification of the services as per the requirements of ISO 9001:2008 has been achieved and is valid till August of 2016.
- ◆ Member of the IECRE sub group SG 551.

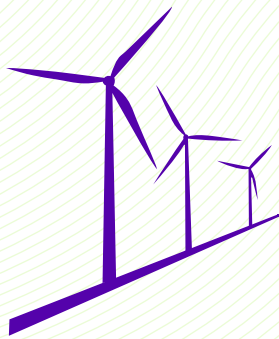
Innovation/ New Facilities

- ◆ Prepared a proposal with Vortex under the Indo-Spanish joint research call on "Wind Power Forecasting" during September, 2012. The proposal which has been implemented by NIWE has received the "SKOCH" Award for the year 2015, for smart technologies.
- ◆ The project for providing surveillance system for the security of WTTS / WTRS, Kayathar including civil and electrical works, networking, documentation and training has been completed.

Future Plans

- ◆ Improve skill sets and qualifications of personnel in the unit.
- ◆ Continual improvement on measurement techniques and equipment with strengthening of the Quality Management System.
- ◆ Improved focus on research related work beneficial for the wind industry.
- ◆ Inter laboratory comparison in the area of Mechanical loads as per the requirements of IEC 61400-13 and its improvement before the next re-accreditation as per the requirements of ISO/IEC 17025:2005.
- ◆ Inclusion of noise, power quality, LVRT and blade tests in the accreditation scope.





WIND TURBINE RESEARCH STATION

NIWE established experimental Wind Turbine Research Station at Kayathar, Thoothukudi Dist. of Tamil Nadu away from the State capital Chennai around 600 km towards south of Chennai. The experimental Research Station was established in one of the Windy Area namely Senkottai Pass in the Western Ghats mountain range, and is considered as best windy area in Tamil Nadu. This station was spread over approximately 100 acres of land with total Wind Electric Generators installed capacity of 4400 kW which comprising 26 years old 9 200 kW, 1 600 kW and 1 2000 kW Wind Electric Generators (Variable Speed) for conducting various R&D related activities in addition to Type Testing. Facilities for Large WEG and Small Wind Turbine performance testing at the Test Beds created with all infrastructure established at the Research Station. This NIWE owned R&D infrastructure machines at Kayathar comprises first generation (200 kW) WEG`s and latest generation (2000 kW variable speed) WEG. Various Strategic efforts were being experimented to improve the machines overall efficiency for the first generation WEG`s (200 kW) after complete re-conditioning of the machines. Installations of additional R&D



200 kW MICON Wind Electric Generators at WTRRS, Kayathar

facility by the addition of 2000 kW DFIG model wind electric generator and 800 kW Gearless wind electric generator are under progress at WTRS, Kayathar.

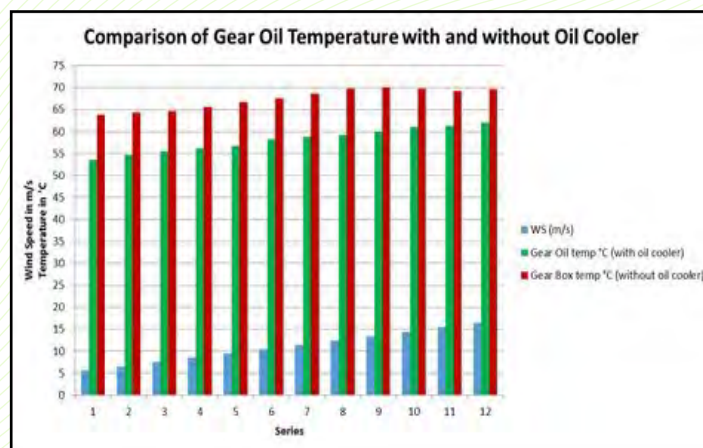
Regular Operation & Maintenance of 9 200 kW MICON Wind Electric Generators at WTRS, Kayathar

The completely retrofitted 26 years MICON (200 kW) Wind Electric Generators at Wind Turbine Research Station, Kayathar were put into continuous operation during the windy season of 2015 after Operation & Maintenance (both preventive and breakdown) works carried out and energy generated is fed into the grid by maintaining unit power factor for all the machines.



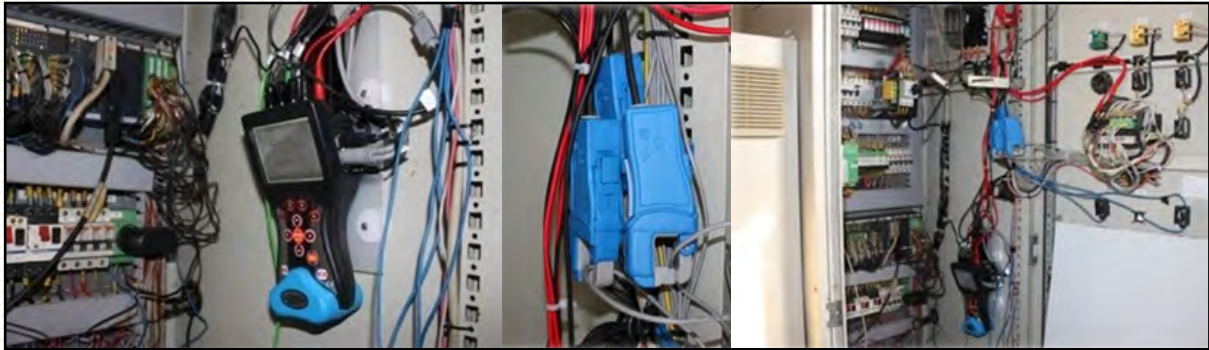
Experimental study on Gear Oil Temperature Reduction by Introducing Oil Cooler on 200 kW MICON Wind Electric Generator

Experimental study on Reduction of Gear Oil Temperature at Nacelle of the 200 kW MICON wind electric generators with and without Improved version of Gear Oil Cooler including provision of Air Ventilator and Increased Radiator Fins were conducted during the windy season 2015. Encouraging Gear Oil Temperature Reduction observed with gear oil cooler installed wind electric generator at Nacelle of the machine (Figure) during the windy season 2015.



Transient Behaviour study on 600 kW WEG at WTRS, Kayathar

Portable Phasor Measurement (PMU) Unit (STER make) was installed by SLRDC, Bangalore at 600 kW SUZLON WEG at WTRS, Kayathar as a part of demonstration study of Transient behaviour of WEG's in the wind farm Grid. Required parameters like Voltage, Current, Frequency, Power Generated etc. are being collected on-line for the above study by SLRDC, Bangalore.



Portable Phasor Measurement Unit (PMU) @ Suzlon 600 kW WEG

Development and Installation of Micro Thruster Augmented Wind Electric Generator at WTRS, Kayathar

An R&D project sanctioned by MNRE, New Delhi and implemented by Vellore Institute of Technology, Vellore for Development and Installation of Micro Thruster Augmented at one of the 200 kW MICON Wind Electric Generator at WTRS, Kayathar is in progress. The specific objective of the project is to prove the concept of a



augmented wind electric generator (WEG) for better efficiency and to increase the capacity utilization of the WEG. Work on erection of cylinder, compressor in the control room at site and laying of pressurised pipe inside the WEG and installation of micro thruster in the blades of the WEG are in progress.

Solarisation of Wind Farm at WTRS, Kayathar

A hybrid study on grid integration of 75 kWp solar PV power plant with one of the 200 kW first generation MICON wind electric generator for maximum utilization of connected grid load during windy season / low wind-season by utilizing the existing land, transformer, transmission lines, etc. is in progress at WTRS, Kayathar. This solarisation (wind-solar grid connected hybrid) of wind farm is first of its kind effort in India. The research knowledge and experience on the field performance of large scale integration of solar PV with Wind Farm (wind energy) will throw new light to maximize full load grid connected capacity for increasing the net (wind & solar) capacity utilization factor (CUF) of the plant during windy season / low wind season. Work on shadow effect of WEG, under ground power cable root detection for erection of mounting structure in the wind farm and integration portion (PLC Programming) with the WEG were miscellaneous activities completed at site.



Cable Route Tracer and Shadow Effect Marking

Industrial Visit to R&D Facilities at WTRS, Kayathar

The following visits were coordinated giving an over view of Testing / R&D facilities at WTRS / WTTS, Kayathar and field exposure training were imparted to the students on safety measures on WTG's, O&M / met masts measurements / demonstration on small aero-generators.

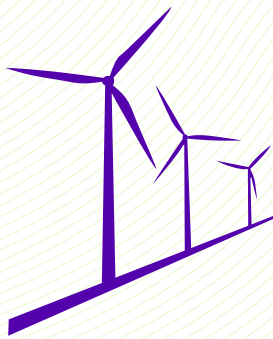
- ♦ 34 Students and 2 staff from V.V. College of Engg. Thesayanvilai, Tirunelveli District, Tamil Nadu on 23rd July 2015.

- ♦ 51 Students and 4 staff from Thiru Ramakrishna Nallammai Polytechnic College, Dharapuram Taluk, Erode District, Tamil Nadu on 6th August 2015.
- ♦ 57 students and 2 staff from KLN college of Information Technology, Pottapalayam, Sivaganga District, Tamil Nadu on 23rd September 2015.
- ♦ 5 M.Tech (Energy) students and 1 staff from Centre for Energy & Environment, Rajasthan Technical University, Kota on 16th December 2015.
- ♦ 14 Faculty members of Energy Engineering from Kalasalingam University, Srivilliputtur on 29th February 2016.
- ♦ 48 Students and 2 staff from Tamil Nadu Agricultural University of EEE Department, Tamil Nadu on 19th March 2016.
- ♦ 54 Students and 3 staff from National Engineering College, Kovilpatti, Tuticorin District, Tamil Nadu on 24th March 2016.



Special Dignitaries visit to R&D Facilities, Kayathar

- ♦ 23 Delegates from System Operators of Load Despatch Centres for Special Training Course on Wind Turbine Technology and Applications visited on 17th July 2015.
- ♦ 18 Delegates from 16th International Training Course on Wind Turbine Technology and Application visited on 3rd September 2015.
- ♦ 20 participants of 17th International Training Course on “Wind Turbine Technology and Applications” visited on 25th February 2016.



STANDARDS & CERTIFICATION

Wind Energy Sector is continuously growing in India with the introduction of more new wind turbine models and more installed capacity. Type Certification of wind turbines plays an active role to facilitate the orderly growth of wind energy sector. TAPS-2000 (amended), the Indian Certification Scheme for wind turbines has been approved and issued by Ministry of New and Renewable Energy. The Scheme has been prepared with the technical guidance of RISO, Denmark in line with the requirements of International standards viz., IEC standards while taking into account of Indian external conditions. Standards & Certification (S&C) unit of NIWE is implementing TAPS-2000 (amended) for certification of wind turbines.

NIWE has completed three projects on renewal of certificates of wind turbine models during the year.

Certification - Renewals Completed (2015-16)

Sl.No.	Manufacturer's Name	Wind Turbine Model / Capacity	Validity
1.	M/s RRB Energy Limited	V 39 – 500 kW with 47m rotor diameter / 500 kW	03.04.2016
2.	M/s RRB Energy Limited	Pawan Shakthi-600 kW / 600 kW	04.07.2016
3.	M/s Southern Wind Farms Limited	GWL 225 / 225 kW	05.01.2017

In addition to the above, based on the directives from Ministry of New and Renewable Energy (MNRE), Internationally accredited certification services are made available in India by NIWE through a Tri-party Co-operation agreement signed on 06.05.2015 among NIWE, M/s TUV Rheinland Industrie Service GmbH, Germany (TUV R Germany), an Internationally accredited Certification Body for Wind Turbines and M/s TUV Rheinland (India) Private Limited, Bengaluru (TUV R India). In this regard, a Wind Turbine Manufacturers meet was organized at Chennai jointly by NIWE & TUV Rheinland on 8th May 2015 for launching the Wind Turbine Certification services.





**NIWE & TUV Rheinland exchanges
International Cooperation Agreement for Certification of Wind Turbines**



**Discussions between NIWE &
TUV Rheinland Industrie Service GmbH
at Cologne, Germany**



**Issuing renewed Certificate to
M/s. RRB Energy Limited**



Issuing renewed Certificate to M/s. Southern Wind Farms Limited

Workshop on “Certification of Wind Turbines in India – Trends, Challenges & Solutions”

NIWE along with TÜV Rheinland & TÜV India jointly organized workshop on “Certification of Wind Turbines in India – Trends, Challenges & Solutions” on 1st December 2015 at GRT Radisson Blu, Chennai with TÜV Rheinland & TÜV India. Subsequently, the 2nd Workshop was organized on 16th February 2016 at NIWE, Chennai.



Workshop on “Certification of Wind Turbines in India – Trends, Challenges and solutions”

The Workshop covered various topics such as Wind Turbine Certification, Internationally Accredited Services in India through local Competencies and also various other certification services offered jointly by NIWE & TÜV Rheinland including advantages of availing such certification services and topics were presented by Dr. S. Gomathinayagam, Director General, NIWE, Shri. A. Senthil Kumar, Director & Head (S&C), Shri. Karl Friedrich, Head – Certification body Wind Turbines & Shri. Jai Prakash Narayan, Product Manager – Wind Certification Body, M/s. TÜV Rheinland Industrie Service



2nd Workshop on “Certification of Wind Turbines in India-Trends, Challenges and Solutions”

GmbH, Germany. In addition, Shri. Eric Effern, Division Manager, Type Testing has also given a presentation on “Grid Integration – Power Quality and LVRT measurement campaigns for global and Indian wind turbine markets” through video conference from Germany.

Further, NIWE along with TUV Rheinland had discussions with various Indian wind turbine manufacturers on their requirements related to type certification of wind turbines in India.

Dr. S. Gomathinayagam, Director General, NIWE and Shri. A. Senthil Kumar, Director & Head, S&C participated in a meeting held with top management officials of M/s. TUV Rheinland Industrie Service GmbH at their Corporate Office at Cologne, Germany on 16th March 2016.

Standards

NIWE is involved in the preparation of Indian standards on wind turbines by supporting Bureau of Indian Standards (BIS). A committee viz., Wind Turbines Sectional Committee (ET 42) has been formulated by BIS for the preparation of Indian standards on wind turbines, under the Chairmanship of Director General, NIWE, and officers part of BIS ET 42 committee, provide the technical support in all the standards related works. Based on the contribution, four Indian standards on wind turbines have been finalized so far and accepted by BIS for publication.

Shri. A. Senthil Kumar, Director & Head, S&C participated in the 6th meeting of Wind Turbines Sectional Committee, ET (42) of BIS held on 19th September 2015 at BIS, New Delhi and explained various works carried out on the standards on wind turbines. During the year, following two Indian standards have been finalized:

Doc.No.	Title
ET 42 (6717)	Wind turbines – Part 4: Design requirements for wind turbine gearboxes
ET 42 (6718)	Wind turbines – Acoustic noise measurement techniques

Working Group meeting on Standards

NIWE has formulated a Working Group on standards consisting of experts from various stake holders to assist NIWE in the standards related works. NIWE organized Working group meeting on standards at NIWE, Chennai on 26th October 2015 to discuss the following two draft Indian Standards:



Doc.No.	Title
ET 42(6888)	Wind Turbines – Part 12-1: Power Performance measurements of electricity producing wind turbines
ET 42(6889)	Wind Turbines – Part 12-2: Power Performance of Electricity producing wind turbines based on nacelle anemometry



Discussion during NIWE's Working Group Meeting on Standards

In the Working Group meeting, based on the discussions, recommendation for adoption of “IEC 61400-12-1:2005, First Edition, Wind Turbines – Part 12-1: Power Performance measurements of electricity producing wind turbines” as Indian Standard was decided and the same has been communicated to BIS along with the comments on National Foreword, prepared by NIWE. The review of draft Indian Standard on “Wind turbines – Part 12-2: Power performance of electricity - producing wind turbines based on nacelle anemometry” by the Working Group is under progress.

India is a P-member (Participating member) in IEC TC 88 committee which is responsible for issue of IEC standards for wind turbines. S&C unit reviews various draft International Electrotechnical Commission (IEC) standards periodically forwarded by BIS and provides technical support to BIS on the voting draft IEC standards at IEC TC 88 Committee.

IEC has formulated a separate system for the renewable energy sector viz., “IEC System for Certification to Standards relating to Equipment for use in Renewable energy Applications (IECRE system)”. IECRE system includes three sectors, namely – Solar PV Sector, Wind Energy Sector and Marine Energy Sector. BIS has obtained the membership for India in IECRE system

(IEC System for Certification to Standards relating to Equipment for use in Renewable Energy Applications). NIWE is providing technical support to CMD of BIS and carried out various works related to IECRE system. Director General, NIWE & Director & Head, S&C participated the meeting on "Renewable Energy Conformity Assessment Working Group (RECAWG)" organized by BIS on 19.05.2015 at New Delhi.

Revised List of Models and Manufacturers of Wind Turbines (RLMM)

Ministry of New and Renewable Energy (MNRE) has been issuing the guidelines for Wind Power Projects to streamline the development and facilitate healthy and orderly growth of the Wind Power Sector in the Country. Based on the directives from MNRE, list of models and manufacturers is being issued by S&C unit, NIWE.

The type certification involves multidisciplinary activities and requires the knowledge to understand and interpret the information on type certification scheme and other technical information provided in the type certificate. Hence, NIWE provides the technical support to the RLMM committee constituted by MNRE, in the verification of the documentation provided by various wind turbine manufacturers and their manufacturing facilities to finalize the list.

As a part of RLMM process, Director & Head, S&C and S&C Engineer carried out the verification of the manufacturing facilities of three wind turbine manufacturers.

Three Revised Lists of Models and Manufacturers of Wind turbines (RLMM) dated 15.05.2015, 28.09.2015, 03.02.2016 have been issued by NIWE and during the year, eight new wind turbine models and one new wind turbine manufacturer have been included in the said lists. In addition, updation of various documentation including type certificate for the existing wind turbine models (more than 50 numbers) and wind turbine manufacturers have been included in the said lists. Further, consolidated lists of wind turbine models and manufacturers have been hosted at NIWE website. The works in connection with issue of next RLMM list is under progress.

Prototype Wind Turbine Models

MNRE guidelines dated 22nd May 2012 & addendum dated 20th September 2012 for installation of prototype wind turbine models in India are being implemented by NIWE. It facilitates the installation of Prototype wind turbine models in India to carry out the Type Testing for obtaining Type Certificate and



to carry out the developmental works. The guideline document stipulates various requirements to be complied for obtaining the recommendation letter. NIWE has formulated a committee to take the suitable decision on issuing the recommendation letters. NIWE provides the technical support to the committee in the verification of the documentation on the prototype wind turbine models provided by various wind turbine manufacturers. Recommendation letters are being issued by NIWE in connection with allowing the installation of a maximum number of 5 (five) wind turbine(s) of a specific prototype wind turbine model in India and synchronize with the Indian grid system.

During the year, the unit has issued recommendation letters in connection with grid synchronization for three prototype wind turbine models for the purpose of type testing.

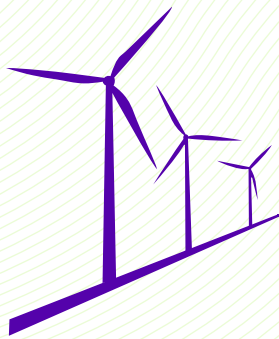
Quality Management System

Wind Turbine certification services of NIWE are certified as per the requirements of ISO 9001: 2008 by Det Norske Veritas, NIWE has successfully undergone the second periodic audit conducted by Det Norske Veritas as per ISO 9001:2008 and recommended for continuation of certification. The continual improvement and maintaining the Quality Management System are ongoing.

Visitors

A team of officials from TUV Rheinland (Shri. Thomas Fuhrmann, CEO & Managing Director, Shri. Benedikt Anselmann, Vice President - Industrial Services, M/s. TUV Rheinland (India) Pvt. Ltd & Shri. Karl Friedrich, Head - Certification body (Wind Turbines), Shri. Jai Prakash Narayan, Product Manager – Certification body (Wind Turbines), M/s. TUV Rheinland Industrie Service GmbH) visited NIWE in connection with Tri-party Co-operation agreement signed among NIWE, M/s TUV Rheinland Industrie Service GmbH, Germany, M/s TUV Rheinland (India) Private Limited, Bangalore & for further interactions with NIWE.





INFORMATION, TRAINING AND CUSTOMIZED SERVICES

Training Programmes

Apart from collation, processing, preserving and dissemination of wind related information, the prime activities of NIWE is organizing training courses for National & International participants. NIWE has trained 1089 National and 382 International professionals through its 21 National and 19 International Training programmes, since 2004. During the year 2015-16, 5 training courses – 3 National Training Course including one special training course for SLDC (State Load Dispatch Centre) & 2 International Training Course and One Day Training Course for Field Inspection Engineers of Tamil Nadu Energy Development Agency (TEDA) on Small Wind and Hybrid Systems have been conducted successfully, with the lectures of the courses delivered by eminent scientists, engineers and other wind energy professionals with years of experience drawn from NIWE, wind turbine industries and academic institutions. As part of every training course, Course Material (compilation of write-ups of all the presentations / lectures) is provided, specially prepared for the benefit of the participants.

National Training Courses

Special Training Course - Load Dispatch Centres

Special Training Course for System Operators of Load Dispatch Centres was successfully conducted on “Wind Energy Technology” during 13th – 18th July 2015 to address all aspects of Wind Power starting from introduction to wind and its technology, wind resource assessment, installation, operation and maintenance aspects of wind farms along with financial analysis. The course was attended by 22 participants from System Operators of Load Dispatch Centres (LDCs) and one participant from Sethu Institute of Technology Virudhunagar. The course was inaugurated by Er. J. Rexline Terese, Chief Engineer (P&C), Tamil Nadu Electricity Board.

During the 6 days of training, 21 classroom lectures were handled and visit to Wind Turbine Test Station and Wind Turbine Research Station at Kayathar and working wind farms in and around Kayathar and Kanyakumari were arranged for practical exposure. Shri. A. Mohamed Hussain, Deputy Director General





Chief Guest addressing the gathering

and Head, WTRS, NIWE distributed the Course Certificates to all the participants at valedictory function held at Kanyakumari.

18th National Training Course

18th National Training Course on “Wind Energy Technology” was successfully conducted during 26th to 30th October 2015 to address all aspects of Wind Power starting from Wind Resource Assessment to project implementation and Operations & Maintenance in a focussed manner. The course was attended by 45 participants from wind turbine manufacturers, developers, investors, consultants and academia from 13 States of the country. The course was inaugurated by Dr. S. Gomathinayagam, Director General, NIWE.



Training Participants with NIWE Officials

One Day Training Course - TEDA

One Day Training Course for Field Inspection Engineers of Tamil Nadu Energy Development Agency (TEDA) on Small Wind and Hybrid Systems has been successfully organized on 30th November 2015. 34 participants attended and gained knowledge of wind energy.

19th National Training Course

19th National Training Course on “Wind Energy Technology” was successfully conducted during 14th to 18th March 2016 to address all aspects of Wind Power starting from introduction to wind and its technology, wind resource assessment, installation, operation and maintenance aspects of wind farms along with financial analysis in a focussed manner. The course was attended by 38 participants from wind turbine manufacturers, developers, investors, consultants and academia from 13 States of the country. The course was inaugurated by Dr. S. Gomathinayagam, Director General and the course certificate was distributed by Dr. Velraj, Director, Institute of Energy Studies Anna University who was the Chief Guest of the Valedictory function.



Dr. S. Gomathinayagam inaugurating the training along with the participant

Participation in the Exhibitions

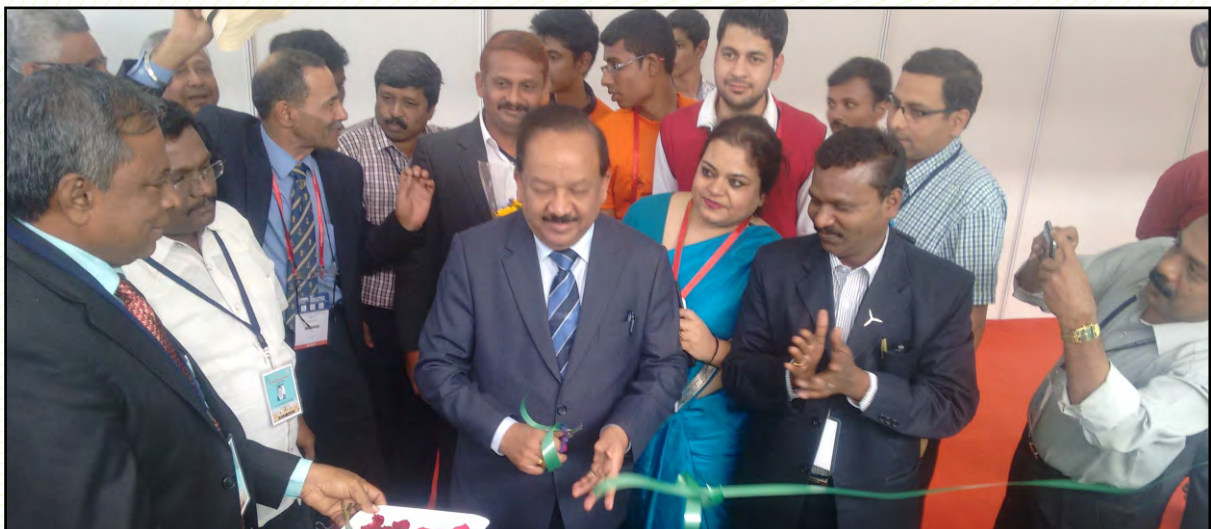
NIWE had established and managed its Stall in the following exhibitions and disseminated the information about the activities and services of the Institute along with the wind energy awareness to the visitors in various capacities.

- ◆ 4th International Wind Conference and Exhibition 4th Edition of International Wind Conference & Exhibition WE20 by 2020 from 21st to 23rd June 2015 at CODISSIA Trade Fair Complex, Coimbatore. The Stall was inaugurated by Shri. Rajesh Lakhoni, Principal Secretary, Energy, Government of Tamil Nadu in presence of Dr. S. Gomathinayagam, Director General, NIWE and Shri. Dilip Nigam, Director, MNRE.



Inauguration of NIWE Stall by Mr. Rajesh Lakhoni, Principal Secretary, Energy, Government of Tamil Nadu in CODISSIA Trade Fair Complex, Coimbatore

- ◆ NIWE's stall in the 3rd India-Africa Forum Summit at New Delhi during 27th & 29th October 2015.
- ◆ NIWE's stall in 103rd Indian Science Congress Exhibition scheduled during 3rd to 7th January 2016 at Mysuru.



Dr. Harsh Vardhan, Hon'ble Union Minister for Science & Technology & Earth Sciences, Government of India inaugurated the NIWE Stall

- ◆ NIWE's stall in the Annual Mega Science Festival at Science City held during 26th to 29th February 2016 at Chennai.

NIWE-IWTMA Knowledge Forum

For the benefit of wind industry, NIWE in association with IWTMA conducts NIWE-IWTMA Knowledge Forum on latest developments. In this series, 11th forum has been conducted on “Recent Trends in Wind Turbine Testing, Validation and Certification” by UL DEWI in NIWE Conference Hall on 29th July 2015. More than 60 participants from wind turbine manufacturing company and research institutions attended the forum.

National Wind Energy Technical Symposium

NIWE in association with UBM India had organized a “National Wind Energy Symposium” on 29th September 2015 for the Technical persons in the wind industry at the 9th Renewable Energy India Expo held at Greater Noida. Nearly 30 people from industry had attended the training and received good feedback from the participants. The following lectures were delivered during the symposium by NIWE experts.

Introduction and Status of Wind Energy Technology	Dr. S. Gomathinayagam
Wind Measurement and Techniques	Shri. A.G. Rangaraj
Wind Turbine Components	Shri. J. C. David Solomon
Small Wind Turbine Testing and Hybrid System	Dr. Rajesh Katyal
Wind Turbine Testing and Measurement Techniques	Shri. S. A. Mathew
Certification of Wind Turbines	Shri. A. Senthil Kumar.

Global Wind Day 2015 Celebration

Since 2007, the Global Wind Day has been celebrated initiated by GWEC (Global Wind Energy Council) on 15th June to create awareness about the advantages and achievements of wind power. Since 2009, NIWE is celebrating the Day with various events among the School Children. To proactively reach the future kids, NIWE this year signed an MoU with World Wide Fund for Nature (WWF) – India.

This year on 15th June, to mark the celebration of Global Wind Day, NIWE celebrated the day in collaboration with World Wide Fund for Nature (WWF) – India.

This year the day was celebrated with Science Fair projects for school students and a Workshop on Renewable Sources of Energy for the teachers of





Glimpses of Global Wind Day

participating schools. The theme of the Science Fair was "Renewable Sources of Energy" for the students to build working models and prizes were distributed to the winners.

This year's event engaged over 58 School Children from various parts of the State along with their teachers at NIWE campus and shared the basic knowledge about wind and renewable energy. Shri. Paneerselvam from the National Centre for Coastal Sustainable Management spoke of the Disastrous Changes in the Climatic Changes in the recent times and its effect on Coastal lines.

WINNERS		
First Prize	Second Prize	Third Prize
Daniel Thomas Mat. Hr. Sec. School, Koyambedu	Apex Pon Vidyashram, Velachery	Anantharasu Aided Middle School, Maraigna nallur, Vedaraniem
1. Aishwarya L	1. Aswati Harikumar	1. Yazhini. R
2. Gokul. C. N	2. Harshni. V	2. Harish Surya. M

Ms. Varsha Joshi, I.A.S., Joint Secretary (Wind Energy), MNRE was the Chief Guest and delivered special address in the celebration and also distributed the prizes to the winners.



NIWE's Newsletter – PAVAN

NIWE is regularly publishing a well received quarterly bilingual NIWE newsletter “PAVAN”, which disseminates information about the activities & services of NIWE, wind energy news, technical articles and information on wind energy related events. In this period, 45th to 48th issues have been published in web-downloadable format as well as printed and mailed to stakeholders.

Prof. Anna Mani Information Centre

NIWE has state-of-art Library named after renowned visionary meteorologist “Prof. Anna Mani” as Information Centre has about 2000 books on renewable energy in general and wind energy in particular with allied subjects. It includes books on Energy and environment, sustainable development, all engineering disciplines, science, management and personality development. NIWE's Library has also subscribed to all major National and International Journals & Magazines related to wind energy and other allied engineering disciplines. It is



also having around 300 technical reports and 300 conference proceedings and other information resources like Wind Atlas and data books, Maps, Manuals, souvenirs, Digital resources, etc.

NIWE Library has been computerised with automation software and Online Public Access Catalog (OPAC) facility is available. It has also membership with leading libraries like IIT, Anna University and American Library for reference purposes. Interested public / students can access NIWE's Library with prior permission, free of cost without borrowing.

Visitors to the Campus

To create awareness and to motivate towards research on wind energy, achieving the indigenization and also to create awareness about the activities and services of NIWE, schools and college students are encouraged to visit the campus. During the period from April 2015 to March 2016, the following visits were coordinated by the Unit.

School Students Visit

Sl. No.	Name of the Institute	No. of Students	Date of Visit
1	Kola Saraswathi Vaishnav Senior Secondary School, Chennai	93	18.06.2015
2	The Pupil Saveetha Eco School, Chennai	75	01.09.2015
3	Kaligi Ranganathan Montford Public School, Chennai	63	09.10.2015



Students visiting the RE facilities available at NIWE

Sl. No.	Name of the Institute	No. of Students	Date of Visit
4	T.I. Matriculation Higher Secondary School, Chennai	87	20.10.2015
5	Good Word Public School, Chennai	70	20.10.2015
6	Lalaji Memorial Omega International School, Chennai	5	29.10.2015
7	JRK Global School	77	27.01.2016

College Students Visit

1	Aksheya College of Engineering Melavalampettai 603314	66	17.04.2015
2	Prince Shri Venkateshwara Arts & Science College, Chennai	37	15.09.2015
3	Loyola-ICAM College of Engineering and Technology, Chennai	59	30.09.2015

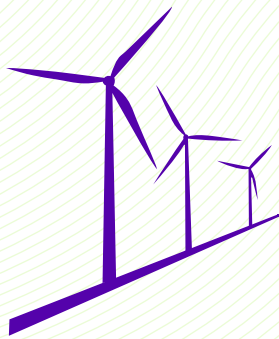
Special Visit

1	Training participants of National Institute of Technical Teachers Training & Research, (NITTR), Chennai	20	15.07.2015
2	Students of Tamil Nadu Agricultural University, Coimbatore	56	01.10.2015
3	Students of Anna University, Chennai	40	09.10.2015
4	Training participants of National Productivity Council, Chennai	43	09.10.2015
5	Training participants of National Institute of Technical Teachers Training, Research (NITTR), Chennai	30	15.10.2015
6	Training participants of Central Scientific Instruments Organization (CSIRO), Chennai	9	12.11.2015
7	Training participants of National Institute of Technical Teachers Training & Research (NITTR), Chennai	5	07.03.2016
8	Students of VIT University/ School of Engineering, Chennai	53	10.03.2016
9	Students of VEL Tech Engineering College, Chennai	85	23.03.2016

NIWE- Chariman's Visit

Shri. Upendra Tripathy, IAS, Chairman, Governing Council, NIWE, Secretary, MNRE Government of India had visited NIWE on 18th February 2016 and given inspiring address to NIWE staff members. He also dedicated to the Nation the upgraded C-WET as a National Institute of Wind Energy - in presence of DG, NIWE Video Conferencing Facility & also addressed and interacted with the participants of 17th International Training Course held during 3rd February to 1st March 2016.





KNOWLEDGE SHARING AND MANAGEMENT

The Societal Mission for NIWE is Sharing & Managing Knowledge generated within, by building on skills in interdisciplinary areas of Electrical/ Mechanical and Simulations. Ingress of new knowledge and skill sets will improve the productivity & provide the needed traction for the next paradigm shift in Institute's business and consultancy services offered to the wind energy stakeholders. This is done by way of practical knowledge transfer and industry specific soft skill development for internal staff primarily and for other stakeholder' evincing interest, including manpower leased young graduates / engineers, in NIWE

Knowledge Aggregation & Dissemination planned through the following outreach programmes

- ♦ TTT (Technology Think Tank)
- ♦ Work Group & Soft skill Training
- ♦ STI-FY (Student Internship & Final Year Project)

Technology Think Tank (TTT)

TTT is a creative platform organised at NIWE to exchange ideas and encourage nurturing of engineering concepts for the welfare of the learned community at



large. Every Thursday afternoon an open discussion forum is organised at NIWE's Conference Hall, where resource person nominated from various in turn share information on a subject relevant to wind & renewable energy environment. After the presentation the session opens up for discussion and brain storming. Entry is free and open to all including non-NIWE personnel. As on date, since inception, there have been 66 TTT knowledge transfer sessions organised at NIWE. Details of the 29 lectures organised during the year are given below:

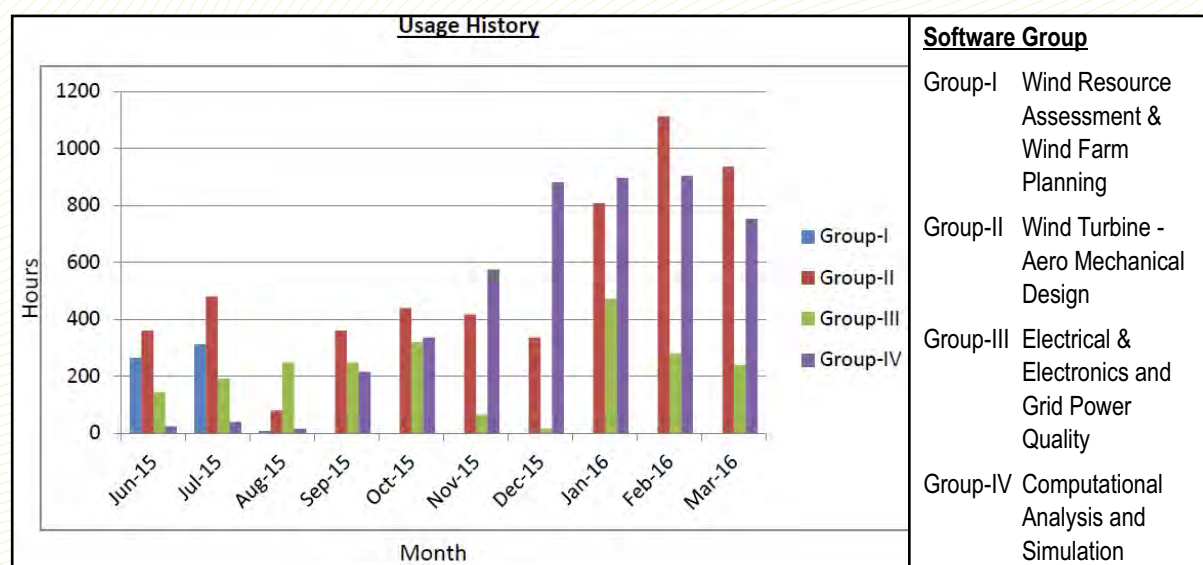
S.No.	Date	Department	Resource Person	Topics
1	16-04-2015	SRRA	C. Muthu	Feasibility Analysis & Design of Solar PV Power Plant
2	30-04-2015	WRA	S. Thiyagarajan	A noble approach for short term wind power forecasting using SVM regression method
3	07-05-2015	R&D	J.C. David Solomon	Biomimetic: Nature-Based Innovation for Wind Engineering
4	14-05-2015	WTT	A.R. Hasan Ali	Wind Farm Project - A Glance
5	28-05-2015	S&C	S. Arulselvan	An overview on 'LVRT' requirements
6	04-06-2015	ESD	S. Sureshkumar	Big Data
7	18-06-2015	ITCS	M. Joel Franklin Asaria	Economic Analysis of the Project
8	25-06-2015	SRRA	A.V. Parthiban	Calibration of Solar Sensors & Analysis of Solar Radiation Data
9	02-07-2015	WRA	S. Nithya	Indian Climate
10	09-07-2015	OSWH&IB	S. Manikandan	Small Wind Turbines and its Applications
11	16-07-2015	WTT	Bhukya Ramdas	Wake Effects of Wind Turbines and its Impacts on Power Curve Measurements

S.No.	Date	Department	Resource Person	Topics
12	23-07-2015	KS&M	Ankit Dalvi & Students S.Siddarth Kumaravadivel	Investigation into a novel way to improve Wind Turbine Operation
13	30-07-2015	KS&M	Sourav Majumder Students Sumanta Kumar Mandal, Rahul Deb Pal & MVN Surendra Gupta	Introduction to a few vital facets in Wind Engineering
14	06-08-2015	S&C	S.Arun Kumar	Energy Security: Role of Renewable Energy
15	10-09-2015	ESD	S.Femina Nasrin	Cloud Computing
16	01-10-2015	ITCS	S.Saravana Kumar	Energy Management & Audit
17	15-10-2015	SRRA	S.Arunkumar	Photovoltaic Principles and Basics of Solar
18	05-11-2015	WRA	Arnald Sweshnekhar	Overview of Wake models used in Wind Flow Modelling Tools
19	12-11-2015	OSWH & IB	P.Prithivi Rajan	Trends in Wind Energy Technology
20	19-11-2015	WTT	M.Saravanan	HVDC Transmission for Off-shore Wind Energy
21	26-11-2015	S & C	K. Parasaran	Wind Turbine System Materials and their corrosive effects & prevention
22	31-12-2015	ESD	M.Anvar Ali	Wind Electric Generators and Types
23	07-01-2016	ITCS	N.V.Vinusha Lakshmi	"Re-Cycling" of Sustainable Future
24	14-01-2016	KSM	M.R.Gunasekaran	"Wave & Tidel Energy" is Sustainable and Predictable

S.No.	Date	Department	Resource Person	Topics
25	21-01-2016	SRRA	M. Bala Vigneshwaran	Analytical Study of Solar Forecasting with the help of Satellite & Solar Radiation Resource Assessment Data
26	03-03-2016	WRA	N. Nishanthini & S. Sowminipriya	CERC - Indian Electricity Grid Code
27	10-03-2016	OSWH&IB	Deepa Kurup	Synchro Phasor Measurement
28	24-03-2016	S & C	K. Venkatesan	Environmental Issues and Economic Impact of Global Warming
29	31-03-2016	WTT	S. Paramasivan	Improving the Wind Turbine Efficiency by using Boundry Layer Fence

Work Group & Soft skill Training

Soft Skill development: A suite of Industry standard renewable Energy related software has been placed at the Work Group lab for usage of all stakeholder communities including NIWE staff. The intention is right capacity building. Initiative aims at human resource skill development and honing skills of professionals working for the renewable energy sector, primarily within NIWE and thereafter other interested personnel.



Students, academic staff, Project engineers, scientists and other professionals working for the renewable field will have a platform to learn and acquaint with new soft skill which would consequently improve their productivity in their areas of contribution in the wind sector. There were 86 active members who have collectively clocked more than 1700 hours of soft skill training on the workgroup software during the period 2015-16.

Training: Training at regular intervals is provided to NIWE staff on software usage and job skills to perform consultancy works. Trained engineers of NIWE can then partake in the various jobs performed by the NIWE units and increase the units business revenue and productivity. The in-house training provided during the period are:

- ♦ ArcGIS one week training was provided to the workgroup & NIWE user during the period 19th-23rd May, 2015.
- ♦ Mi-Power three day training was provided to the workgroup & NIWE user during the period 27th-29th January 2016.

Presently the Work Group facility can be accessed for the following four areas of soft skill involving analysis, design, simulation and development:

- ♦ Wind Turbine - Aero Mechanical Design
- ♦ Wind Resource Assessment & Wind Farm Planning



- ♦ Electrical & Electronics and Grid Power Quality
- ♦ Computational Analysis and Simulation

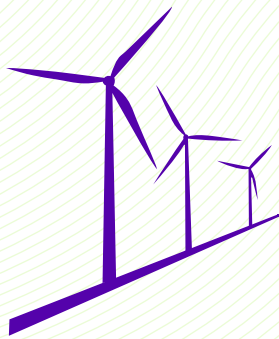
Regular personnel employed with NIWE and those hired through manpower learning are provided free access and non-NIWE personnel from renewable energy stakeholder communities can access the facility, for a small fee which ensures responsibility from the participant.

Student Internship & Final Year Project (STI-FY)

Engineering Student Projects & Internships are offered as a means of grooming future young professionals for probable entry to wind energy sector & allied fields. The applications should be made in advance for short-listing of candidates allowed to carry out projects & Internships at NIWE.

The workgroup software have been open to access for these students in addition to all employees of NIWE, Project Mode Engineers and paid members. About 14 post-graduate students and 4 graduate students have undertaken Internship and project work in NIWE.





ENGINEERING SERVICES DIVISION

In the modern resource assessment, Wind and Solar sectors require sophisticated instrumentation and data acquisition systems interfaced with network servers using GPRS, which needs to be maintained on 24x7 basis to facilitate resource data collection, storage, retrieval, analysis and processing. NIWE's infrastructure needs multi-disciplinary engineering services starting with Civil, Electrical, Information Technology including cyber security, planning, maintenance and management. Engineering Service Division (ESD) of NIWE caters to the above services. Details of some important works completed this year are as follows:·

Video Conferencing system

A sophisticated Video Conferencing System has been established at NIWE for connecting different offices for meetings / trainings etc. from NIWE itself without physically traveling to those places. This will help to reduce the carbon footprint a little contribution towards mitigating the Global warming and climate change along with proactive use of travel time and their impact on productivity of NIWE. The facility works started during July 2015 and completed in the month of October 2015. The Video Conferencing setup has been inaugurated by the Secretary, MNRE on 18th February 2016.



Video Conferencing Facility

380 kVA Diesel Generator and 62.5 kVA Diesel Generator

- I) New Project has been started in the month of January 2015 for Installation, Erection, Commissioning and Testing works of 380 kVA Diesel Generator and 62.5 kVA Diesel Generator for power back up purpose at NIWE. The 380 kVA Diesel Generator foundation was completed during the month of August 2015.
- ii) In this connection, CEA inspection for 62.5 kVA has been conducted and New Generator 400 kVA Diesel Generator power distribution works has been completed in the month of October 2015. The CEA inspection for DG sets had been conducted by the Central Electricity Authority, and the project has been completed on 31st March 2016.



62.5 kVA Diesel Generator



380 kVA Diesel Generator

30 kW Solar Photo Voltaic power plant

- I. The main purpose of In-House project providing the On-Grid Solar inverters (20 kW and 10 kW) with necessary connections is to reduce the energy consumption from Grid and to generate own power inside the campus. A committee has been constituted by DG for technical evaluation of 20 kW and 10 kW SPV grid interactive system. The installation of 20 kW SPV panel has been carried out by M/s Iacharya Silicon Private Limited at the roof top of the front side of NIWE building and 10 kW SPV panel at the top of EB room rear side of the canteen at NIWE.
- ii. The SPV panel structural work has been started during July 2015 and completed in October 2015. Power generation is being monitored on daily basis.

- iii. The latest 30 kW SPV plant Power Generation plant between January to February 2016 is 6129.3 KWh and the Cumulative generation is 39.22 MWh, which is more than 10% of annual energy consumption, coming from Solar. NIWE's annual consumption is 0.35 MU (Million Units) and NIWE/WTRS already generates from Wind 7 MU / year.

LAN Re-structuring work

The local area network (LAN) is useful for sharing resources like files, printers, games or other applications. Re-structuring work of LAN has been executed. The documentation, configuration and testing of the network links has been carried out and the LAN restructuring work in NIWE campus was completed in the month of November 2015 and the LAN restructuring work is under progress at WTRS, Kayathar.



LAN Re-Structuring Work

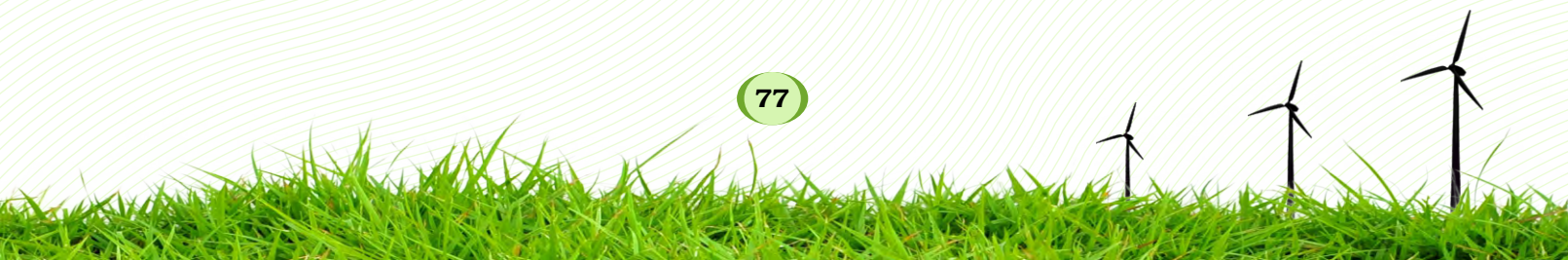
CPWD civil and General Maintenance Works

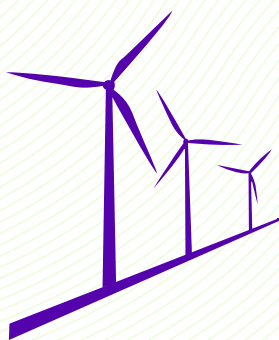
- I) The main Entrance Gate and front side Compound wall work has been completed in December 2015. The work was handled by CPWD, even after some damages post the devastating deluge of Chennai, in December 2015.



NIWE Main Entrance

- ii) The height of the existing compound wall at NIWE campus has been extended for 10 feet in the month of September 2015.
- iii) The Construction of Security Guard room near main entrance gate work is in progress.
- iv) The rear side of the new compound wall work was completed on 31st March 2016.
- v) The upgrade C-WET as National Institute of Wind Energy was dedicated to the Nation in presence of DG, NIWE on 18th February 2016.
- vi) Civil works for Constructing Store room and Staff room at the Utility Block work is in progress.
- vii) Construction of roof top shed for 55 kVA Nacelle and near Driver Cabin work were completed on 31st March 2016.





SOLAR RADIATION RESOURCE ASSESSMENT

Ministry of New and Renewable Energy (MNRE), Government of India has sanctioned a project for the establishment of nation-wide network of Solar Radiation Resource Assessment (SRRA) stations to make available good quality measured solar radiation data to meet the specific challenges in the implementation of JNNSM. One of the major objectives of JNNSM is to establish India as a global leader in Solar Energy.

The SRRA mission project has been implemented by National Institute of Wind Energy (NIWE), Chennai, an autonomous R&D institution under the Ministry, because of its rich experience in Wind Resource Assessment and development of Wind Atlas of the nation. The scope of the SRRA project is to assess and quantify the ground data of solar radiation, data processing & quality assessment of data collected, modeling and making of Solar Atlas of the country. However, the mission mode project has served beyond its goals, by providing regional technical service and consultancies for Solar Project developments in India.

Detailed Work

- ◆ 2nd Technical Committee meeting on the project “Study on Grid Integration of Solar PV Power plant with existing 200 kW Wind Electric Generator, at Kayathar” was held on 11th April 2015 at NIWE, Chennai.
- ◆ SRRA station at Belgaum under Phase-I was decommissioned and relocated at Rani Chennamma College of Agriculture, Gokak, Karnataka on 18th April 2015.
- ◆ Shri. Prasun Kumar Das and Shri. Karthik. R visited IMD, Pune for the period 20th-24th April 2015 for training on inter-comparison of primary standards.
- ◆ 'Indian Solar Radiation Atlas release and Stakeholders Meet' was organized by SRRA on 3rd June 2015.
- ◆ The Indian Solar Radiation Atlas was launched by Shri. Tarun Kapoor, Joint





Secretary, MNRE, New Delhi along with the release of the brochure on Indian Solar Atlas in the presence of Dr. S. Gomathinayagam, Director General, NIWE, Shri. Achim Fabig, Consul General, Consulate of Germany, Chennai & Dr. Wilfried Damm, Director, IGEN, GIZ, New Delhi on 3rd June 2015.

- ◆ Micrositing carried out at NIT, Goa on 8th June 2015 for relocating Silvassa SRRA station.
- ◆ SRRA station at Bellary under Phase-I was decommissioned and relocated at Agriculture Research Station, Haveri, Karnataka on 13th June 2015.
- ◆ SRRA station at Guruzala, Andhra Pradesh under Phase-I was decommissioned and relocated to Acharya Nagarjuna University, Guntur on 29th June 2015.
- ◆ Micrositing carried out at IIT Rajasthan Karwad in July 2015 to relocate the Jodhpur SRRA station at Jodhpur.
- ◆ SRRA station at Silvasa, Dadra & Nager Haveli under Phase-II was decommissioned and relocated to National Institute of Technology, Goa on 27th July 2015.
- ◆ Upgraded Quality Control Algorithm of SRRA during 17th to 28th August 2015 with the assistance of M/s. Suntrace.
- ◆ Shri. Karthik. R attended the meeting of the Working Group on Space Technology for Renewable Energy Resources Assessment (WGSTRERA) on 9th November 2015 at SAC, Ahmedabad.

- ♦ Dr. G. Giridhar attended Technical Committee meeting on SRRA held on 22nd December 2015 at MNRE, New Delhi.
- ♦ A meeting on Solar Forecasting held in NIWE, Chennai on 20th January 2016 with GIZ officials.
- ♦ SRRA officials visited SRLDC, Bangalore during 2nd to 4th February 2016 for discussion on solar forecasting.
- ♦ Micrositing carried out at GERMI new campus at Gandhi Nagar on 16th February 2016 for relocating the SRRA and AMS from PDP, Gandhi Nagar.
- ♦ Price Fixing Committee (PFC) Meeting for review and fixing prices of solar and Solar Atlas data as per Solar Data sharing and Accessibility Policy (SDSAP) of the Ministry was held on 26th February 2016 at NIWE, Chennai.
- ♦ Dr. G. Giridhar attended third meeting of the Interim Administrative Cell (IAC) of ISA on 11th March 2016 at New Delhi.
- ♦ SRRA & AMS station at PDP, Gandhinagar, Gujarat under Phase-I was decommissioned and relocated to new GerMI Campus, Gandhi Nagar on 14th March 2016.

Micrositing

- ♦ Micrositing carried out at VNIT, Nagpur on 26th November 2015 for the establishment of a Solar Radiation Resource Station under commercial program with MEDA, Pune.
- ♦ Micrositing carried out at IIT Bhubaneswar on 18th January 2016 for the relocation of the existing Bhubaneswar SRRA station.
- ♦ Micrositing carried out at Karaikudi on 16th March 2016 for the relocation of the existing Karaikudi SRRA station.

Achievements

- ♦ Calibration of 32 pyranometers and 16 Pyrhemometers of SRRA project carried out during the period April 2015 to March 2016.
- ♦ Project report on Solar Resource Assessment in HP and Maharashtra was submitted to M/s. SJVN in September 2015.
- ♦ Calibration of 19 pyranometers was carried out under commercial mode during the period April 2015 to March 2016.
- ♦ Training program under PPA mode with GSES, New Delhi conducted at NIWE, Chennai during the period 20th to 24th July 2015 & 14th to





16th September 2015 on Design & Installation for stand alone, roof top grid connected and MW scale solar power projects.

- ◆ Half yearly report on SRRA at 4 SRRA stations in Maharashtra for MEDA for the period April - September 2015 sent to MEDA on 7th January 2016.
- ◆ A training program on Solar Energy was conducted exclusively for M/s. Suzlon Energy Ltd. (SEL), Pune during 4th to 6th August 2015 at Pune.
- ◆ A “Solar Technician Training Program program” conducted at Hyderabad under PPP mode with M/s. Ultimate Energy, Hyderabad during 17th August to 16th September 2015.
- ◆ Site visit carried out on 16th October 2015 at CCBF, Alamadhi for evaluating the feasibility of installing SPV systems in the campus and subsequently submitted a report.
- ◆ Project report on the “Solar Resource Assessment at Kharaghoda” was submitted to M/s. SJVN, New Delhi on 30th October 2015.
- ◆ A visit in connection with the feasibility study on solar energy systems carried out on 14th November 2015 at the Greyhound Police Training Centre at Timmapur, Vishakapatam to collect the ground truth information and submitted a feasibility report subsequently.
- ◆ A training program on “Standalone and Rooftop PV Systems Design and Installation” conducted at NIWE, Chennai under PPP mode with M/s. GSES, New Delhi during 16th to 20th November 2015.
- ◆ Dr.G.Giridhar attended Expert Committee Meeting at NCAOR, Goa on 24th November 2015 in connection with the establishment of solar energy

systems in the NCAOR campus and submitted a report.

- ♦ SRRA official inspected VNIT, Nagpur in connection with micro siting to establish SRRA station on commercial mode on 26th November 2015.
- ♦ Dr. G. Giridhar attended “Solar Energy Global Conference & Awards”, at Mumbai on 26th November 2015.
- ♦ Draft report on SRRA at 2 SRRA stations (Latur & Washim) for the 1 year (January 15-December 2015) period submitted to MEDA on 14th January 2016.
- ♦ Dr. G. Giridhar attended the foundation laying ceremony of International Solar Alliance (ISA) Secretariat Building in the NISE Campus, Gurugram and held discussion with MNRE/SECI officials at New Delhi during 24th to 25th January 2016.
- ♦ A faculty from University of Malay joined SRRA as NAM S&T Central Research training Fellowship for Developing Country Scientists (RTD-DCS) on 3rd February 2016.
- ♦ A project proposal for the preparation of DPR in connection with establishment of SPV power plant at 4 locations in Maharashtra submitted to MEDA on 5th February 2016.
- ♦ A student from University of Oldenburg, Germany taken up 2 months project work for the MS project.



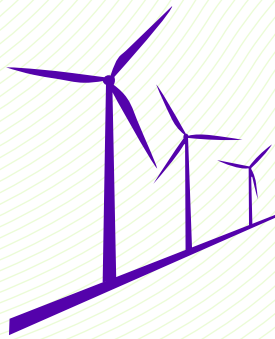
- ♦ A training program on SRRA covering data analysis, Operation & Maintenance were imparted to MEDA officials during 11th to 12th February 2016 at MEDA,Pune.
- ♦ A training program on “Rooftop PV systems: design and installation” conducted at NIWE, Chennai under PPP mode with M/s GSES, New Delhi during 15th to 18th February 2016.
- ♦ Purchase order for commissioning 1 SRRA station at NIT, Nagpur for MEDA placed on 10th March 2016.
- ♦ One faculty from Egypt joined SRRA as NAM S&T Central Research training Fellowship for Developing Country Scientists (RTD-DCS) on 14th March 2016.
- ♦ Quality Controlled data of 87 SRRA stations were provided to 35 clients under SDSAP-2013 policy for the period 1st April 2015 to 31st March 2016.

Future Plans

- ♦ Identification of organizations having expertise in solar forecasting through global EOI.
- ♦ Capacity building for solar forecasting
- ♦ Commissioning of virtual power plants.

Visitors

- ♦ Shri. Achim Fabig, Consul General, Consulate of Germany, Chennai & Dr.Wilfried Damm, Director, IGEN, GIZ, New Delhi visited SRRA facilities, had brief interaction with the Scientists and also visited calibration laboratory of SRRA at PITAM, Chennai on 2nd June 2015.
- ♦ 3 faculty members of NIT, Goa and one Scientist from GERMI, Gandhi Nagar visited NIWE & SRRA facilities at PITAM, Chennai to discuss on collaborative program.



PUBLICATIONS

The following papers / articles published by NIWE officials in the Journals, Magazines, Newsletters and Conferences

Journals / Magazines / Newsletter

1. Rajesh Katyal and Dilip Nigam, "Modeling, Simulation and Validation of Wind Turbine Lattice Tower", International Journal of Wind and Renewable Energy, Vol. 4, No. 3, pp. 70-77, ISSN: 227-3975.
2. A. Hari Bhaskaran, "Influence of Flue Gas and Feed Water Temperatures on Boiler Efficiency – An Analysis", International Journal of Innovative Research in Science, Engineering and Technology, Vol. 5, No. 1, January 2016.
3. S. Gomathinayagam, R. Karthik and G. Giridhar, "Quality Assessment Protocol of Solar Data in SRRA", Akshay Urja: Vol.8, No. 5, April 2015.
4. K. Boopathi and S. Gomathinayagam, "Offshore Wind Resource Assessment and Turbine Deployment Challenges", InWind Chronicle – A wind industry international Bi-monthly journal, Vol. 11, No. 4, Aug. – Sep. 2015, pp. 17-20
5. S. Gomathinayagam, "Wind Resource Assessment" Indian Wind Power - IWTMA Bi-monthly magazine, Oct. - Nov. 2015.
6. S. Gomathinayagam, K. Boopathi and A.G. Rangaraj, "Scheduling & Forecasting – Experience of NIWE", INWEA Magazine, Vol.11, No.5 pp. 20-21.
7. S. Gomathinayagam, "Pace of Utilization of Wind Energy" Wind Insider Magazine, No. 8, Nov. 2015.
8. K. Boopathi, S. Gomathinayagam and J. Bastin, "Wind Resource Assessment in India", Indian Wind Power, Bimonthly, IWTMA. Vol.1, No. 6, Oct. - Nov. 2015, pp. 9-14.

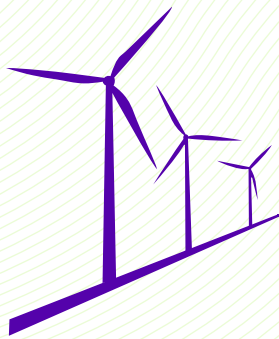


9. News: "Indian Solar Radiation Atlas is Launched", Current Science, Vol.109, No.10, 25 Nov.2015.
10. Rajesh Katyal and S. Gomathinayagam, "Offshore Wind Energy Development in India", Facilitating Offshore Wind in India (FOWIND) in FOWIND periodic Newsletter, Dec. 2015.
11. R. Karthik and G. Giridhar, "Indian Solar Radiation Atlas", Pavan Newsletter, Issue 45, pp. 14-16.

Conferences

14. S.A. Mathew and M. Saravanan, "Terrain evaluation for Power Curve Measurements of wind turbines in variance to the requirements as per IEC 61400-12-1", International Conference on Alternate Energy in Developing Countries and Emerging Countries –2015, Elsevier in Energy Procedia.
15. S.A. Mathew and Bhukya Ramadas, "Aerodynamic Performance to Turbulence and its Impacts on the Power Curve of Wind Turbines", International Conference on Alternate Energy in Developing Countries and Emerging Countries – 2015, Elsevier in Energy Procedia.
16. G. Arivukkodi, S. Gomathinayagam and S. Kanmani, "Field Measurement of Wind Turbine Noise Propagation and Guidelines in India" submitted to "World Conference on Energy Sources and Environmental Technologies 2016".





INVITED LECTURES

DELIVERED BY NIWE STAFF IN TRAININGS,
CONFERENCES, WORKSHOP, SYMPOSIUM AND SEMINARS

Dr. S. Gomathinayagam, Director General

- ♦ Panel Discussion on Renewable Energy-RSD -15 at IIT Madras on 11th April 2015.
- ♦ Chaired the session on “Forecasting of Wind Energy in India” in the 4th International Wind Conference & Exhibition-WE 20 by 2020 held at CODISSIA, Coimbatore on 21st June 2015.
- ♦ Invited as speaker on Shell Lubricants Global Lecture Series 2015 organized by Shell India Markets Private Limited at Bengaluru on 10th August 2015.
- ♦ Delivered a lecture in National Seminar on “Renewable Conversion Technologies” at RMK College on 28th September 2015.
- ♦ Delivered a lecture at PSG College of Technology, Coimbatore on 12th October 2015.
- ♦ Chaired-Working Session on Renewable Energy in the Seminar “Towards A Sustainable and Affordable Power Sector” at Hyderabad 13th October 2015.
- ♦ Attended SKOCH Smart Technology Award 2015 – Presentation at New Delhi on 18th November 2015.
- ♦ Presentation made and participated in panel discussion in the “International Seminar on Wind Energy – Opportunities in Rail Sector” at Western Railway, Mumbai on 20th November 2015.
- ♦ Chaired R&D Meeting of Veltech Dr RR & Dr SR Technical University on 21st November 2015.
- ♦ Delivered a lecture on “Small Wind Turbine Global & Indian Scenario” in the Training Course organized by NIWE for Field Inspection Engineers of TEDA on SWES at NIWE, Chennai on 30th November 2015.
- ♦ Gave an Interview on “Energy Conservation” in Sun TV- Virunthinar Pakkam which was telecasted on 16th December 2015.
- ♦ Panel Member & presentation on behalf of MNRE in the 103rd Session of the Indian Science Congress at Mysuru on 4th January 2016.



- ♦ Delivered a lecture in the International Workshop “Wind Engineering and Wind Energy” at BITS Pilani, Hyderabad on 28th January 2016.
- ♦ Invited as Chief Guest and delivered inaugural address on “International conference in Disaster Mitigation Management for sustainable Development and Risk Reduction” at NIT, Trichy on 22nd February 2016.
- ♦ Chief Guest for the inauguration of “Centre of Excellence in Power and Energy Systems” at SA Engineering College on 29th March 2016.

Dr. Rajesh Katyal, Deputy Director General

- ♦ Delivered a lecture on “Small wind turbine testing and hybrid systems” in One-day National Wind Energy Technical Symposium – organized by M/s UBM India Pvt. Ltd., at India Expo Centre, Greater Noida on 24th September 2015.
- ♦ As a panel speaker delivered a lecture on “Recent Developments regarding Offshore Projects in India” at Indian Wind Energy Forum (IEWF) at New Delhi on 25th November 2015.

Dr. G. Giridhar, Deputy Director General

- ♦ Delivered a lecture on Role of Educational Institutions in the promotion of Renewable Energy at NIT, Goa on 24th November 2015.
- ♦ Invited as Chief Guest in the Biomass Energy for Rural Electrification conference organized by Agricultural College, Coimbatore on 22nd January 2016.
- ♦ Delivered lecture on “Solar Radiation Resource Assessment” at NPTEL, Bengaluru on 15th March 2016.

A. Senthil Kumar, Director & Head

- ♦ Delivered a lecture on “Type Certification of Wind Turbines” in National Wind Energy Technical Symposium, RE Expo 2015, organized by UBM, at Greater Noida, New Delhi on 24th September 2015.
- ♦ Made a presentation on “Introduction of Local Competencies” during the workshop on “Certification of Wind Turbines in India – Trends, Challenges & Solutions”, jointly organized by NIWE with TUV Rheinland at GRT Radisson Blu, Chennai on 1st December 2015.

M. Anvar Ali, Additional Director & Head

- ♦ Delivered a lecture on “Wind Turbine Generators” & “Grid Integration of Wind Turbine” in Gandhigram Rural Institute at Gandhigram on 13th April 2015.



J.C. David Solomon, Additional Director & Head

- ♦ Delivered a lecture on “Wind Turbine Design Aspects” in the Gandhigram Rural Institute, Under MHRD at Gandhigram on 13th April 2015.
- ♦ Delivered a lecture on “Small Wind Turbine Generators & Hybrid System” during the North-East Review meeting conducted by JS/MNRE at Shillong on 24th April 2015.
- ♦ Delivered a lecture on “Installation of Hybrid System under CFA MNRE Scheme” during the beneficiary meet at Tura Government Arts College on 25th April 2015.
- ♦ Made a presentation on "Wind Turbine Components" delivered at National Wind Energy Symposium for the Technical persons in the wind industry at the 9th Renewable Energy India Expo organized by UBM India at Greater Noida on 29th September 2015.
- ♦ Delivered a lecture on “NIWE for R&D in Indian Wind Energy Development” during the Special Research propagation interaction meet with the researchers and staff of KCG Engineering College, Chennai on 30th September 2015.
- ♦ Delivered a lecture on “Wind Turbine Design & Engineering (Both Small & Large Wind Turbines)” during the Special Training Programme on WRA & SWES to SNA officials of the North East held at Guwahati, Assam on 18th November 2015.

K. Boopathi, Additional Director

- ♦ Delivered a lecture on “Wind Resource Assessment techniques” at Gandhi Gram Rural Institute – Deemed University, Dindigul on 13th April 2015.
- ♦ Delivered a lecture on WRA during one day awareness programme on energy, environment and climate change for school students at Sathyabama University on 30th October 2015.
- ♦ Delivered a lecture on “Wind Resource Assessment & techniques” at Gandhi Gram Rural Institute – Deemed University on 4th March 2016.
- ♦ Delivered a lecture on “Instrumentation in Power Plant” at St. Joseph College of Engineering, Chennai on 23rd March 2016.
- ♦ Delivered a lecture on “Instrumentation in Power Plant” at Anand Institute of Higher Technology, Chennai on 24th March 2016.

- ♦ One day training on modified SWES focusing telecom sector and to deliver a lecture on Wind Resource Assessment & Techniques for M/s.OREDAs officials at Bhubaneswar on 28th March 2016.
- ♦ Provided training on Wind Resource Assessment & Techniques for officials of Aarupadai Veedu Institute of Technology on 31st March 2016.

Dr. P. Kanagavel, Additional Director & Head

- ♦ Inaugurated the “Renewable Energy Club” at Arupadai Veedu Institute of Technology, Paiyanoor, Chennai on 6th April 2015.
- ♦ Delivered a lecture on “Wind Energy: An Comprehensive overview”, “Wind Power Development in India and Role of NIWE” at Gandhigram Rural Institute, Dindigul on 13th April 2015.
- ♦ Delivered a lecture on “Wind Energy Technology & Applications” at Sri Muthukumaran Institute of Technology, Chennai on 23rd April 2015.
- ♦ Delivered a lecture on “Green Environment and Library” in the National Conference on “Impact of Electronic Resources on Teaching, Learning and Research: Issues and Opportunities” at Alagappa University, Karaikudi on 24th & 25th April 2015.
- ♦ Delivered a lecture on "Wind Energy and Future" on "Global Wind day 2015 Celebrations" at Chennai on 15th June 2015.
- ♦ Delivered a lecture on “Wind Energy Applications” at National Institute of Technical Teacher Training and Research (NITTTR), Taramani, Chennai on 14th July 2015.
- ♦ Delivered a lecture on “Recent Trends in Wind Energy Technology” at Karpaga Vinayaga College of Engineering & Technology, Chennai on 22nd August 2015.
- ♦ Delivered a lecture on “Wind Turbine Technology & Applications” at Agni College of Technology, Chennai on 1st September 2015.
- ♦ Delivered a lecture on “Wind Turbine Technology and Applications” for International participants of ITEC programme organized by Central Scientific Instruments Organization (CSIO) at Chennai on 12th November 2015.
- ♦ Delivered a lecture on “An overview of Indian Wind Power Sector & Wind Energy – Government Policies & Schemes” in the Special Training Programme organized on WRA & SWES for SNA Officials of North East Regions at Guwahati held on 18th & 19th November 2015.



- ♦ Delivered a Keynote speech on “Wind Energy” in the International Conference on Climate Change & Sustainability at Tagore College of Science and Commerce, Mumbai held on 21st to 22nd December 2015.
- ♦ Delivered a lecture on "Green Library" in one day workshop on "Skills Building" organized by PG and Research Department of Library and Information Science of Bishop Heber College, Trichy on 29th January 2016.
- ♦ Attended and delivered lecture on "Scholarly Information Access Methods and Patterns" at Arrupe Library, St. Joseph's College, Trichy in the Rev. Fr. S. Lazar Endowment Seminar on "Digital Visibility of Research Productivity" held on 30th January 2016.
- ♦ Delivered a lecture on "Renewable Energy" in Sri Sankara Vidyashramam Matriculation Higher Secondary School, Chennai on 10th February 2016.
- ♦ Delivered a lecture on "Research opportunities in the area of Wind Energy Technology" at SRM University, Kattankulathur on 25th February 2016.
- ♦ Delivered a lecture for the M.Tech. students of Renewable Energy at Gandigram Rural Institute, Dindugul on 4th & 5th March 2016.
- ♦ Delivered a lecture on "Wind Turbine Technology and Applications", covering 'Energy, Environment and its impact and use of Alternate Energy particularly Wind Energy' at Centre for New and Renewable Energy Studies (CNRES), Periyar University, Salem on 28th March 2016.

Joel Franklin Asaria, Additional Director

- ♦ Delivered a Lecture for the M.Tech. students of Renewable Energy at Gandigram Rural Institute, Dindugul on 4th & 5th March 2016.

A. Hari Bhaskaran, Deputy Director (Technical)

- ♦ Delivered a lecture on Wind Resource Assessment and techniques to the ME graduates (Energy Engineering, Solar Energy), Institute for Energy Studies, College of Engineering (Guindy), Anna University, Chennai on 4th September 2015.

Karthik. R., Assistant Director (Technical) Contract

- ♦ Visited NISE to impart training on soiling experiment to NISE officials along with Mr. Kaushal Chhatbar, Suntrace GmbH, Germany during 23rd to 25th July 2015.
- ♦ Delivered a lecture on “Solar Radiation Resource Assessment Study in India” at Suzlon Energy Ltd, Pune on 4th August 2015.



- ♦ Delivered a lecture on “Solar Radiation Assessment” at VIT, Vellore on 16th October 2015.
- ♦ Made a presentation on Solar Radiation Measurements and Validation results of satellite derived solar radiation from ISRO Kalpana - I against MNRE/SRRA data for a limited period of October to December 2011 for the Working Group on Space Technology for Renewable Energy Resources Assessment (WGSTRERA) at SAC, Ahmedabad on 9th November 2015.
- ♦ Delivered a lecture on “Solar Radiation Resource Assessment” in the GSES training program on “Standalone and Rooftop PV Systems Design and Installation” at NIWE on 17th November 2015.
- ♦ Delivered a lecture on “Solar Radiation Technologies” and inaugurated SRRA Facility at NIE Institute of Technology, Mysuru on 20th January 2016.

Prasun Kumar Das, Assistant Director (Technical) Contract

- ♦ Attended CSP Focus 2015 Conference and delivered a lecture on "Solar Resource in India for CSP" at New Delhi during 1st to 3rd July 2015.
- ♦ Delivered a lecture on “Solar Resource Assessment” for ME (Solar Energy) & ME (Energy Engineering) students of IES, Anna University on 13th October 2015.
- ♦ Delivered a lecture on “Solar Potential in North-East India” at the Industry Academy Meet organized by Tezpur University, at Guwahati on 4th November 2015.
- ♦ Delivered a lecture on “Solar Resources in the North East region” in the training program organized by NIWE for the SNA's of North East at Guwahati on 19th November 2015.
- ♦ Delivered a lecture on “Solar Resources Assessment in North-East India” at TEQIP 2015 organized by NIT, Patna on 27th November 2015.
- ♦ Delivered a lecture on “Solar Technology and Grid integration” at NPTI, Bengaluru on 15th March 2016.

M.R.Gunasekaran, Executive Secretary-II

- ♦ Made a presentation on "Renewable Energy Challenges" at Student interaction meet at SRM University, Chennai on 13th February 2016.



MoU signed

♦ FOWIND – MoU signed by CSTEP, GWEC and NIWE

A Memorandum of Understanding (MoU) has been inked on 15th June 2015 between CSTEP, GWEC and NIWE for facilitating the development of offshore wind power projects in the country. As part of the MoU, CSTEP on behalf of FOWIND project consortium intends to transfer the ownership of



LiDAR to NIWE for undertaking the real time wind resource measurement in the Gujarat Coast. The wind resource measurements using LiDAR will act as useful pointers for development of offshore project, which will be first of its kind in the country.

- ♦ MoU signed with PSG College of Technology, Coimbatore on 12th October 2015.
- ♦ MoU signed with S.A. Engineering College on Academic, Research & Collaborative activities on 29th March 2016.

NIWE staff delivered lecture(s) in the following Programmes

Special Training Course on “WIND ENERGY TECHNOLOGY” for System Operators of Load Despatch Centres during 13th to 18th July 2015

S.No.	Topic	Speaker
1	Wind Resources Assessment & Techniques Forecasting of Wind power	K. Boopathi
2	Wind Turbine Components Basics of Wind Turbine Aerodynamics	J.C. David Solomon
3	Wind Electric Generators & Types	M. Anvar Ali
4	Control and Safety System of Wind Turbine System	S. Arulselvan
5	Wind Turbine Tower Concepts	Dr. S. Gomathinayagam
6	Wind Turbine Foundation Concepts	Dr. Rajesh Katyal
7	Grid Integration of wind turbines	Deepa Kurup
8	Type Certification of wind turbines	A. Senthil Kumar
9	Wind Turbine Testing and Measurements	S.A. Mathew
10	Offshore Wind Energy: An Overview	Joel Franklin Asaria
11	Role of NIWE in Wind Energy Development	P. Kanagavel
12	Indian government policies and Overview of WTRS/WTTS	Mohamed Hussain

18th National Training Course on “WIND ENERGY TECHNOLOGY” during 26th to 30th October 2015

1	Introduction & Status of Wind Energy Technology Wind Turbine Tower concepts	Dr. S. Gomathinayagam
2	Wind Turbine Components	J. C. David Solomon
3	Wind Electric Generators & Types	M. Anvar Ali
4	Wind Resources Assessment & Techniques Design and Layout of Wind farms Forecasting of Wind and Energy Production	K. Boopathi
5	Wind Data Measurement and Instrumentation	Hari Bhaskaran
6	Control & Safety System of Wind Turbine System	S. Arulselvan
7	Wind Turbine Foundation Small Wind Turbines and Hybrid Systems	Dr. Rajesh Katyal
8	Grid Integration of Wind Turbines	Deepa Kurup
9	Certification of Wind Turbine	A. Senthilkumar

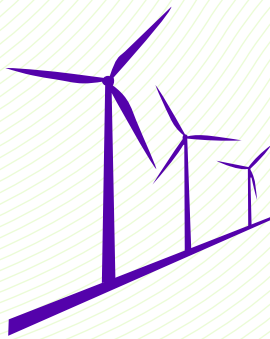
S.No.	Topic	Speaker
10	Indian Government Policies and Schemes	Dr. G. Giridhar
11	Offshore Wind Energy : An overview	Joel Franklin Asaria
12	Wind Turbine Testing & Measurement Techniques	S. A. Mathew
13	Indian Wind Energy Development & Role of NIWE	Dr. P. Kanagavel
One Day Training Course on "SMALL WIND ENERGY AND HYBRID SYSTEMS" for Field Inspection Engineers of TEDA on 30th November 2015		
1	Small Wind Turbine, Global & Indian Scenario	Dr. S. Gomathinayagam
2	Introduction to MNRE Scheme for Small Wind Hybrid Systems and Site Selection Criteria	Hari Baskaran
3	Wind Solar Hybrid System – Technology	Dr. Rajesh Katyal
4	Testing and Analysis of SWT	Deepa Kurup
5	Instrumentation on SWT	Naveen Muthu
19th National Training Course on "WIND ENERGY TECHNOLOGY" during 14th to 18th March 2016		
1	Introduction & Status of Wind Energy Technology	Dr. S. Gomathinayagam
	Wind Turbine Tower concepts	
2	Certification of Wind Turbine	A. Senthilkumar
3	Wind Turbine Components	S. Arulselvan
4	Wind Turbine Gearbox	N. Raj Kumar
5	Wind Electric Generators & Types	A. G. Rangaraj
6	Control & Safety System of Wind Turbine System	S. Arulselvan
7	Wind Resources Assessment & Techniques Forecasting of Wind and Energy Production	K. Boopathi
8	Design and Layout of Wind farms	J. Bastin
9	Indian Government Policies and Schemes	Mohamed Hussain
10	Grid Integration of Wind Turbines	Deepa Kurup
11	Indian Wind Energy Development & Role of NIWE	Dr. P. Kanagavel
12	Small Wind Turbines and Hybrid Systems	Dr. Rajesh Katyal
13	Offshore Wind Energy : An overview	Joel Franklin Asaria
14	Wind Turbine Testing & Measurement Techniques	S. A. Mathew

16th International Training Course on “WIND TURBINE TECHNOLOGY AND APPLICATIONS” during 12th August – 8th September 2015

S.No.	Topic	Speaker
1	Introduction and Status of Wind Energy Technology	Dr. S. Gomathinayagam
	Wind Turbine Tower	
2	Role of NIWE in Wind Energy Development Wind Power Development in India	Dr. P. Kanagavel
3	Overview of Wind Turbine Components	J. C. David Solomon
	Drive Train Concepts	
4	Wind Turbine Gear Box	N. Raj Kumar
5	Wind Turbine Generators	M. Anvar Ali
6	Control and Protection System in Wind Turbine	S. Arulselvan
7	Wind Turbine Foundation	Dr. Rajesh Katyal
	Small Wind Turbine Testing and Hybrid Systems	
8	Wind Resource Assessment and Techniques	K. Boopathi
	Forecasting of Wind and Energy Production	
9	Wind Measurement and Instrumentation	B. Krishnan
10	Guidelines for Wind Measurements	A. G. Rangaraj
11	Wind Data Measurements and Analysis	G. Arivukkodi
12	Wind Measurements by Remote Sensing Instruments	M.C. Lavanya
13	Design and Layout of Wind Farms	J. Bastin
14	Type Certification of wind turbine and Overview of Design Requirements as per IEC 61400 - 1	A. Senthilkumar
15	Wind Turbine Testing & Measurement Techniques	S. A. Mathew
16	Instrumentation for Wind Turbine Testing	M. Saravanan
	Power Curve Measurements	
17	Safety and Function Testing	Bhukya Ram Das
18	Grid Integration of Wind Turbine	Deepa Kurup
19	Offshore Wind Energy: An Overview	Joel Franklin Asaria
	Environmental Aspects of Wind Turbine Technology	
20	Indian Government Policies and Schemes	Mohamed Hussain
21	Solar Radiation Resource Assessment	R. Karthik

17th International Training Course on “WIND TURBINE TECHNOLOGY AND APPLICATIONS” during 3rd February – 1st March 2016

S.No.	Topic	Speaker
1	Introduction and Status of Wind Energy Technology	Dr. S. Gomathinayagam
	Wind Turbine Tower	
2	Wind Resource Assessment and Techniques	K. Boopathi
	Forecasting of Wind and Energy Production	
3	Guidelines for Wind Measurements	A. G. Rangaraj
4	Wind Measurements by Remote Sensing Instruments	M.C. Lavanya
5	Wind Data Measurements and Analysis	G. Arivukkodi
6	Design and Layout of Wind Farms	J. Bastin
7	Role of NIWE in Wind Energy Development	Dr. P. Kanagavel
8	Overview of Wind Turbine Components	Joel Franklin Asaria
	Offshore Wind Energy	
9	Wind Turbine Gear Box	N. Raj Kumar
10	Wind Turbine Generators	M. Anvar Ali
11	Control and Protection System in Wind Turbine	S. Arulselvan
12	Wind Turbine Foundation	Dr. Rajesh Katyal
	Small Wind Turbine Testing & Hybrid Systems	
13	Wind Turbine Testing & Measurement Techniques	S. A. Mathew
14	Instrumentation for Wind Turbine Testing	M. Saravanan
	Power Curve Measurements	
15	Safety and Function Testing	Bhukya Ram Das
16	Grid Integration of Wind Turbine	Deepa Kurup
17	Type Certification of Wind Turbine and Overview of Design Requirements as per IEC 61400 - 1	A. Senthilkumar
18	Indian Government Policies and Schemes	Mohamed Hussain
19	Solar Radiation Resource Assessment	R. Karthik



AWARDS AND HONORS

Awards & Honors - Institutional - NIWE

42nd Skoch Award - NIWE - VORTEX



Final SKOCH Award



Order of Merit Award

NIWE-Vortex has received the 42nd SKOCH Award for the Project “Wind Power Forecasting” on 11th December 2015 at India Habitat Centre, New Delhi. The Skoch Award is known to follow the most rigorous process of selection. The Skoch Awards celebrate human excellence and agents of change in Indian society. The Awards are

based on the philosophy of spearheading positive socio-economic changes through recognizing persons who have contributed immensely to salutary transformations in society and governance by displaying exemplary leadership abilities. The Awards are conferred on the mighty and the ordinary alike.

Education Leadership Award - NIWE



NIWE has been awarded “Education Leadership Award” by Vijayavani, Karnataka's largest circulated Kannada daily on 12th September 2015 at Vivanta by Taj, Bengaluru. The award is in recognition of leadership, development, marketing an institute and industry interface of an Educational Institute. Dr. P. Kanagavel, Additional Director & Head, ITCS received the Award on behalf of NIWE.

Africa Education Leadership Award - NIWE

NIWE has been awarded "Africa Education Leadership Award" by World CSR Day & World Sustainability held on 9th December 2015 at Le Mereidien, Mauritius.



Hindi - Official Language Implementation - NIWE

NIWE has received the Consolation Award for the best performance in the progressive use of Official Language Implementation during the year 2014-15 from the TOLIC Chairman & General Manager, Southern Railways during the Town Official Language Implementation Committee (TOLIC) meeting held at IIT-Madras, Chennai on 21st December 2015. Dr. Rajesh Katyal, Deputy Director General and Head, OSHS & IB received the Award on behalf of NIWE



Awards & Honors - Individual



The following NIWE staff has been awarded in the India Sustainability Leadership Summit & Awards and Sustainable Maharashtra held on 26th November 2015 at Mumbai organized by the World Sustainability Congress in recognition of leadership, development, marketing an institute and industry interface of an Educational Institute.

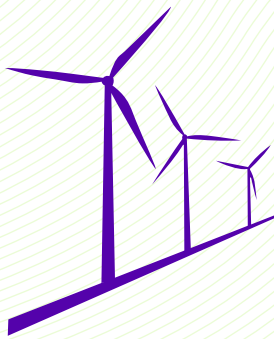


Dr. S. Gomathinayagam, Director General, NIWE - “50 Most Influential Solar Energy Leadership” citation.

Dr. P. Kanagavel, Additional Director & Head, ITCS, NIWE - “50 Most Influential Sustainability Leadership” citation.



Dr. S. Gomathinayagam, Director General, NIWE has received “Ariviyal Kalanzhiyam Award” from Mr. Gunaseelan, Former Hon'ble Chief Justice of India, High Court, Bharatiya Vidya Bhavan, East Mada Street, Mylapore, Chennai on 6th March 2016..



MEETINGS / TRAININGS / SEMINARS / CONFERENCES ATTENDED BY NIWE STAFF

Dr. S. Gomathinayagam, Director General

- ♦ 35th Governing Council at MNRE, New Delhi on 1st April 2015.
- ♦ 3rd Governing Council of NISE at New Delhi on 6th April 2015.
- ♦ Parliamentary Committee Meeting at MNRE, New Delhi on 7th April 2015.
- ♦ Discussion on CERC Draft Regulations for Renewable Energy at MNRE, New Delhi on 17th April 2015.
- ♦ Workshop on Enhanced RE Grid integration with emphasis on forecasting REMC & balancing capacity at India Habitat Centre, New Delhi on 22nd & 23rd April 2015.
- ♦ Technical Orientation Programme on Wind Resource assessment & small wind energy and hybrid systems programmes including review of other renewable energy programmes for North Eastern states Meeting at Shillong during 24th & 25th April 2015.
- ♦ RLMM Committee for WT models and manufacturers on working & scope of RLMM Committee at MNRE New Delhi on 29th April 2015.
- ♦ .Launch of Internationally Accredited Certification Services for Wind Turbines in India at GRT Grand, Chennai on 8th May 2015.
- ♦ Training on Knowledge Management for Organisational Effectiveness at Mussoorie & enroute visit to alternate hydro energy centre at IIT, Roorkee and SRRA stations / UPES Dehradun during 9th to 16th May 2015.
- ♦ BIS Meeting at New Delhi on 19th May 2015.
- ♦ Meeting on Need for long term RE Policy and Legal Forms at MNRE, New Delhi on 20th May 2015.
- ♦ Indian Solar Radiation Atlas launch with web service for Radiation under Indo-German (GIZ) partnership on 3rd June 2015.
- ♦ Parliamentary Standing Committee Meeting on Energy at Kolkata on 4th June 2015.



- ♦ Ph.D Confirmation Meeting of Shri. Surendra Bogadi at MIT Chrompet on 9th June 2015.
- ♦ 2nd Meeting of Technical Evaluation Committee to review the R&D proposals in thrust areas of small wind energy & hybrid systems on 11th June 2015.
- ♦ Signing of MoU with (1) St.Peter's University and (2) FOWIND on 15th June 2015.
- ♦ Meeting on Integration of Large scale renewable energy at MNRE, New Delhi on 19th June 2015.
- ♦ Operational Review Meeting (ORM) at MNRE, New Delhi on 23rd June 2015
- ♦ Small Wind & Hybrid Scheme Committee Meeting at MNRE, New Delhi on 26th June 2015.
- ♦ 14th Edition of “Green Power Conference & Exposition on Renewable Energy Technologies” at ITC Grand Chola, Chennai on 2nd July 2015.
- ♦ Visit to Suzlon Blade Test Center, Vadodara on 15th July 2015.
- ♦ Meeting on Setting up of Blade Test Centre in India at New Delhi on 16th July 2015.
- ♦ Stake Holder's Meeting at MNRE, New Delhi on 16th July 2015.
- ♦ Meeting on Bird Migration Study organized by IWTMA at Bengaluru on 21st July 2015.
- ♦ Workshop on RTI by ISTM at NIWE, Chennai on 24th July 2015.
- ♦ Meeting of the Consultative Committee of Members of Parliament at The Parliament House, New Delhi on 3rd August 2015.
- ♦ Operational Review Meeting (ORM) at New Delhi on 4th August 2015.
- ♦ Meeting of RDSPAC to consider R&D Project Proposal on SWES at New Delhi on 5th August 2015.
- ♦ ET 42-Wind Turbines Sectional Committee Meeting at BIS, Manak Bhavan, New Delhi on 19th August 2015.
- ♦ Standing Committee on Energy meeting – “Energy access in India – Review of current States and Role of RE” at Paliarment House, New Delhi on 20th August 2015.
- ♦ IRENA Workshop RE Map 2030 on 24th August 2015.
- ♦ Standing Committee on Energy- Examination of the subject “Energy Access in India- Review of current status & role of Renewable Energy at Delhi on 26th August 2015.



- ♦ 1st Foundation Day of AREAS at Bengaluru on 27th August 2015.
- ♦ Interaction Meeting by Hon'ble Minister (I/C) Power, Coal & NRE and also the launch of GIS based wind resource Atlas at 100m AGL by Hon'ble Minister at New Delhi on 2nd September 2015.
- ♦ Global Investors Meet at Chennai Trade Centre, Chennai on 9th September 2015.
- ♦ Industrial Exemption Committee meeting at Land Reform Department, Chennai on 11th September 2015.
- ♦ Offshore Wind Energy Development in India Meeting at MNRE, New Delhi on 17th September 2015.
- ♦ Standing Committee on Energy-Examination of subject "Energy Access in India-Review of current status & role of RE & Development and status of small hydro sector" at New Delhi on 22nd September 2015.
- ♦ Visit to Vestas Chennai Office on 9th October 2015.
- ♦ Meetings on (1) Renewable Watch (Magazine) Conference (2) Governing Council Meeting of NISE and (3) High Level Meeting on Offshore wind in India and Repowering at MNRE, New Delhi on 15th October 2015.
- ♦ Standing Committee on Energy Meeting at Parliament House, New Delhi on 16th October 2015.
- ♦ Awards Committee Meeting of Tamil Nadu Science & Technology at DOTE Campus, Chennai on 26th October 2015.
- ♦ Joint Committee on Offices of Profit – Oral evidence by the representative of MNRE at Parliament House, New Delhi on 27th October 2015.
- ♦ Governing Council Meeting of NIBE at MNRE, New Delhi on 28th October 2015.
- ♦ Vigilance Awareness Talk by Dr A. Muthukrishnan, Sr.CoA, CSIR-CLRI at NIWE, Chennai on 29th October 2015.
- ♦ Operational Review Meeting at MNRE New Delhi on 3rd November 2015.
- ♦ 65th Governing Body Meeting of TEDA on 5th November 2015.
- ♦ 22nd Foundation Day of NIOT, Chennai on 6th November 2015.
- ♦ Global Energy Technology Summit at New Delhi on 9th November 2015.
- ♦ Meeting regarding NREL- MoU alongwith Unit Heads of NIWE on 16th November 2015.



- ♦ NIWE & TUV Rheinland International Workshop on Type Certification of Wind Turbines at Chennai on 1st December 2015.
- ♦ Wind Power Forecasting Workshop at New Delhi on 11th December 2015.
- ♦ Meeting of Steering Committee of 2nd Renewable Energy Global Investors Meet & Expo (RE-INVEST) at New Delhi on 13th January 2016.
- ♦ Meeting with GIZ at NIWE on 20th January 2016.
- ♦ First Doctoral Committee Meeting for Shri. M. Natesan at VIT University, Chennai on 23rd January 2016.
- ♦ Foundation Laying Ceremony of International Solar Alliance (ISA) Secretariat Building within NISE Campus by PM at New Delhi on 25th January 2016.
- ♦ Chaired the RLMM Meeting on 1st February 2016.
- ♦ Meeting on compliance of Hon'ble CERC order in respect of Petition at Central Electricity Authority, Southern Region Power Committee at Bengaluru on 5th February 2016.
- ♦ International Workshop on Forecasting & Scheduling of Wind Power jointly organized by NIWE & IWPA at Radisson Blu Hotel GRT, Chennai during 8th to 10th February 2016.
- ♦ Workshop on “Certification of Wind Turbines in India – Trends, Challenges and Solutions” organized by NIWE-TUV Rheinland at NIWE on 12th February 2016.
- ♦ Standing Parliamentary Committee meeting at Tirupathi on 18th February 2016.
- ♦ Meeting with INOX, Delhi along with TUV Rheinland on 25th February 2016.
- ♦ Chaired Twelfth Meeting of the Committee for the Empanelment of Small Wind Turbines at NIWE on 2nd March 2016.
- ♦ First meeting of the Committee to review the Recruitment Rules of NIWE, NISE & NIBE on 5th March 2016.
- ♦ Review Meeting at MNRE, New Delhi on 9th March 2016.
- ♦ 37th GC of NIWE at MNRE, New Delhi on 9th March 2016.
- ♦ Consultation meet on establishment of Centralized Monitoring System (CMS) for remote / online monitoring of Grid connected solar rooftop on 9th March 2016.



- ♦ Doctoral Committee Meeting at MIT, Chennai on 23rd March 2016.
- ♦ GE's Next Generation Wind Turbine & Digital Wind Farm Launch at New Delhi on 30th March 2016.

Dr. Rajesh Katyal, Deputy Director General

- ♦ Parliamentary Standing Committee meeting on Energy at Kolkata on 4th June 2015.
- ♦ “Offshore / High level Industry Interaction Meeting” under the Chairmanship of Joint Secretary, MNRE at MNRE, New Delhi on 15th October 2015.
- ♦ “Regional Interactive Workshop on Wind Energy” organized by Confederation of Indian Industry at Bhopal on 2nd November 2015.
- ♦ “DFID / FCO sponsored Offshore Wind Energy Project (implemented by IT Power)” meeting under the Chairmanship of Joint Secretary, MNRE at New Delhi on 5th November 2015.
- ♦ Meeting regarding various stakeholders viz. FOWIND, NIWE, BHC, funding agencies and project developers under the chairmanship of Joint Secretary, MNRE, to discuss various issues related to offshore wind development at MNRE, New Delhi on 26th November 2015.
- ♦ Participated discussion meeting held with Scientist, NIOT to decide the base structure / mast configuration for typical water depth of 20m for the States of Gujarat and Tamil Nadu at NIOT, Chennai on 30th November 2015.
- ♦ First meeting of the working group for recommending clearance procedure to be adopted for offshore wind energy in India, at MNRE, New Delhi on 1st December 2015.
- ♦ Meeting of delegates from European Union under the Chairmanship of JS, MNRE on “Technical Assistance for setting up of first offshore wind farm in India under Clean Energy Cooperation in India Project” at MNRE, New Delhi on 3rd February 2016.
- ♦ Meeting under the Chairmanship of JS, MNRE on “Discuss the Draft REMC DPR for the State of Karnataka and current status of Intra State GEC” at MNRE, New Delhi on 4th February 2016.
- ♦ Meeting with Assam Energy Development Agency to discuss about SWTs for telecom tower at Guwahati on 15th February 2016.



Dr. G. Giridhar, Deputy Director General & Head

- ♦ Workshop on “Enhanced RE grid integration with emphasis on forecasting, REMC and balancing capacity” at New Delhi on 22nd & 23rd April 2015.
- ♦ One day seminar on “Renewable Energy Production & Its Challenges” in Prathyusha institute of Technology and Management (PITAM) at Thiruvallur on 29th April 2015.
- ♦ Conference on “Sustainable Environmental through Renewable Energy” at Chennai on 27th October 2015.
- ♦ Expert Committee Meeting in connection with the establishment of solar energy systems in the NCAOR campus at NCAOR, Goa on 24th November 2015.
- ♦ Chief Guest for the conference organized by Agricultural College, Coimbatore on 22nd January 2016.
- ♦ Foundation laying ceremony of International Solar Alliance (ISA) Secretariat Building in the NISE Campus, Gurugram and held discussion with MNRE / SECI officials at New Delhi on 24th & 25th January 2016.
- ♦ AEEICB – 2016, 2nd IEEE International conference on Advances in Electrical, Electronics, Information, Communication & Bio-Informatics organized by PITAM at Thiruvallur on 27th & 28th February 2016.
- ♦ 3rd meeting of the Interim Administrative Cell (ICA) of ISA and meeting with Dr. Ashvini Kumar, MD, SECI on 11th March 2016.

D. Lakshmanan, Director

- ♦ One day training programme on “Effective Implementation of Apprenticeship” organized by M/s. Internal Coach Factory on 24th February 2016.

S.A. Mathew, Director & Head

- ♦ Interaction meet on Solar Atlas with Dr. Winfried Damm, Director, GIZ, New Delhi and Shri. Achim Fabig, Consul General, German Consulate organized by SRRA at NIWE, Chennai on 2nd June 2015.
- ♦ Launching event of “Indian Solar Radiation Atlas and Inaugurate the Stakeholders Meet” jointly with cooperation of GIZ, Germany under Indo-German Energy Program using SRRA data with technical assistance from Suntrace, Germany organized by SRRA at Chennai on 3rd June 2015.
- ♦ ET 42 Sectional Committee Meeting organized by BIS at Delhi on 19th August 2015.



- ♦ "Industry Partnership Meet" at Veltech Dr. RR & Dr. SR Technical University, Chennai on 29th August 2015.
- ♦ "Power Quality Instruments Demonstration" by M/s. Atalon Innovative Measurement Software at WTTS, Kayathar on 28th October 2015.
- ♦ Chaired the R&D Meeting (Electrical & Electronics Engineering) and the idea of the meeting is to give opportunity to professors to present their innovative research proposals held at Veltech Dr. RR & Dr. SR Technical University, Chennai on 1st November 2015.
- ♦ Training on "Calibration Techniques for Electrical Parameters" organised by Standardisation Testing & Quality Certification (STQC) at Centre for Electronics Test Engineering (CETE), Noida on 4th & 5th January 2016.
- ♦ Training on "Evaluation of Measurement Uncertainty (Electro-Mechanical Parameters)" organised by Standardisation Testing & Quality Certification (STQC) at Centre for Electronics Test Engineering (CETE), Noida during 20th to 22nd January 2016.
- ♦ International Seminar on "Planning and Management of Energy in Smart Cities" organised by M/s. Steag Energy Services (India) Pvt. Ltd. at India Habitat Centre, Delhi on 28th January 2016.
- ♦ International Workshop on "Wind Power Forecasting and Scheduling" jointly organised by NIWE & IWPA at Radisson Blu Hotel GRT, Chennai during 8th to 10th February 2016.
- ♦ Workshop on "Certification of Wind Turbines in India - Trends, Challenges and Solutions" organised by TUV Rheinland India Pvt. Ltd. at NIWE, Chennai on 16th February 2016.
- ♦ Training programme on "Wind Turbine Power Performance as per IEC 61400-12-1 ed.1 and IEC 61400-12-2 ed.1" organised by DNVGL at Bengaluru during 14th to 17th March 2016.

A. Senthil Kumar, Director & Head

- ♦ Meeting on "Bill of Material evaluation committee for issuance of Concessional Custom Duty Certificate (CCDC), Special additional duty (SAD) and Excise Exemption Duty Certificate (EDEC) for manufacturers of WOEg and its components" at MNRE, New Delhi on 17th April 2015.
- ♦ Meeting of the committee constituted by MNRE to discuss and recommend a suitable course of action about Working and scope of RLMM committee at MNRE, New Delhi on 29th April 2015.



- ♦ Meeting on “Renewable Energy Conformity Assessment Working Group” Organized by BIS at New Delhi on 19th May 2015.
- ♦ Participated in detailed discussions of “Standards Conclave -2015” on “Role of Standards in International Trade : Challenges, Opportunities and Issues” at Hotel Taj Palace, New Delhi on 21st & 22nd May 2015.
- ♦ Meeting conducted by Southern Regional Power Committee (SRPC) on deliberation on technical aspects and implementation issues of ROP in Respect of petition No 420/MP/2014 in connection with LVRT at TANTRANSCO/TANGEDCO office, Chennai on 20th July 2015.
- ♦ 2nd meeting on “Bill of Material Evaluation / approval committee for issuance of duty exemption certificates for manufacturers of WOREG and its components” at New Delhi on 16th & 17th July 2015.
- ♦ 6th meeting of Wind Turbines Sectional Committee, ET (42) of BIS at BIS, New Delhi on 19th August 2015.
- ♦ Meeting on “Bill of Material Evaluation / Approval Committee for issuance of Special Additional Duty (SAD) Certificate for additional items of wind operated electricity generator (WOREG)” at MNRE, New Delhi on 6th November 2015.
- ♦ Lecture on “Youth & Nation Building” delivered by Hon'ble President of India through Video Conferencing at NIWE, Chennai on 19th January 2016.
- ♦ Meeting held with officials from UL-DEWI, Shri. Hergen Bolte, Managing Director, & Shri. Siddharth B. Naik, Business Manager-South Asia, wind services at NIWE, Chennai on 28th January 2016.
- ♦ SRPC meeting on compliance of Hon'ble CERC order in respect of petition No.420/MP/2014 at SRPC, Bengaluru on 5th February 2016.
- ♦ Meeting on “Bill of Material (BOM) Evaluation / Approval Committee for issuance of Special Additional Duty (SAD) and EDEC for manufacturers of (WOREG) and its components” at MNRE, New Delhi during 17th – 19th February 2016.
- ♦ One day Technology Update seminar on “ANSYS 17.0-10X–performance, Insight, Productivity” conducted by 'ANSYS India' at Chennai on 11th March 2016.
- ♦ Meetings held with officials of M/s. Fraunhofer Institute for Wind Energy and Energy System Technology IWES at Bremerhaven, Germany, Officials of M/s. TUV Rheinland Industrie Service GmbH at Cologne, Germany &



Participated in “Berlin Energy Transition Dialogue 2016” at Berlin, Germany during 15th to 18th March 2016.

M. Anvar Ali, Additional Director & Head

- ♦ The Grid demonstration by iPLON at NIWE, Chennai on 12th June 2015.
- ♦ The workshop on “Stakeholder Consultation on gross” conducted by USAID PACE-DTA program at Bengaluru on 11th September 2015.
- ♦ “USAID – GRID Integration Review Committee Meeting at Bengaluru on 19th October 2015.
- ♦ Managed NIWE Stall in the “Indo Africa Forum Summit III – Conference & Exhibition” at New Delhi during 26th to 30th October 2015.
- ♦ NE SNA Training Program meeting at Guwahati-Assam during 17th to 20th November 2015.
- ♦ iPLON project Re2TN Final Meeting at Chennai on 4th February 2016.
- ♦ Co-ordinated with 17th International training course participants for field visit at Pondicherry on 19th & 20th February 2016.
- ♦ Co-ordinated with the International participants for field visit & Ayyanaruthu SS real time monitoring & VC system Inspection at WTRS, Kayathar and Kanniyakumari between 25th to 27th February 2016.
- ♦ “Renewable Energy Sources Grid Integration” at PSTI (NPTI), Bengaluru on 15th March 2016.
- ♦ “Sweden India smart Grid Round Table” at New Delhi on 17th March 2016.

J.C.David Solomon, Additional Director & Head

- ♦ Two days workshop on "Liaison Officers of SC/ST and OBC" organised by the Institute of Secretariat Training & Management at New Delhi on 12th & 13th October 2015.
- ♦ Managed the NIWE Stall in the “Indo African Forum Summit-III - Exhibition” at New Delhi held during 26th to 30th October 2015.

K. Boopathi, Additional Director & Head

- ♦ Governing Council Meeting at MNRE, New Delhi on 1st April 2015.
- ♦ Board of Studies Meeting of Aarupadai Veedu Institute of Technology, Paiyanoor on 11th April 2015.
- ♦ Visited Dhanushkodi, Rameshwaram for discussion with officials for extension of lease period during 16th to 18th April 2015.



- ♦ NE region orientation programme on Wind Resource Assessment at Shillong, Meghalaya during 23rd to 28th April 2015.
- ♦ Visited Gamesa manufacturing unit in connection with Wind Generation data for Forecasting on 8th May 2015.
- ♦ 2nd Meeting of Technical Committee to consider various issues relating to large scale integration of renewable generation at Jaipur, Rajasthan on 9th May 2015.
- ♦ Technical Committee Meeting for Large Scale Integration of Renewable Energy need for balancing, deviation settlement Mechanism (DSM) and associated issues at Ministry of Power, New Delhi on 27th May 2015.
- ♦ On the spot study visit of the Standing Committee on Energy to Kolkata during 2nd to 4th June 2015.
- ♦ Meeting/discussion on Wind Power Potential with Power Secretary, Odisha at Odisha on 5th & 6th June 2015.
- ♦ Workshop on Grid Integration of Renewable and presenting a brief presentation on Wind Power Forecasting Services at NLDC, New Delhi on 9th June 2015.
- ♦ Meeting at MNRE, New Delhi on 19th June 2015.
- ♦ 4th International Wind Conference and Exhibition (WE20 by 2020) at Coimbatore on 22nd & 23rd June 2015.
- ♦ Meeting on Wind & Solar Energy Potential Assessment (Green Energy Corridor) at MNRE, New Delhi on 25th June 2015.
- ♦ Visited Tagore Engineering College to provide Technical support for their DST project on 30th June 2015.
- ♦ Appraisal Committee Meeting on Reassessment of Wind Power Potential of India at MNRE, New Delhi on 14th July 2015.
- ♦ Workshop/meeting on Reassessment of Wind Potential in the country at C-STEP, Bengaluru on 21st & 22nd July 2015.
- ♦ Meeting Energy Secretary, Maharashtra in connection with Wind Power Development in the state of Maharashtra on 6th & 7th August 2015.
- ♦ National meet programme for promoting space technology based tools and applications at New Delhi on 7th September 2015.
- ♦ Workshop for Liaison Officers of SC/ST organized by Institute of Secretariat Training & Management at New Delhi on 12th & 13th October 2015.



- ♦ Meeting of the Grid Integration Review Committee for Southern Regional Grid Integrational Study at Bengaluru on 19th October 2015.
- ♦ Meeting of Working Group on Space Technology for Renewable Energy Resources Assessment (WGSTRERA) at Space Application Centre (SAC), Ahmedabad on 9th November 2015.
- ♦ NCAOR Expert Committee meeting at Goa on 24th November 2015.
- ♦ 42nd Skoch Summit at New Delhi on 10th & 11th December 2015.
- ♦ Governing Council meeting at MNRE on 9th March 2016.
- ♦ Pre-bid meeting at Andhra Pradesh Power Generation Corporation Limited, Hyderabad on 10th March 2016.
- ♦ Carried out site visit at Bidda, Jammu for preparation of DPR for M/s. JAKEDA, Jammu and had discussion with Secretary, Science & Technology, Jammu during 11th to 15th March 2016.
- ♦ Development of India's Offshore wind industry workshop at MNRE on 22nd March 2016.

Dr. P. Kanagavel, Additional Director & Head

- ♦ National Conference on “Impact of Electronic Resources on Teaching, Learning and Research: Issues and Opportunities” held at Alagappa University, Karaikudi on 24th & 25th April 2015.
- ♦ National Conference on Innovative Librarianship in the Knowledge Society: Enhancing Teaching, Learning and Research (NCILKS 2015)” at Coimbatore on 15th & 16th May 2015 and the Pre-Conference Tutorial on 14th May 2015.
- ♦ Indian Solar Radiation Atlas launch with web service for radiation under Indo-German (GIZ) partnership on 3rd June 2015.
- ♦ Training on the Grid demonstration by iPLON energy study at NIWE, Chennai on 12th June 2015.
- ♦ Co-ordinated & supported the Wind Energy Technical Symposium by NIWE jointly organized with M/s. UBM India Private Limited on 24th September 2015 at Renewable Energy India Expo 2015 held at Greater Noida during 23rd to 25th September 2015.
- ♦ Managed the NIWE Stall in the “Indo Africa Forum Summit III – Exhibition” at New Delhi held during 26th to 30th October 2015.
- ♦ One Day National Seminar on “Research Publication and Evaluation” organized by Justice Basheer Ahmed Sayeed College at Chennai on 7th November 2015.



- ♦ Coordinated of one day Regional Workshop on “MNRE Scheme for Small Wind Energy & Hybrid Systems for SNA officials for the site selection for both WRA & SWES project at Bhubaneswar, Odisha on 28th March 2016.

M. Joel Franklin Asaria, Additional Director

- ♦ Coordinated of one Day Regional Workshop on “MNRE Scheme for Small Wind Energy & Hybrid Systems for SNA officials for the site selection for both WRA & SWES project at Bhubaneswar, Odisha on 28th March 2016.

A. Hari Bhaskaran, Deputy Director (Technical)

- ♦ RDSPAC meeting at MNRE, New Delhi on 5th & 6th August 2015.
- ♦ Meeting/discussion on Small Wind Energy & Hybrid Systems & R&D activities at MNRE, New Delhi on 19th & 20th October 2015.

N. Raj Kumar, Deputy Director (Technical)

- ♦ Lecture on “Youth & Nation Building” delivered by Hon'ble President of India through Video Conferencing at NIWE, Chennai on 19th January 2016.
- ♦ One day Technology Update seminar on “ANSYS 17.0-10X–performance, Insight, Productivity” conducted by 'ANSYS India' at Chennai on 11th March 2016.

A.G. Rangaraj, Assistant Director (Technical)

- ♦ Meeting/discussion with M/s. GEDA and M/s. GEDCO officials in connection with wind power forecasting at Vadodara, Gujarat during 30th April to 2nd May 2015.
- ♦ Visited Gamesa manufacturing unit in connection with Wind Generation Data for Forecasting on 8th May 2015.
- ♦ Task Force Meeting and presented a PPT on Wind Power Forecasting services – a Pilot project at Tamil Nadu Electricity Board in connection with Wind Power Forecasting Services on 27th May 2015.
- ♦ Symposium at Noida on 24th September 2015.
- ♦ Meeting of the Grid Integration Review Committee for Southern Regional Grid Integrational Study at Bengaluru on 19th October 2015.
- ♦ Evaluation conference on SKOCH Smart Technology Award 2015 at New Delhi on 18th November 2015.
- ♦ 42nd Skoch Summit at New Delhi on 10th & 11th December 2015.



- ♦ Review Committee Meeting in connection with Grid integration in Southern region at Tamil Nadu Electricity Board on 12th January 2016.
- ♦ Meeting on compliance of honorable CERC order in respect of LVRT and other provisions of CEA/CERC regulations at Bengaluru on 5th February 2016.
- ♦ Meeting/discussion with SR/REMC on Wind Power Forecasting Services at TNEB on 16th February 2016.
- ♦ Meeting on formation of REMC organized by Joint Secretary, MNRE and preliminary meeting with Shri. Kashish Bhambhani, Chief Manager, PGCIL at MNRE, New Delhi on 24th February 2016.
- ♦ Carried out verification of DBT meter fixed in selected substations in the state of Tamil Nadu in connection with wind power forecasting during 26th February to 1st March 2016.
- ♦ Incore work group committee meeting on Wind Power forecasting project with TANGEDCO & IWPA officials on 21st March 2016.

M. Saravanan, Assistant Director (Technical)

- ♦ Webinar on the topic "Wind Turbine Power Performance Testing" organised by DNV GL Energy Academy at NIWE, Chennai on 17th November 2015.
- ♦ Training on "Wind Turbine Power Performance as per IEC 61400-12-1 ed.1 and IEC 61400-12-2 ed.1" organised by DNVGL at Bengaluru during 14th to 17th March 2016.

Bhukya Ramdas, Assistant Director (Technical)

- ♦ Interaction meet on Solar Atlas with Dr. Winfried Damm, Director, GIZ, New Delhi and Shri. Achim Fabig, Consul General, German Consulate organized by SRRA at NIWE, Chennai on 2nd June 2015.
- ♦ "Power Quality Instruments Demonstration" by M/s. Atalon Innovative Measurement Software at WTTS, Kayathar on 28th October 2015.
- ♦ Webinar on the topic "Wind Turbine Power Performance Testing" organised by DNV GL Energy Academy at NIWE, Chennai on 17th November 2015.
- ♦ Training on "Calibration Techniques for Electrical Parameters" organised by Standardisation Testing & Quality Certification (STQC) at Centre for Electronics Test Engineering (CETE), Noida on 4th & 5th January 2016.
- ♦ Training on "Evaluation of Measurement Uncertainty (Electro-Mechanical Parameters)" organised by Standardisation Testing & Quality Certification



(STQC) at Centre for Electronics Test Engineering (CETE), Noida during 20th to 22nd January 2016.

J. Bastin, Assistant Director (Technical)

- ♦ Visited Amrapur site, Gujarat in connection with bid evaluation project for M/s.THDC Ltd during 6th to 8th April 2015.

R. Karthik, Assistant Director (Technical) Contract

- ♦ Technical Committee meeting on tender evaluation in Agricultural Engineering Department, Chennai on 30th September 2015.
- ♦ Conference on “Sustainable Environmental through Renewable Energy at Chennai on 27th October 2015.
- ♦ Meeting of the Working Group on Space Technology for Renewable Energy Resources Assessment (WGSTRERA) at SAC, Ahmedabad on 9th November 2015.

Prasun Kumar Das, Assistant Director (Technical) Contract

- ♦ Prasun Kumar Das and a SRRA official attended a meeting with NRSC/MNRE officials at Hyderabad on 1st October 2015.
- ♦ Seminar on “Opportunities and Challenges for Renewable Energy Adoption in Tamil Nadu” organized by Waterfalls Institute of Technology Transfer (WITT) & The Madras Chamber of Commerce & Industry at Chennai on 16th February 2016

A.R. Hasan Ali, Assistant Engineer

- ♦ Workshop on “Recent Advances in Structural Engineering” –(RASE 2015) organized by CSIR – Structural Engineering Research Centre at CSIR campus, Chennai on 7th & 8th May 2015.

M. Karuppuchamy, Assistant Engineer

Workshop on "Grounding Practices" organised by Central over Research Institute at Bengaluru on 28th & 29th January 2016.

Y. Packiyraj, Assistant Engineer

Training on "Laboratory Quality Management Systems and Internal Audit as per ISO 17025:2005" organized by Bureau of Indian Standards at Hyderabad during 17th to 20th November 2015.

S. Arulselvan, Assistant Engineer

- ♦ Meeting conducted by Southern Regional Power Committee (SRPC) on deliberation on technical aspects and implementation issues of ROP in



Respect of petition No 420/MP/2014 in connection with LVRT at TANTRANSCO/TANGEDCO office, Chennai on 20th July 2015.

- ♦ Meeting on “First Grid Integration Review” at Southern Regional Power Committee, Bengaluru on 19th October 2015.
- ♦ SRPC meeting on compliance of Hon'ble CERC order in respect of petition No.420/MP/2014 held at SRPC, Bengaluru on 5th February 2016.
- ♦ One day Technology Update seminar on “ANSYS 17.0-10X–performance, Insight, Productivity” conducted by 'ANSYS India' at Chennai on 11th March 2016.

C. Stephen Jeremias, Assistant Engineer

- ♦ 16th ESRI User Conference meeting at New Delhi during 2nd to 4th December 2015.
- ♦ Networking work and Firewall Configuration at WTRS, Kayathar campus for Video Conferencing and Surveillance system setup has been established during 18th to 20th March 2016.
- ♦ Training on Information & Network Security organized by ERNET India “Information Security Education and Awareness (ISEA)” project phase – II, at ERNET India, Chennai on 29th & 30th March 2016.

S. Paramasivan, Junior Engineer

- ♦ Workshop on “Recent Advances in Structural Engineering” –(RASE 2015) organized by CSIR – Structural Engineering Research Centre at CSIR campus, Chennai on 7th & 8th May 2015.
- ♦ Training on "Laboratory Management System and Internal Auditing based on ISO/IEC 17025:2005" for Personnel organised by M/s. Brainwave Consultants at Chennai during 18th to 21st January 2016.
- ♦ Workshop on "Grounding Practices" organised by Central Power Research Institute at Bengaluru on 28th & 29th January 2016.

R. Vinodkumar, Junior Engineer

- ♦ Incore work group committee meeting on Wind Power forecasting project with TANGEDCO & IWPA officials on 21st March 2016.
- ♦ One day training on modified SWES focusing telecom sector and provided hands on training on WRA instruments for M/s. OREDA officials at Bhubaneswar on 28th March 2016.
- ♦ Provided hands on training on WRA instruments for officials of Aarupadai Veedu Institute of Technology on 31st March 2016.



M.R.Gunasekaran, Executive Secretary-II

- ♦ One day workshop on "Joint Indo European Offshore Wind Research & Development platform of Support Offshore Wind in India" organised by NIWE with FOWIND and GWEC on 18th September 2015.
- ♦ 2 Days ArcGIS 16th user Conference at New Delhi during 1st to 4th December 2015.

ArcGIS training

Rajesh Katyal, Deepa Kurup, K. Boopathi, A.G. Rangaraj, J. Bastin, M.C. Lavanya, G. Arivukkodi, B. Krishnan, T. Sureshkumar, R. Vinodkumar, M. Saravanan, R. Karthik, Prasun Kumar Das and SRRA two project Assistants have attended ArcGIS training at NIWE Chennai during 19th to 23th May 2015.

ECO sense - Renewable Energy Lab equipments training

G. Arivukkodi, B. Krishnan, T. Sureshkumar, R. Vinodkumar, Bhukya Ramdas, S. Arulselvan, Dr. P. Kanagavel and Joel Franklin Asaria have the training on "ECO Sense – Renewable Energy Lab Equipments explaining the details about the products, followed by the practical demonstration on the equipments by Shri. Seshnag, R&D Associate from M/s. ECO Sense Sustainable Solution Pvt. Ltd. at NIWE, Chennai during 9th to 11th June 2015.

MatLab Seminar

M.C. Lavanya & G. Arivukkodi have attended seminar on MatLab at Le Royal Meridien, Chennai on 8th July 2015.

Sodar Technology Workshop

K. Boopathi, A. Hari Bhaskaran, J. Bastin, A.G. Rangaraj, M.C. Lavanya, J. Bastin, A.G. Rangaraj, G. Arivukkodi, T. Sureshkumar and R. Vinodkumar have attended workshop on SODAR technology and its application at Sathyabama University, Chennai on 16th July 2015.

Right to Information Act, 2015

All NIWE staff have attended training on Right to Information Act, 2015 at NIWE, Chennai on 24th July 2015.

IWTMA Knowledge Forum

All NIWE staff have attended "One day Knowledge Forum on Recent Trends in Wind Turbine Testing Validation and Certification" conducted by UL DEWI in association with NIWE & IWTMA at NIWE, Chennai on 29th July 2015.



Official language Hindi Workshop

All NIWE staff have attended one day Official language Hindi workshop - Use of Digital tools on computer in Hindi organized by NIWE at NIWE, Chennai on 17th August 2015.

Wind Atlas launch programme

K. Boopathi, A. Hari Bhaskaran, A.G. Rangaraj, J. Bastin, M.C. Lavanya, G. Arivukkodi, B. Krishnan, T. Sureshkumar & R. Vinodkumar have participated in the Wind Atlas launch programme at India Habitat Centre, New Delhi on 2nd September 2015.

National Workshop

Dr. S. Gomathinayagam, S.A. Mathew, A. Senthil Kumar have attended National Workshop on Lab. Infrastructure for Testing, Standardization, Certification and Inspection for Renewable energy Development Programme at India Habitat Centre, Delhi on 10th September 2015.

Environmental Management of Renewable Energy Projects

Dr. P. Kanagavel, Joel Franklin Asaria, J.C. David Solomon, G. Arivukkodi, R. Karthik Jayalakshmi and Prasun Kumar Das have attended three days workshop on “Environmental Management of Renewable Energy Projects” at Hotel Aloft, Chennai during 9th to 11th September 2015.

One day International Workshop

All Scientific staff have attended one day Inception workshop on “Joint Indo European Offshore Wind Research & Development platform of support Offshore Wind in India” organized by NIWE along with FOWIND and GWEC at NIWE, Chennai on 18th September 2015.

Offshore Wind Energy Workshop

Dr. Rajesh Katyal, S.A. Mathew, A. Senthil Kumar, Dr. P. Kanagavel, J.C. David Solomon, A. Haribhaskaran, J. Bastin & G. Arivukkodi have attended one-day workshop for industrial professional on Offshore Wind Energy Course conducted by DNV-GL at New Delhi on 22nd September 2015.

GNSS User Meet

R. Karthik and a Project Assistant attended GNSS user meet on “Towards Self-reliance in Satellite Navigation” at ISRO Satellite Centre, Bengaluru on 8th October 2015.



Half a day Seminar

S.A. Mathew, M. Saravanan, Bhukya Ramdas have attended the half a day Seminar on "Wind Energy Vs Power Quality" organised by M/s. ATALON Instruments Pvt. Ltd. at Hotel Satyam Grand, Sriperumbudur, Chennai on 27th October 2015.

MS Project 2013 Software Training

S.A. Mathew, M. Saravanan, Bhukya Ramdas, N. Raj Kumar, M.R. Gunasekaran, S. Arulselvan, Y. Packiaraj and A.R. Hasan Ali have attended the training on "MS Project 2013 Software" organised by M/s. USAM Technology Ltd. held at NIWE, Chennai during 2nd to 4th November, 2015.

Three day Training Programme - PDPP

D. Lakshmanan, R. Girirajan, K. Tamilselvi and V. Shanmugam have attended the three day training programme on "Professional Diploma in Public Procurement (PDPP)" organized by M/s. All India Management Associate (AIMA) during 26th -28th November 2015.

103rd Indian Science Congress Exhibition

M. Anvar Ali, J.C. David Solomon and Dr. P. Kanagavel managed NIWE Stall in the 103rd Indian Science Congress Exhibition held at Mysuru University, Mysuru during 3rd to 7th January 2016.

MiPower Training

S. Arulselvan, Deepa Kurup, M. Saravanan, Bhukya Ramdas and A.R. Hasan Ali have attended the Training on "MiPowerTM Ver.9.1 - Power System Analysis" organised by M/s. Power Research & Development Consultants Pvt. Ltd. at NIWE, Chennai during 27th to 29th January 2016.

Advance level training

K. Boopathi, A.G. Rangaraj, J. Bastin, M.C. Lavanya, G. Arivukkodi, B. Krishnan, T. Sureshkumar & R. Vinodkumar have attended Advance level training on "Wind Power Forecasting" at NIWE, Chennai during 11th to 13th February 2016.

Stress & Time Management Training

B. Krishnan, T. Suresh Kumar, R. Vinodkumar, M.R. Gunasekaran, M. Karuppuchamy and R. Girirajan have attended training programme on "Stress & Time Management for Managerial Effectiveness" organized by M/s. Jaipur Productivity Centre at Goa during 15th to 19th February 2016.



ArcGIS software training

K.Boopathi, A.G. Rangaraj, J. Bastin, M.C. Lavanya, G. Arivukkodi, B. Krishnan, T. Sureshkumar, R. Vinodkumar, Naveen Muthu, SRRA Project Assistant, M.R. Gunasekaran and C. Stephen Jeremias have attended ESRI ArcGIS software training at NIWE, Chennai during 29th February to 2nd March 2016.

Knowledge sharing presentations

A. Senthil Kumar, S. Arulselvan and N. Rajkumar have attended knowledge sharing presentations delivered by Shri. Karl Friedrich, Head – Certification body & Shri. Jai Prakash Narayan, Expert-Rotor Blade & Mech. Components division.

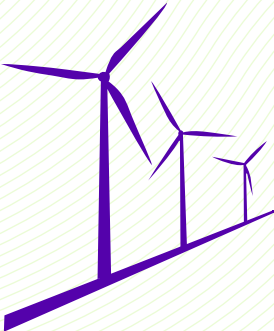
Ph.D Degree work done among NIWE Staff



Shri. Rajesh Katyal, DDG, NIWE has been awarded Degree of Doctor of Philosophy (Ph.D.) in Civil Engineering, titled “Wind Variability Analysis and Shape Optimization of Wind Sensitive Structures for Complex Terrains” from Rajiv Gandhi Proudhyogiki Vishwavidyalaya M.P., University of Technology of Madhya Pradesh during May 2015.



Shri. P. Kanagavel, Additional Director, NIWE has been notified eligible for the award of Degree of Doctor of Philosophy (Ph.D.) in Library and Information Science, based on the acceptance of his thesis entitled “Mapping of Research in Wind Energy: A Scientometric Study” from Bharathiar University of Coimbatore, Tamil Nadu.



NIWE INTERNATIONAL INTERACTION

International Workshop on Forecasting & Scheduling of Wind Power

Wind power forecasting plays an important role in the allocation of balancing power. Wind Power Forecasting service was launched on 13th May 2015 and is helping Tamil Nadu's state-owned electricity generation and distribution utility, TANGEDCO, better manage the fluctuations in wind power output in the region. As Indian Wind Power Association (IWPA) had approached NIWE to carryout forecasting of Wind power for the entire State of Tamil Nadu as per CERC norms in vogue, NIWE has developed a new Forecasting service for the wind industry focusing on providing accurate forecast so as to allow the grid operator in the State Load Dispatch Center (SLDC) to evacuate more wind power.

Wind Resource Assessment unit organized an International Workshop on “Forecasting & Scheduling of Wind Power” jointly with Indian Wind Power association (IWPA) during 8th to 10th February 2016 in Radisson Blu Hotel GRT, Chennai. Around 150 participants from across the country, officials from M/s. Vortex, Spain, M/s. Meteoblue & stakeholders have participated in the workshop.



Purpose of the Workshop

The wind energy in India with an installed capacity of above 25 GW can add about 4-5% of the total energy generation of India. But accommodating wind energy into the grid is a major issue, as wind is an intermittent source of energy which is unable to be predicted. The only way to overcome this issue is the proper forecasting and scheduling of wind energy. Now NIWE has come good in forecasting the wind energy in Tamil Nadu which consists of more than 30% of total installed capacity and the datas are sent to the client for further planning. The error percentage calculated based on SERC revised formula was found to be minimum of 2 to 6%. With the forecasting technique has been proved in Tamil Nadu, now the work is to schedule the power, based on the availability and needs. In regard with this work, the workshop will pave the way for discussion between the organizations to find the ways to apply the forecasting techniques throughout the nation and also to schedule the power. Based on which the necessary actions can be taken for evacuation of the maximum wind energy.

Needs of Forecasting and Scheduling

The forerunners of wind energy like China, America, Germany, Spain, etc has reduced the pollution created from the fossil fuels by connecting the wind energy into the grid. To solve this problem of forecasting NIWE has studied the forecasting techniques along with the help of M/s. Vortex private limited, Spain and brought down the error percentage from 80 to 6%. In this workshop SLDC and other organizations could interact with the foreigners and come up with the idea of forecasting and scheduling of wind power, which can further enhances the growth of wind energy.



Inauguration of the Workshop

International Training Courses

16th International Training Course



Chief Guest inaugurate the Course

16th International Training Course on “Wind Turbine Technology and Applications” was successfully conducted during 12th August – 8th September 2015. This is a special training course for ITEC / SCAAP partner countries sponsored by the Ministry of External Affairs (MEA), Government of India under ITEC / SCAAP programme. The course was attended by 18 Participants from 12 Countries.

The training was inaugurated by Shri. R. Virendra, Deputy Director General, National Productivity Council, Chennai.

Shri. T. Sankaralingam, former Chairman and Managing Director, National Thermal Power Corporation (NTPC) was the Chief Guest for the Valedictory Function and distributed the course certificates to all the participants.



Mr. T Sankaralingam distributing the Course Certificate

17th International Training Course



Release of Course Material

17th International Training Course on “Wind Turbine Technology and Applications” was successfully conducted during 3rd February to 1st March 2016 course was sponsored by the Ministry of External Affairs (MEA), Government of India under ITEC / SCAAP programme. The training course was inaugurated by Dr. G. Giridhar, Deputy Director General & Head, Solar Radiation Resource Assessment, National Institute of Wind Energy, Chennai. The course was attended by 23 participants from various organizations from 16 countries. Dr. Ashvini Kumar, Managing Director, Solar Energy Corporation of India (SECI) was the Chief Guest for the valedictory function and distributed the course certificates to the all the participants.



Dr. Ashvini Kumar distributing the Course Certificate

Visits Abroad

S.A. Mathew, Director & Head, Wind Turbine Testing was invited to participate as a Session Chairman in a technical discussion and presented a paper and **Bhukya Ramadas**, Assistant Director (Technical) & **M. Saravanan** participated and presented papers in the 2015 International Conference on Alternate Energy in Developing Countries and Emerging Countries – 2015 AEDCEE held at Bangkok on 28th & 29th May 2015.

A.G. Rangaraj, **J. Bastin** and **M.C.Lavanya** attended WAsP, WAsP Certification and WAsP Engineering Course at RISØ DTU, Denmark and obtained Certification during 7th to 19th June 2015.

K. Boopathi, Additional Director & Head, WRA

- ♦ Attended meeting on New Technology and Renewable Energy Work Group (NTREWG) at Washington, USA along with Shri.Tarun Kappor, Joint Secretary, MNRE during 16th to 18th September 2015.
- ♦ Attended “World Future Energy Summit – Global Atlas Workshop” organized by International Renewable Energy Agency (IRENA) at Abu Dhabi on 18th January 2016.
- ♦ Participated and presented a paper on “Wind Power Forecasting – Pilot in Tamil Nadu” in the workshop on advancing the use of Wind & Solar Forecasting to facilitate the integration of variable Renewable Energy to the Grid organized by USEA in collaboration with USG in Bangkok during 16th to 18th February 2016.

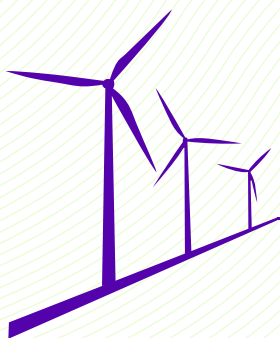
Dr. P. Kanagavel has attended Final Review workshop as part of the International Training Programme on “Wind Power Development & Use” at Arusha, Tanzania during 1st to 4th December 2015 and also visited Kenya and Ethiopia towards disseminating the training information for mobilizing more number of participants for the future training courses.

Prasun Kumar Das attended Global Atlas Medium term strategy workshop organized by IRENA, Abu Dhabi during 17th to 20th January 2016.

Dr. S. Gomathinayagam and **A. Senthil Kumar** participated in meetings held with officials of M/s. Fraunhofer Institute for Wind Energy and Energy System Technology IWES at Bremerhaven, Germany, top management officials of M/s. TÜV Rheinland Industrie Service GmbH at Cologne, Germany and Participated in “Berlin Energy Transition Dialogue 2016” held at Berlin, Germany during 15th to 18th March 2016.

K.Boopathi and **B. Krishnan** visited Srilanka for carrying out site visit for ground reality verification for 10 MW wind farm in Colombo during 17th to 20th March 2016.





GENERAL INFORMATION

MANAGEMENT COMMITTEE

**The following are the members of the Management Committee
(To take decisions as and when required and
to inform GC from time to time)**

1.	Chairman, Governing Council, NIWE	Chairman
2.	Financial Adviser, MNRE	Member
3.	Director General, NIWE	Member

FINANCE COMMITTEE

**The following are the members of the Finance Committee
(To review the financial performance of the Institute)**

1.	Shri. J.B. Mohapatra, I.R.S., Joint Secretary & Financial Adviser, MNRE, New Delhi	Chairman
2.	Shri. Rajesh Lokhoni, I.A.S., Principal Secretary to Government, Energy Department, GoTN, Chennai	Member
3.	Ms. Varsha Joshi, I.A.S., Joint Secretary (Wind Energy), MNRE, New Delhi	Member
4.	Dr. S. Gomathinayagam, Director General, NIWE, Chennai	Member
5.	Shri. Dilip Nigam, Director (Wind Energy), MNRE, New Delhi	Member
6.	Shri. G.M, Bhatla, Deputy Secretary (Finance) MNRE, New Delhi	Member
7.	Shri. D. Lakshmanan, Director (F&A), NIWE, Chennai	Member Secretary

RESEARCH AND DEVELOPMENT COUNCIL

The following are the members of the Research and Development Council (To guide NIWE on laying down Research direction to serve the Indian Wind Energy Sector)

1.	Shri. S.K. Soonee, CEO, Power System Operation Corporation Ltd, New Delhi – 110 016	Chairman
2.	Ms. Varsha Joshi, I.A.S., Joint Secretary, Ministry of New and Renewable Energy, New Delhi – 110 003	Member
3.	Dr. B. S. K. Naidu. Ex-Director General, NTPI & CPRI and Chairman, Great Lakhs IEMR, NCR, New Delhi	Member
4.	Shri. Y. K. Sehgal, Executive Director (Smart Grid), Power Grid Corporation of India Ltd, Gurgaon – 122 001	Member
5.	Smt. K. A. Fathima, Former Senior Director – C-DAC, Trivandrum – 695 030	Member
6.	Shri. S. C. Bhan, Scientist-E, India Meteorological Department, New Delhi – 110 003	Member
7.	Shri. Ganesh Prasad, GM (R&D), M/s. Engineers India Ltd, New Delhi – 110 066	Member
8.	Shri. N.K. Singh, Addl. General Manager, Bharat Heavy Electricals Ltd, Hyderabad – 502 032	Member
9.	The Chairman, Indian Wind Turbine Manufacturers Association, Chennai.	Member
10.	Dr. S. Gomathinayagam, Director General, National Institute of Wind Energy (NIWE), Chennai – 600 100	Member
11.	Shri. Rajesh Katyal, Deputy Director General & Head, R&D, National Institute of Wind Energy (NIWE), Chennai – 600 100	Member Secretary

Empanelment Committee on Small Wind Turbine		
1.	Dr. S. Gomathinayagam, Director General, NIWE	Chairman
2.	Chairman & Managing Director Tamil Nadu Energy Development Agency	Member
3.	Managing Director, Rajasthan Renewable Energy Development Agency	Member
4.	Shri. G. Upadhyay, Sr. Director (Wind), MNRE	Member
5.	Dr. Rajesh Katyal, DDG & Head, OSWH&IB, NIWE	Member
6.	Smt. K.A. Fathima, Former Senior Director C-DAC, Trivandrum	Member
7.	Shri. J.P.Singh, Former Director, MNRE	Member
8.	Shri. Rajendra Kharul, Director & CEO Synergy Infrasys Management Pvt. Ltd.	Member
9.	Shri. A Hari Bhaskaran, Deputy Director (Technical), WRA & MNRE (S&T) Co-ordinator	Member-Secretary
MNRE - Committee for Evaluating and Recommending the R&D proposals in thrust areas of Small Wind Energy Hybrid Systems - Members		
1.	Dr. S. Gomathinayagam, Director General, NIWE	Chairman
2.	Dr. Rajesh Katyal Deputy Director General & Head- R&D, NIWE	Member
3.	Shri. Jami Hossain, Wind Force - Expert	Member
4.	Prof. A.P. Haran, Park College of Engineering, Coimbatore	Member
5.	Shri. M.K. Deb, CECL, Bhopal- Expert	Member
6.	Shri. A. Hari Bhaskaran, Deputy Director (Technical), WRA & MNRE (S&T) Co-ordinator	Member Secretary
MNRE – “Workgroup for recommending clearance procedures to be adopted for Development of Offshore Wind Energy in India” in accordance with “National Offshore Wind Energy Policy”		
1.	Joint Secretary (Wind Energy), MNRE	Chairman
2.	Shri. Mukesh Mangal, Director (IS-I), MHA	Member
3.	Representative from MEA	Member
4.	Shri. Naveen Kumar, Director, NAVY-I, MoD	Member
5.	Shri. Prasant Lokhande, Director, MoPNG	Member
6.	Shri. Lalit Bakolia, Addl. Director MoEF and Climate Change	Member
7.	Shri. Shyam Lal Barik, DDG (Technical), DG, Shipping	Member
8.	Dr. Rajkumar, Group Director, AOSG-EPSA, SAC, DoS	Member
9.	Shri. Sudhir Kumar, CE, DGH	Member
10.	Shri. Gangesh Upadhyay, Sr. Director, MNRE	Member
11.	Dr. Rajesh Katyal, DDG, NIWE	Member
12.	Shri. P.K. Dash, Scientist 'C', MNRE	Member Secretary

REVISED LIST OF MODELS AND MANUFACTURERS OF WIND TURBINES (RLMM) COMMITTEE

The following are the members of the Revised List of Models and Manufacturers of Wind Turbines (RLMM) Committee

1.	Dr. S. Gomathinayagam, Director General, NIWE	Chairman
2.	Shri. Dilip Nigam, Director (Wind Energy), MNRE (till 15.09.2015)	Member
3.	Shri. J.K.Jethani, Scientist "D", MNRE (from 15.09.2015)	Member
4.	Shri. A. A. Khatana, Executive Director, IREDA (till 13.05.2015)	Member
5.	Shri. B.V. Rao, Director (Technical), IREDA (from 13.05.2015)	Member
6.	Shri. V. Balaji, DGM, SRLDC	Member
7.	Shri. Madhusudan Khemka, Hon.Chairman IWTMA, Chennai	Member
8.	Dr. K. Kasthurirangaian, Chairman, IWPA, Chennai	Member
9.	Shri. A. Senthil Kumar, Director & Head, S&C, NIWE	Secretary

PROTOTYPE WIND TURBINE MODELS COMMITTEE

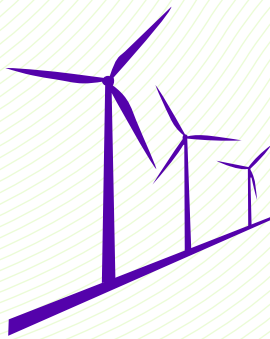
The following are the members of the Prototype Wind Turbine Models Committee

1.	Dr. S. Gomathinayagam, Director General, NIWE	Chairman
2.	Shri. Mohamed Hussain, Director, MNRE & Head, WTRS, NIWE	Member
3.	Shri. Siddhartha Bhatt, Additional Director, CPRI, Bangalore	Member
4.	Shri. D.V. Giri, Secretary General, IWTMA, Chennai	Member
5.	Shri. A. Senthil Kumar, Director & Head, S&C, NIWE	Member Secretary

HINDI PROMOTION COMMITTEE

The following are the members of the Hindi Promotion Committee (Constituted for the purpose of promotion of Hindi Official Language in NIWE)

1.	Dr. S. Gomathinayagam, Director General, NIWE	Chairman
2.	Dr. Rajesh Katyal Deputy Director General & Head, OSWH&IB, NIWE	Member Secretary
3.	Shri. D. Lakshmanan, Director, F&A, NIWE	Member
4.	Shri. R. Girirajan, Assistant Director, F&A, NIWE	Member
5.	Dr. P. Kanagavel, Additional Director & Head, ITCS, NIWE	Member



FINANCE AND ADMINISTRATION

Serving as the artery connecting scientific units of Wind Technology & Solar Resources with Management.

- ♦ Budget & Revised Estimates for grants-in-aid, Allocation & re-appropriation of funds, Expenditure management & budget control, Project financial management.
- ♦ Statutory compliances on Service Tax and Income Tax etc., Dealing with audits, Drawing up balance sheet, laying of audited accounts on the table of Parliament.
- ♦ Framing of Rules, Schemes and Grievance Redressal, Contract Management, Legal issues, Court Cases & RTI, Recruitment, Promotion and upgradations.
- ♦ Statutory compliances on EPF, Gratuity, Contract Labour, Societies Registration, Bills of Establishment, Facility Management, Activities related to Official Language. Maintenance of Vehicle, Security and Housekeeping.
- ♦ Stores & Purchase section which is part of Finance & Administration is committed to organize procurement of items required for projects of the Institute in time, at competitive rates consistent with requirement, availability of finance and in a transparent manner. Procurements (Indigenous & Imports) & Service Contracts.

Trainings Organized

- ♦ One day Training Programme on “Right to Information Act, 2005” by Shri K. Govindarajulu, Joint Director (BT), ISTM held on 24th July 2015.
- ♦ One day workshop on “Yoga” by M/s. Isha Yoga Foundations held on 26th June 2015.
- ♦ One day workshop on “Good and Bad are not due to others” by Shri V. Viswanathan, Faculty Member, Sri Sathya Sai Education in Human Values on 25th May 2015.



- ♦ One day workshop on Official Language “Use of Digital Tool in Hindi” by M/s. Sahajdigital.com held on 17th August 2015.

Vigilance Awareness Week

Vigilance awareness week for the year 2015 was observed in NIWE from 26th October 2015 to 31st October 2015 and all the employees have taken a pledge as instructed by the Central Vigilance Commission. As a part of Vigilance Awareness Week an essay writing competition on the topic “Preventive Vigilance as a good Governance” was conducted on 28th October 2015. Prizes were distributed to the winners in the essay writing competition. A speech on “Vigilance Awareness” was delivered by Dr. A. Muthukrishnan, Sr. CoA & Vigilance Officer, CSIR - CLRI on 29th October 2015.

Committee for prevention of sexual harassment of women at work place

In accordance with Government instructions, a Complaints Committee for women for redressal of complaints concerning sexual harassment in work place has been constituted in NIWE and the Committee conducted its quarterly meetings on 20.08.2015, 04.11.2015 & 01.02.2016. No complaints received during the year 2015-16.

Foundation Day

“Foundation Day”, 18th Birthday was celebrated fourth consecutive year on 21st March 2016, with variety of programmes. 'Open Day' was announced for public to visit all the facilities of NIWE on 21st March 2016 between 9.30 am and 12.30 pm to create awareness about the Renewable Energy Sources and its applications.





Glimpses of NIWE's Foundation Day Prize Distribution

As part of the celebrations, in association with World Wide Fund for Nature (WWF) India, various competitions were conducted for school children wherein more than 600 students from 30 schools across Tamil Nadu participated in the competitions. Dr. Praveen Saxena, Chief Executive Officer - Designate and Former Advisor, MNRE & Director General, National Institute of Solar Energy were the Chief Guest and delivered Foundation Day Lecture at the Conference Hall of NIWE among NIWE staff and winners of the competitions. As Chief Guest of the day, he distributed award to the winning students as well as the awards and souvenirs to the NIWE Staff. Shri. J. K. Jethani, Principal Scientific Officer, MNRE was also present in the celebration.

Promotions during the year 2015-16

Sl. No.	Name	Previous Cadre and Scale of Pay	Promoted Cadre and Scale of Pay	Date of Promotion
1.	Shri. S.A. Mathew	Additional Director Rs.15,600-39,100/- + GP Rs.7600	Director Rs.37400-67000/- + GP Rs.8700	01.01.2015
2.	Shrir. A. Senthil Kumar	Additional Director Rs.15,600-39,100/- + GP Rs.7600	Director Rs.37400-67000/- + GP Rs.8700/-	01.01.2015
3.	Shri. S. Marutha nayagam	Driver Rs.5200-20200/- +GP Rs.1900/-	Sr. Driver Rs.5200-20200/- + GP Rs.2400/-	01.04.2015
4.	Shri. K.A. Haji Abdul Ibrahim	Daftary Rs.5200-20200/- + GP Rs.1900/-	Record Keeper Rs.5200-20200/- + GP Rs.2400/-	18.08.2015

Official Language Act

NIWE has been an active member in the Town Official Language Implementation Committee, Chennai. The Hindi version of “PAVAN”, the Quarterly News Bulletin of NIWE is considered a standard communications in Hindi.

Hindi fortnight was celebrated in NIWE from 15.09.2015 to 23.09.2015. Various competitions were conducted and prizes distributed.



Glimpses of Hindi fortnight celebration

During the year 2015, 11 regular staff members passed in first class in Probodh examination, conducted by Hindi Teaching Scheme.

Continuous Hindi Classes is being conducted in the campus of NIWE to improve upon spoken Hindi and also to prepare staff members for appearing in the examinations (Praveen) towards implementation of Official Language.

Right to Information Act

During the year 2015-16, 09 applications were received seeking information under RTI Act, 2005 and requisite details have been given. No appeal has been preferred against the decision of CPIO.

Implementation of Persons with Disabilities Act 1995

The following facilities are being available to Persons with Disabilities

1. Though NIWE is functioning in a two storey building (where lift is not mandatory) a lift has been provided for the convenience of physically challenged.
2. A separate ramp has been provided to enable use of crutches / wheel chairs.

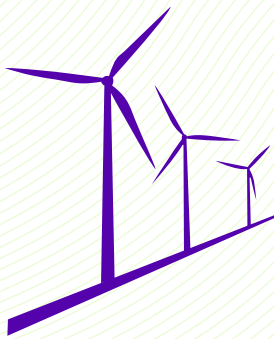
3. Low level steps laid by the side of the lift for easy access.
4. Post reservation for physically handicapped as per GOI rules.

Tribute to Maruthanayagam



Shri. S. Maruthanayagam, Senior Driver & his Wife passed away in the Chennai deluge in December 2015. We are grieved that we have had a precious person's loss and pray the Almighty to enable the wards to come out of the sudden demise of their parents.



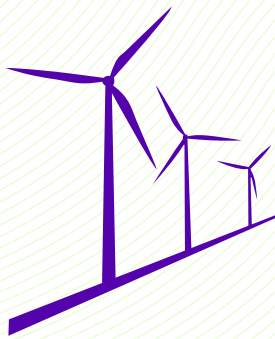


HUMAN RESOURCE

Sl.No.	Name	Cadre
Scientific & Technical Research (S&T)		
1.	Dr. S. Gomathinayagam	Director General
2.	Smt. Anuradha Babu	Executive Staff Officer
3.	Smt. J. Rekha	Junior Executive Assistant
Finance & Administration (F&A)		
1.	Shri. D. Lakshmanan	Director (F&A)
2.	Shri. R. Girirajan	Assistant Director (F&A)
3.	Smt. K. Tamilselvi	Administratoin & Accounts Officer
4.	Shri. V. Shanmugam	Executive Assistant
5.	Smt. B. Muthulakshmi	Executive Secretary II
6.	Shri. M. Selvakumar	Record Keeper
7.	Shri. M. Malaravan	Senior Driver
Offshore, Small Wind Hybrid System & Industrial Business (OSWH & IB)		
1.	Shri. Rajesh Katyal	Deputy Director General & Head
2.	Smt. Deepa Kurup	Deputy Director (Technical)
3.	Shri. R. Naveen Muthu	Junior Engineer
Wind Resource Assessment (WRA)		
1.	Shri. K. Boopathi	Additional Director & Head
2.	Shri. A.G. Rangaraj	Assistant Director (Technical)
3.	Shri. J. Bastin	Assistant Director (Technical)
4.	Smt. M.C. Lavanya	Assistant Director (Technical)
5.	Smt. G. Arivukkodi	Assistant Engineer
6.	Shri. T. Suresh Kumar	Assistant Engineer
7.	Shri. B. Krishnan	Assistant Engineer
8.	Shri. R. Vinod Kumar	Junior Engineer



Sl.No.	Name	Cadre
Wind Turbine Testing		
1.	Shri. S.A. Mathew	Director & Head
2.	Shri. M. Saravanan	Assistant Director (Technical)
3.	Shri. Bhukya Ramdas	Assistant Director (Technical)
4.	Shri. M. Karuppuchamy	Assistant Engineer
5.	Shri. A.R. Hasan Ali	Assistant Engineer
6.	Shri Y. Packiyaraj	Assistant Engineer
7.	Shri. S. Paramasivan	Junior Engineer
8.	Shri. K.A. Haji Abdul Ibrahim	Record Keeper
Standards & Certification (S&C)		
1.	Shri. A. Senthil Kumar	Director & Head
2.	Shri. N. Rajkumar	Deputy Director (Technical)
3.	Shri. S. Arulselvan	Assistant Engineer
Information Training & Customized Service (ITCS)		
1.	Dr. P. Kanagavel	Additional Director & Head
Engineering Service Division (ESD)		
1.	Shri. M. Anvar Ali	Additional Director & Head
2.	Shri. C. Stephen Jeremias	Assistant Engineer
Knowledge Sharing & Management (KSM)		
1.	Shri. J.C. David Solomon	Additional Director & Head
2.	Shri. M.R. Gunasekaran	Executive Secretary II
Officials on deputation from MNRE		
1.	Shri. A. Mohamed Hussain	Deputy Director General
2.	Dr. G. Giridhar	Deputy Director General
3.	Shri. Joel Franklin Asaria	Additional Director
4.	Shri. A. Hari Baskaran	Deputy Director
Mission Mode Project		
1.	Shri. Prasun Kumar Das	Assistant Director (Technical)
2.	Shri. R. Karthik	Assistant Director (Technical)



NIWE OFFICIALS ON EXTERNAL COMMITTEES, BODIES AND MEMBERSHIP OF ASSOCIATIONS

S. Gomathinayagam

- Institution of Engineers (India), Fellow Life Member / Chartered Engineer.
- Computer Society of India, Life Member.
- Instrument Society of India, Life Member.
- Indian Society of Wind Engineers, Life Member.
- Indian Meteorological Society, Life Member.
- External Examiner of UGC-JRF PHD program for MIT, Anna University, Member.
- Expert Advisory Committee, Tamil Nadu, Scientists Award- (TANSA) - 2008 for Engineering and Technology.
- Executive Committee Member of Institute of Energy Studies, Anna University, Chennai.
- Member of Monitoring Committee, NIMITLI, Wind Turbine Development Project of CSIR.
- Chairman, Wind Turbine Sectional Committee ET42 of B/S.

D. Lakshmanan

- National Institute of Personnel Management, Kolkata, Corporate Member.

Rajesh Katyal

- Institution of Engineers (India), Fellow.

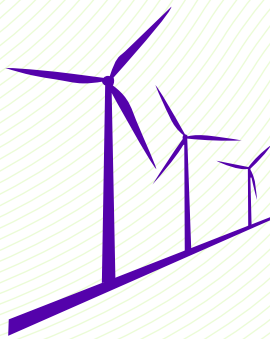
A. Senthil Kumar

- Wind Turbines Sectional Committee, ET 42 of BIS, Member.

P. Kanagavel

- Society for the Advancement of Library and Information Science (SALIS), Member.
- Indian Academic Library Association (IALA), Member.
- International Journal of Recent Research and Applied Studies, Member
- Advisor, Arivukkan - a Monthly Science Magazine





AUDITOR'S REPORT

The Chairman
Governing Council
National Institute of Wind Energy
Chennai – 600 100

INDEPENDENT AUDITORS' REPORT

Sir,

We have audited the attached financial statements of National Institute of Wind Energy (NIWE) formerly known as Centre for Wind Energy Technology (C-WET), Velachery – Tambaram, Pallikaranai, Chennai, which comprise the Balance sheet as at 31.03.2016, the Income & Expenditure Account and the Receipts and Payments Account for the year then ended and a summary of significant accounting policies and other explanatory information.

Management's Responsibility

NIWEs' Management is responsible for the preparation of these financial statements that give a true and fair view of the financial position, financial performance and cash flows of the NIWE in accordance with the Accounting Standards issued by the Institute of Chartered Accountants of India. This responsibility also includes maintenance of adequate accounting record in accordance with the provisions of the Indian laws applicable to NIWE for safeguarding the assets of the Institution and for preventing and detecting



frauds and other irregularities; selection and application of appropriate accounting policies; making judgments and estimates that are reasonable and prudent; and design, implementation and maintenance of adequate internal financial controls, that were operating effectively for ensuring the accuracy and completeness of the accounting records, relevant to the preparation and presentation of the financial statements that give a true and fair view and are free from material misstatement, whether due to fraud or error.

Auditors' Responsibility

Our responsibility is to express an opinion on these financial statements based on our audit.

We have taken into account the provisions of the Indian law's applicable to NIWE, the accounting and auditing standards and matters which are required to be included in the audit report under the provisions said Indian laws and the Rule made there under.

We conducted our audit in accordance with the Standards on auditing issued by the Institute of Chartered Accountants of India. Those standards require that we comply with the ethical requirements and plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatements.

An audit involves performing procedures to obtain audit evidence about the amounts and the disclosures in the financial statements. The procedures selected depend on the auditor's judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal financial control relevant to NIWEs' preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the NIWEs' internal finance control.

An audit also includes evaluating the appropriateness of the accounting policies used and reasonableness of the accounting estimates made by the management, as well as evaluating the overall presentation of financial statements. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.



Opinion

- a) In our opinion and to the best of our information and according to the explanations given to us, the aforesaid financial statements, including the Balance Sheet, Income & Expenditure Account and Receipts and Payments Account dealt with by this report read together with schedules, accounting policies and notes thereon give a true and fair view in conformity with the accounting principles generally accepted in India:
- i. In the case of Balance Sheet, of the state of affairs of the above mentioned Institution as at 31st March, 2016;
 - ii. In the case of Income & Expenditure account of the Excess of Income over expenditure of this Institution for the year ended on that date; and
 - iii. In the case of Receipts and payments Account of the Receipts and Payments of this Institution for the year ended on that date.

Emphasis of Matter

We draw attention to the Note No.13 of "Schedule 14: Notes forming part of the accounts", During the Financial year 2014-15 NIWE has changed the accounting policy from charging the expenditure on the running project to Income & Expenditure in the year of incurring the same to accumulating the same and charging to Income & Expenditure in the year of completion of the project when corresponding fee received is continued to be shown under advance received from projects in the year of receipt and accounted as income in the year of completion of project. Accordingly, a sum of Rs.1,86,95,951/- being expenditure during the year is shown in the Balance Sheet under the head of "Current Assets, Loans, Advances and Other Assets: Expenditure on running projects". Because of this change in Accounting policy, surplus is more by Rs. 1,86,95,951/- and General fund is more by Rs. 1,86,95,951/-.

Our opinion is not qualified in respect of this matter.

Report on Other Legal and Regulatory Requirements

We report that:

- a) We have obtained all information and explanations which to the best of our knowledge and belief were necessary for the purpose of our audit;



- b) In our opinion, proper books of account have been kept by the above mentioned Institution so far as appears from our examination of the books;
- c) The Balance Sheet, Income & Expenditure Account and Receipts and Payments Account referred to in this report are in agreement with the books of accounts;
- d) In our opinion the Balance Sheet, Income and Expenditure Account and Receipts and Payments Account dealt with by this report are prepared in accordance with the applicable Accounting Standards issued by the Institute of Chartered Accountants of India.

For **G Badri Narayana & Co**
Chartered Accountants
(Firm Registration No: 010743S)

Place: CHENNAI
Date:

Shravan Gattupalli
Partner
M No: 226441



NATIONAL INSTITUTE OF WIND ENERGY

(An Autonomous R&D Institution under MNRE, Government of India)

Chennai - 600 100

BALANCE SHEET AS AT 31st MARCH 2016

(Amount in Rs.)

FUND AND LIABILITIES	Schedule	31st March 2016	31st March 2015
CAPITAL ASSET FUND	1	32,62,04,080	36,86,89,600
RESERVES AND SURPLUS	2	45,84,73,569	43,44,85,821
CURRENT LIABILITIES AND PROVISIONS	3	28,55,42,809	14,77,38,363
TOTAL		1,07,02,20,458	95,09,13,784
ASSETS			
FIXED ASSETS			
(a) Created out of Central Government Grants	4	30,50,16,662	35,13,33,473
(b) Out of Internal Generation Grants		2,11,87,418	1,73,56,127
CURRENT ASSETS,			
LOANS AND ADVANCES	5	74,40,16,378	58,22,24,184
TOTAL		1,07,02,20,458	95,09,13,784
SIGNIFICANT ACCOUNTING POLICIES	13		
NOTES ON ACCOUNTS	14		

For National Institute of Wind Energy

As per our Report attached
For G.Badrinarayana & Co.,
Chartered Accountants
Firm Regn No.010743S

Sd/-
D.Lakshmanan
Director (F&A)

Sd/-
Dr. S.Gomathinayagam
Director General

Sd/-
Shravan Gattupalli
Partner
Membership No.226441



NATIONAL INSTITUTE(An Autonomous R & D Institution under Ministry of
Chennai**RECEIPTS AND PAYMENTS ACCOUNT**

RECEIPTS	31st March, 2016	31st March, 2015
I. Opening Balances		
(a) Cheques in hand		
(b) Bank balances		
i) In Current Account	100,470	100,000
ii) In Savings Bank Account	84,978,626	138,144,730
iii) In Deposit Accounts	410,000,000	360,000,000
(c) Stamps in hand	8,887	9,899
	495,087,983	498,254,629
II. Grants Received / UnUtilised Grants		
(a) From Government of India	137,000,000	120,000,000
(b) From Government of India Smart Grid Project		6,452,000
(c) Sale of Fixed Assets	8,417	9,144
(d) From Government of India - North East Project	80,600,000	-
(e) From Government of India for SRRA Project	20,000,000	70,000,000
(f) General Reserve (Welfare Fund)	20,350	-
III. Income on Investments		
IV. Interest Received		
(a) On Bank deposits	36,493,245	49,025,759
(b) On Bank deposits (SRRA)	1,468,007	2,817,965
V. Other Income		
(a) Fees for services	50,652,861	83,626,850
(b) Fees for services (SRRA)	10,025,000	-
(c) Income from publications	1,642,131	2,355,911
(d) Energy receipts	15,524,924	20,198,769
(e) Misc. Income	21,231,391	21,753,435
(f) Misc. Income (including SRRA Income)	1,912,617	1,269,921
VI. Amount borrowed		
VII. Any other receipts		
(a) Fees received in advance on Consultancy projects	65,017,250	74,559,750
(b) Fees received in advance on Consultancy projects (SRRA)	6,500,000	8,250,000
(c) Security deposit received - Internal Generation	61,090	1,051,560
(d) Security deposit received Grant	991,100	
(e) Security deposit received (SRRA)		950,000
(f) Earnest money deposit received Grant	2,696,341	4,275,064
(g) Service tax realised	71,936	5,950
(h) TDS to be remitted	739,765	1,059,525
(i) TDS to be remitted (Including SRRA)	31,531	1,237,058
(j) Advances and Deposits - Grants	840,650	
(k) Sundry Creditor (SRRA / Branch Division)	327,269	13,238,033
(l) Advances and Deposits - Internal Generation	6,246,674	
(m) Receivable from Debtors/other payments/Branch division	41,383,270	4,653,045
(n) Performance Guarantee - Grants	2,518,733	1,117,931
(o) Performance Guarantee - SRRA	242,792	
	496,917,227	495,237,786
TOTAL	992,005,210	993,492,415

Receipts and Payments Account

OF WIND ENERGY

New and Renewable Energy, Government of India)
600 100

FOR THE YEAR ENDED 31st MARCH 2016

(Amount in Rs.)

PAYMENTS	31 st March, 2016	31 st March, 2015
I. Expenses		
(a) Employee related Expenses	45,676,769	44,909,020
(b) Administrative Expenses	44,979,093	40,869,794
II. Payments made against funds for various projects		
Out of CFA		
(a) In house R&D project expenses	28,065,850	45,002,373
(b) Seminar & Information dissemination	2,053,919	3,319,981
(c) Accreditation fee	67,744	44,944
Out of Grants for projects		
(a) WRA Lakshadweep Islands 2008-09	480,000	
(b) Wind Profile Measurement - Dhanushkodi		6,432,323
(c) Wind Shear Assessment expenses 120 Mast	1,338,400	1,686,039
(d) North-Eastern Project 2006-07 & 2010-11	1,365,492	556,749
(e) Study on Uncovered / New areas (2003-04 to 2013-14)	4,166,239	3,582,527
(f) Solar Radiation Resource Assessment	17,209,618	31,152,309
(g) Offshore Wind Resource Assessment	60,680	
III. Investment and Deposits made		
IV. Expenditure on Fixed assets & Capital Work-in-Progress		
(a) Purchase of Fixed assets (Grants)	31,477,185	21,724,932
(b) Purchase of Fixed assets (Internal Generation)	10,009,523	14,707,325
(c) Purchase of Fixed assets (SRRA)	2,851,473	116,278,044
V. Refund of Surplus Money		
(a) Balance of Grants-in-aid to Government of India	-	
VI. Other Payments		
(a) Refund of Security deposits / Performance Guarantee IE	355,247	7,311,526
(b) Refund of Security deposits / Performance Guarantee Grant	1,503,312	
(c) Refund of Security deposits SRRA / Performance Guarantee		6,324,692
(d) Refund of Earnest Money Deposits	5,192,086	5,016,819
(e) Refund of Earnest Money Deposits (SRRA)		926,580
(f) Expenditure on Consultancy Projects	46,857,338	43,977,351
(g) Expenditure on Consultancy Projects SRRA	6,926,427	
(h) Advance & Deposits from Grants	10,785,454	(16,806,490)
(i) Advance & Deposits from SRRA	(2,217,806)	(20,248,468)
(j) Advance & Deposits from Internal Generation	22,335,664	41,089,800
(k) Payment of TDS (Grants)	77,041	315,785
(l) Payment of TDS (Internal Generation)	982,484	312,924
(m) Payment of TDS (SRRA)	1,237,058	85,704
(n) Service tax remittances	5,562	71,936
(o) Receivable from Debtors/other payments /Branch Division	38,427,242	15,443,563
(p) Receivable from Debtors/other payments /Branch Division SRRA	762,033	
(q) Festival advance paid	(900)	4,500
(r) Transfer of fees received in advance	50,001,000	67,861,850
(s) Transfer of fees received in advance from SRRA	10,450,000	16,450,000
VII. Closing Balances		
(a) Cheques in hand		
(b) Bank Balances		
i) In Current Account	1,503,573	100,470.01
ii) In Savings Bank Account	175,016,702	84,978,626
iii) In Deposit Accounts	427,000,000	410,000,000
iv) In Deposit Accounts (SRRA)	5,000,000	
(c) Stamps in hand	3,708	8,887
TOTAL	992,005,210	993,492,415

For National Institute of Wind Energy

As per our Report attached for
G Badrinarayana & Co.,
Chartered Accountants
Firm Regn No.010743S

Sd/-
D.Lakshmanan
Director (F&A)

Sd/-
Dr. S.Gomathinayagam
Director General

Sd/-
Shravan Gattupalli
Partner,
Membership No.226441

NATIONAL INSTITUTE OF WIND ENERGY
(An Autonomous R&D Institution under MNRE, Government of India)
Chennai - 600 100

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31st MARCH 2016

(Amount in Rs.)

INCOME	Schedule	31st March 2016	31st March 2015
Income from Scientific & Technical Consultancy Services	6	7,55,02,785	10,38,25,619
Income from publication	7	15,22,131	23,55,911
Interest Earned	8	3,52,84,686	4,69,78,932
Other Income	9	2,23,56,043	2,23,19,014
Grants from Government of India allocated for Revenue expenditure during the year	3.1	4,49,79,093	4,08,55,756
Grants from Government of India allocated for In house project expenditure during the year	3.1	3,75,98,325	6,06,24,936
Closing stock		58,78,291	52,80,287
TOTAL (A)		22,31,21,354	28,22,40,454
EXPENDITURE			
Opening stock		52,80,287	19,88,407
Establishment Expenses	10	4,75,06,717	4,69,15,500
Administrative Expenses	11(A)	4,49,79,093	4,08,55,756
Consultancy Project Expenses	11(B)	5,34,60,184	4,05,93,601
In house project expenditure		3,75,98,325	6,06,24,936
TOTAL (B)		18,88,24,606	19,09,78,200
Balance being excess of Income over Expenditure (A-B)		3,42,96,748	9,12,62,254
Prior period adjustment	12	3,756	(1,879)
Transfer to Capital Asset Fund	4	1,00,09,523	1,80,91,075
Transfer to Welfare Fund		3,23,583	4,26,381
BALANCE BEING SURPLUS TRANSFERRED TO GENERAL RESERVE FUND		2,39,67,398	7,27,42,919
SIGNIFICANT ACCOUNTING POLICIES	13		
NOTES ON ACCOUNTS	14		

For National Institute of Wind Energy

As per our Report attached for G.Badrinarayana & Co.,
Chartered Accountants
Firm Regn No.010743S

Sd/-
D.Lakshmanan
Director (F&A)

Sd/-
Dr. S.Gomathinayagam
Director General

Sd/-
Shravan Gattupalli
Partner
Membership No.226441



नीवे NIWE

राष्ट्रीय पवन ऊर्जा संस्थान NATIONAL INSTITUTE OF WIND ENERGY

नवीन और नवीकरणीय ऊर्जा मंत्रालय, अनुसंधान एवं विकास स्वायत्त संस्थान, भारत सरकार
An Autonomous R & D Institution under the Ministry of New and Renewable Energy, Government of India

वेलचेरी - ताम्बरम मुख्य मार्ग, पल्लिकरानै, चेन्नई - 600 100, तमिलनाडु, भारत
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