

2020-21
वार्षिक रिपोर्ट
ANNUAL REPORT

WIND ENERGY

FOR CLEANER INDIA



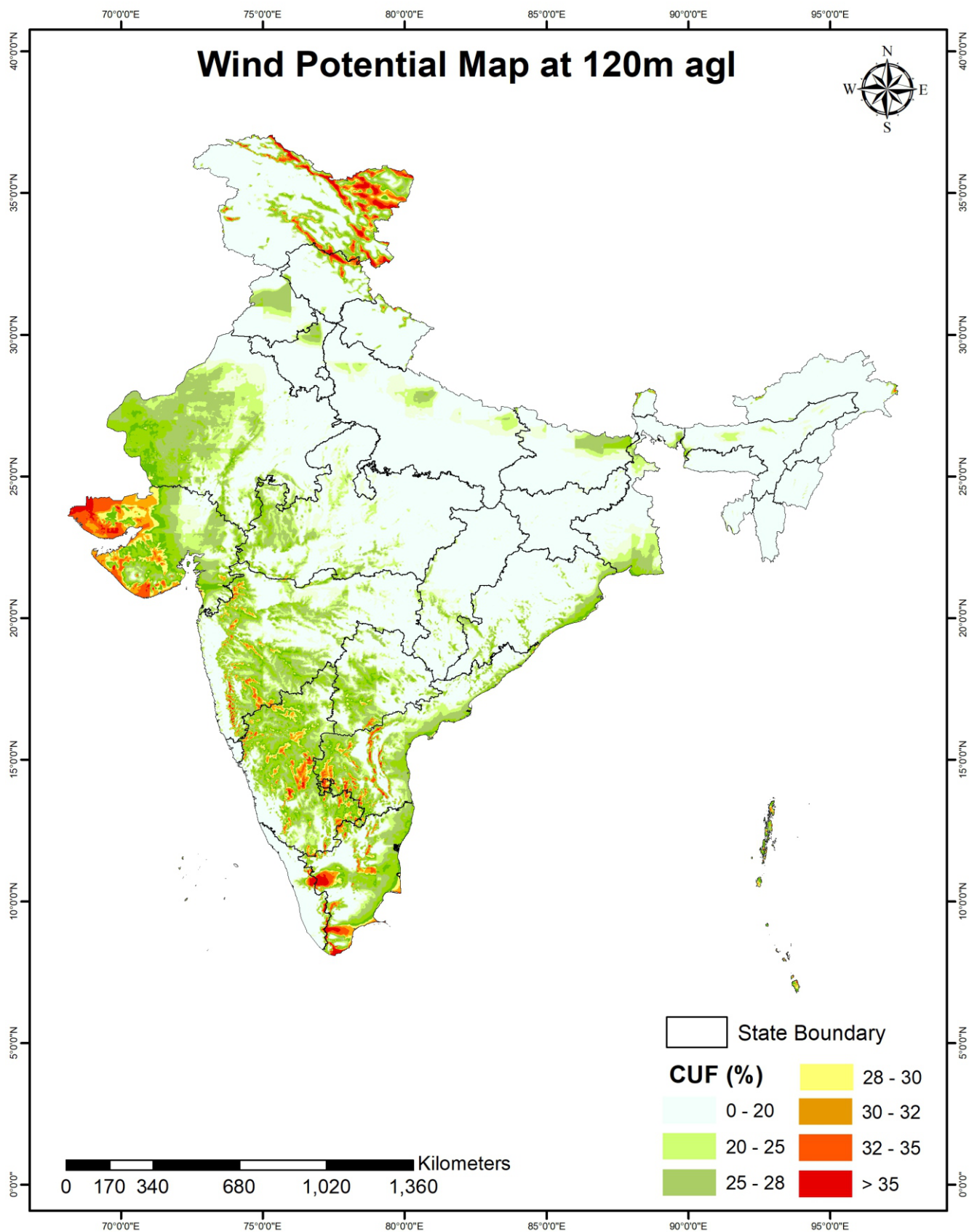
नीवे NIWE

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



ANNUAL REPORT 2020-21



NATIONAL INSTITUTE OF WIND ENERGY

An Autonomous Research & Development Institution
Ministry of New and Renewable Energy, Government of India
Chennai - 600 100

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E-poster competition conducted on 15th June 2020 on the occasion of "Global Wind Day"

YUVASRI. S - X Std

The Rani Meyyamel Girls Higher Secondary School, Chennai

PREAMBLE



- **From the
Director General's Desk**
- **Functional Structure**
- **The Charter**
- **Governing Council**
- **NIWE's Committees**



E-poster competition conducted on 15th June 2020 on the occasion of "Global Wind Day"

B. BAVANI - X Std

Sri RKM Sarada Vidhyalaya Girls Higher Secondary School , Chennai

Functional Structure





E-poster competition conducted on 15th June 2020 on the occasion of "Global Wind Day"

INNISHA - IX Std

S C DAV Public School, Noida



“

“The Power and Energy sectors are the biggest constituents of the infrastructure sector. If you ignore them, no development will happen”

- Shri. Narendra Damodardas Modi
Hon'ble Prime Minister of India

”





From the Director General's Desk

Government of India has been driving a vibrant renewable energy programme aimed at achieving energy security, energy access and reducing the carbon footprints of the national economy. This is in line with India's commitments under the 2015 Paris Agreement to reduce greenhouse gas emissions intensity by 33 to 35 percent below 2005 levels, and to achieve 40 percent of installed electric power capacity from non-fossil sources by 2030. With progressively declining costs, improved efficiency and reliability renewable energy is now an attractive option for meeting the energy needs across different sectors of the economy. However, renewable energy integration is still evolving in terms of technological challenges and cost competitiveness, and face numerous market related, economic and social barriers.

It has been over a year since COVID-19 was declared as a global pandemic and the effect of the pandemic is visible in all spheres of human life causing both social and economic strains. The COVID-19 pandemic has thrown up new challenges and the pace of project implementation has been impacted. Even in this midst of the most tumultuous time that the world has seen in over a century, National Institute of Wind Energy was quick to respond and adapted to the situation. For us, it is a matter of pride to see the commitment and dedication that our officers had displayed to serve and support Government of India's initiatives and wind energy sector during this pandemic.

In such a background, it is our pleasure to present the National Institute of Wind Energy's Annual report 2020-21 which is made with vital technical inputs and activities of significance.

During the year, National Institute of Wind Energy (NIWE) had proactively involved in various national important initiatives of Government of India such as 'Carbon Neutral' Ladakh, 'Green energy Islands (Andaman & Nicobar Islands, Lakshadweep)', 'Renewable Energy park' in Kutch. Towards the development of offshore wind power projects in the country, NIWE had successfully completed the Geo-technical investigations at Gulf of Khambhat, off Gujarat coast and Gulf of Mannar, off Tamil Nadu coast, which provide useful pointers for designing the mono-pile structures. The other initiative such as testing of large and small wind turbines, development of standards in wind energy, certification and R&D are being continued.

India is taking rapid strides to move towards renewable energy to accelerate economic development, improve energy security and energy access while mitigating climate change challenges too. Our success in achieving all of these demands for a rich pool of workforce in the energy sector to propel India to become one of the top leaders in the world's renewable energy market. With this objective, during the year, NIWE had conducted 'Vayumitra Foundation Course' aimed to provide a complete overview about the Wind Energy Technology to cater to the needs of various personnel's such as technicians, engineers etc. focusing on un-employed youth with rural background with the focused group of technicians, diploma and graduate's/post graduate's engineers/professionals. As part of knowledge transition during this pandemic, NIWE had also conducted 13 webinars and online training courses covering various facets of wind turbine technology.

Further, sustained efforts towards boosting the growth of renewable energy sector will play a significant role in helping us inch closer to fulfill Hon'ble Prime Minister's vision of 'Aatmanirbhar Bharat'. In view of this, during the year NIWE had series of meetings with wind turbine manufacturers and other stakeholders and prepared and submitted a preliminary report on "Scaling Up Domestic Manufacturing of Wind Turbine Components – A Step towards Atmanirbhar", to MNRE.

I would like to place on record the unstinting support and encouragement from the members of the Governing Council and financial Committee of NIWE and officials of MNRE in reaching our set targets during pandemic. The support received from various stakeholders including international bodies must also be mentioned. I would like to congratulate each and every staff member of my NIWE family for their accomplishment being made in 2020-21 despite the pandemic situation and leaving behind an appeal that our target for 2021-22 is much more, in terms of multiple accomplishments and achievements.

Let us sustain the momentum of team spirit and I hope and trust that we will all come out victorious through these difficult times.

Dr. K. Balaraman
Director General

“

“Lakhs of families in the country are deprived of energy connectivity. Fruits of development will not reach the common man until energy connectivity reaches every last household of the country. In the age of globalization, we have no option but to make a quantum leap in energy production and connectivity.”

- Shri. Narendra Damodardas Modi
Hon'ble Prime Minister of India

”

The Charter

The National Institute of Wind Energy (NIWE) was established at Chennai in 1998 as an autonomous R&D institution under the Ministry of New and Renewable Energy (MNRE), Government of India. NIWE is managed by a Governing Council headed by Secretary, MNRE and the Director General is the head of the Institute.

NIWE was established to serve as a technical focal point of excellence to foster the development of Wind Energy in the country and it is a unique research organization in the whole of South Asia. A Wind Turbine Test Station (WTTS) has also been established as an integral part of NIWE at Kayathar, Tamil Nadu with an objective to conduct and / or coordinate testing of complete wind power systems, sub-systems and components according to internationally accepted test procedures.

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 analyse 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 standards including guidelines, procedures, protocols for design, testing and certification of wind power systems, sub-systems and components, taking into consideration the Indian conditions and in line with internationally recommended practices and standards and update the same based on the feedback.
- ◆ To establish world class facilities, conduct and coordinate testing of complete wind power systems, sub-systems and components according to internationally accepted test procedures and criteria, whereby the total performance that includes power performance, power quality, noise level, dynamics, operation and safety systems is tested according to agreed protocols.
- ◆ To accord type approval / type certification which verifies conformity with safety related requirements as per standards, guidelines and other rules for design, operation and maintenance, as well as adequate documentation of quality issues such as power performance, noise, life expectancy and reliability.
- ◆ To monitor the field performance of wind power systems, sub-systems and components, effectively utilize this feedback for fulfillment of the above objective and issue of certification, establish and update the data bank on a continuous basis and serve as information Centre for selective dissemination.
- ◆ To undertake human resource development programme 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.

NIWE's Committees

Governing Council 2020-21

PRESIDENT OF THE SOCIETY & CHAIRMAN



Shri. Indu Shekhar Chaturvedi, I.A.S.,
Secretary, MNRE, New Delhi

MEMBERS



Shri. Vimalendra Anand Patwardhan, I.A. & A.S.,
Joint Secretary and Financial Adviser, MNRE, New Delhi



Shri. Bhanu Pratap Yadav, I.A. & A.S.,
Joint Secretary (Wind Energy), MNRE, New Delhi



Shri. J.N. Swain, I.A.S.,
Managing Director, Solar Energy Corporation of India Limited (SECI)



Smt. Sunaina Tomar, I.A.S.,
Additional Chief Secretary, Government of Gujarat, Gujarat



Shri. S.K. Prabakar, I.A.S.,
Principal Secretary to Government, Energy Department, Govt. of Tamilnadu, Chennai



Shri. Pradip Kumar Das
Chairman & Managing Director, Indian Renewable Development Agency Limited



Shri. Jitendra J Jadhav
Director, CSIR-National Aerospace Laboratories & Chairman, R&D Council, NIWE



Shri. Tulsi R Tanti
Chairman, Indian Wind Turbine Manufacturers Association



Shri. Sunil Jain
President, Wind Energy Independent Power Producers Association (WIPPA)



Prof. Nagesh R Iyer
Expert (former Director CSIR-SERC)

MEMBER SECRETARY



Dr. K. Balaraman
Director General, NIWE, Chennai

NIWE's Committees

Finance Committee

Chairman

Joint Secretary and Financial Adviser
MNRE, New Delhi

Members

Principal Secretary to Govt.
Energy Department, Government of Tamilnadu
Chennai

Joint Secretary (WE)
MNRE, New Delhi

Director General
National Institute of Wind Energy , Chennai

Director (Wind)
MNRE, New Delhi

Deputy Secretary [IFD]
MNRE, New Delhi

Member Secretary

Division Head (Administration & Finance)
National Institute of Wind Energy , Chennai

NIWE's Committees

Research & Development Council

Chairman

Director

CSIR-National Aerospace Laboratories, Bangalore

Members

Joint Secretary (WE)

Ministry of New and Renewable Energy, New Delhi

Shri. G Upadhyay

Scientist-G, Ministry of New and Renewable Energy, New Delhi

Dr. Sanjay Bajpai

Advisor / Scientist 'G', Head, Technology Mission Division

Department of Science & Technology, New Delhi

Nominee from CSIR

Wind Engineering Laboratory

Structural Engineering Research Centre (SERC), Chennai

Prof. Dr. Rangan Banerjee

Forbes Marshall Chair Professor

IIT Bombay, Mumbai

Dr. M.A. Atmanand

Director, National Institute of Ocean Technology, Chennai

Nominee

Central Power Research Institute (CPRI), Bangalore

Prof. Dr. H.P. Khincha

Former Chancellor, Visvesvariah Technological University, Belgaum

Dr. K.V. Nagendra Gopal

Associate Professor, Department of Aerospace Engineering

Indian Institute of Technology Madras, Chennai

Dr. K. Balaraman

Director General, NIWE, Chennai

Member Secretary

Shri. K. Boopathi

Director & Division Head, R&D, RDAF & SRRA, NIWE, Chennai

NIWE's Committees

Prototype Wind Turbine Models Committee

Chairman

Dr. K. Balaraman, Director General, NIWE

Members

Shri. N. Rajkumar, Joint Director, CPRI, Bangalore

Shri. N. Nallarasana, Chief GM (SO), NRLDC-POSOCO, New Delhi

Shri. D.V. Giri, Secretary General, IWTMA, New Delhi

Member Secretary

Shri. A. Senthil Kumar, Director & Division Head, S&R, NIWE

Complaints Committee for Women

Chairman

Dr. Yasodha Shanmugasundaram
Educationist & Ex. Vice Chancellor, Mother Teresa Women's University

Members

Dr. Aruna Dhathathreyan, Retd. Chief Scientist, CLRI

Dr. Vijaya Ravichandran, Scientist 'F', NIOT

Smt. G. Arivukkodi, Asst. Exe. Engineer, NIWE

Smt. M.C. Lavanya, Asst. Director (Tech.), NIWE

Smt. Anuradha Babu, Executive Staff Officer, NIWE

Member Secretary

Smt. B. Muthulakshmi, Executive Secretary, NIWE

Invitees

Shri. D. Lakshmanan, Deputy Director General (F&A), NIWE

Shri. R. Girirajan, Assistant Director (F&A), NIWE

NIWE's Committees

Hindi Promotion Committee

Chairman

Dr. K. Balaraman, Director General, NIWE

Members

Dr. Rajesh Katyal, Deputy Director General & Head, WSOM, NIWE

Dr. P. Kanagavel, Director & Head, SDT, NIWE

Shri. R. Girirajan, Assistant Director, F&A, NIWE

Member Secretary

Shri. J. C. David Solomon, Director and Division Head, F&A, NIWE

TECHNOLOGICAL HIGHLIGHTS



- **Wind & Solar Resource Measurements & Offshore**
- **Standards and Regulation**
- **Testing & Research Station**
- **Certification of Wind Turbines**
- **R&D, Resource Data Analytics, Forecasting & RE Projects**



E-poster competition conducted on 15th June 2020 on the occasion of "Global Wind Day"

A. DHARANI - X Std

Sri R.K.M Sarada Vidyalaya Girls Higher Secondary School, Chennai



Dr. Rajesh Katyal

Deputy Director General &
Division Head

Wind, Solar Resource Measurements and Offshore

TEAM

DEEPA KURUP
Additional Director (Technical)

A. HARI BHASKARAN
Deputy Director (Technical)

J. BASTIN
Deputy Director (Technical)

B. KRISHNAN
Assistant Director (Technical)

GUNASEKARAN. M.R
Executive Secretary - II

R. VINOD KUMAR
Junior Engineer

T. SANKARA RAO
Junior engineer

B. SENTHILKUMAR
Technician

M. NANDAKUMAR
Technician

National Institute of Wind Energy under the National Wind Resource Assessment Programme undertakes various studies to locate wind-rich sites in the country through field measurements for the development of wind farms. The ground measured data collected from all parts of the country are consolidated for the preparation of the National wind power potential atlas at various hub heights. Apart from this, all onshore and offshore wind resource-related studies using advanced techniques like models and satellite information are also used for the exploration of wind profile. NIWE is also involved in data collection activities related to the development of offshore wind power projects in the country by using the latest and advance technologies currently available in the world.

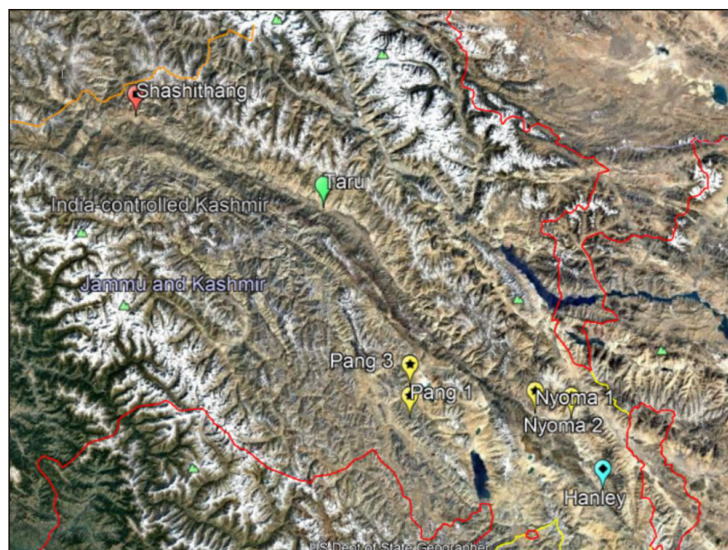
During the year, ground measurements of wind were continued in uncovered / new areas of the country despite travel restrictions due to COVID-19 pandemic. As on 31.03.2021, 29 wind monitoring stations are operational at 6 states under various wind monitoring projects funded by the Ministry of New and Renewable Energy (MNRE).

Onshore wind resource assessment activities

During the year, NIWE had installed and commissioned two numbers of 100 m wind monitoring stations at Uttar Pradesh and Gujarat. Further, 44 Nos. of 50m wind monitoring stations installed at various parts of North Eastern region were closed after requisite data collection from all the sites including the measurement campaign on existing telecom towers in NE region. NIWE had also carried out the following activities during the year.

'Carbon Neutral' Ladakh

NIWE has initiated a project in Ladakh and Kargil region towards meeting the vision of Hon'ble Prime Minister of 'Carbon Neutral' Ladakh. In this regard, NIWE had carried out extensive field visits to various parts of Ladakh and Kargil region and identified suitable locations for carrying out the ground measurements and development of Wind-Solar hybrid projects and the details are given in figure. In addition, NIWE also propose to carry out the Solar Radiation Resource Assessment studies in Ladakh region by installing 2 Nos. of Solar Radiation Resource Assessment Stations (SRRA) at the 10 GW Wind-Solar Hybrid proposed project site.



Sites identified for the development of wind-solar hybrid projects in Ladakh & Kargil

Renewable Energy Park, Kutch, Gujarat

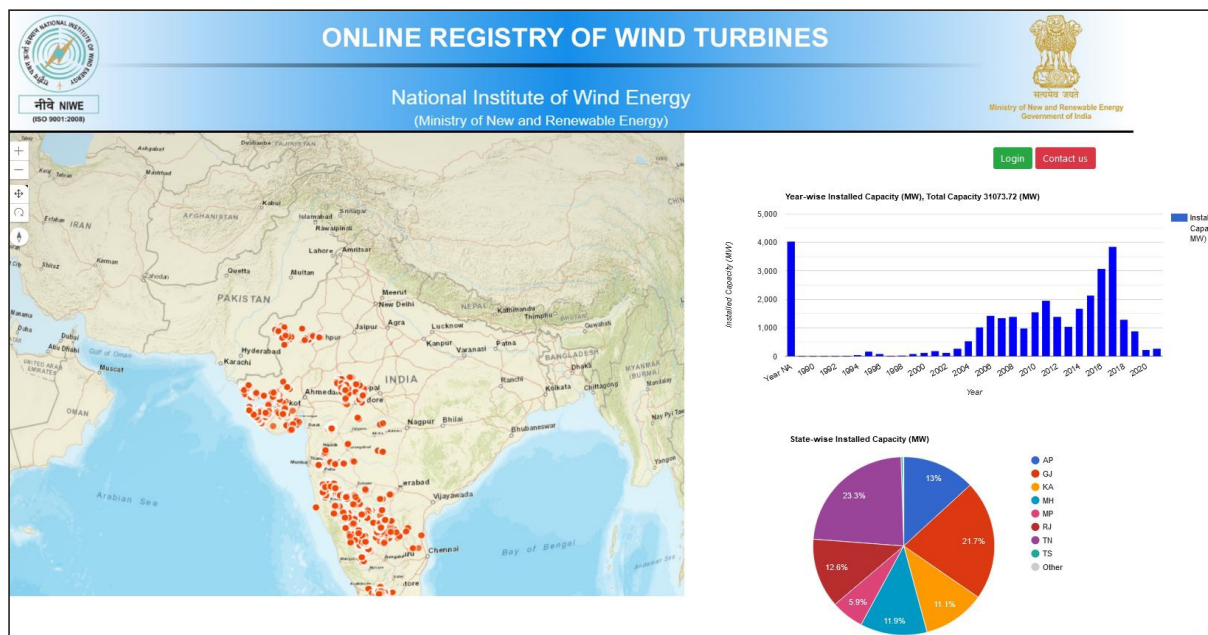
NIWE has identified three (3) locations at the proposed 30 GW Renewable Energy Park (Khavada region), Kutch District, Gujarat to install three 100 m integrated Wind-Solar resource assessment stations. The data from these resource assessment stations will facilitate the project developers / investors in developing the wind / solar power projects in the region and achieve the target set by Government of India. Currently, the installation and commissioning activities are underway.

Green Islands

As part of Government of India's initiative of Greening the Islands, during the year NIWE has carried out Meso-scale based data analysis and identified few locations in A&N Islands for the development of nearshore wind power projects. In this context, NIWE had identified tentative locations in the A&N Islands for carrying out in-situ ground measurements by installing 100m level wind monitoring stations.

Development of Online Registry / Geotagging of Wind Turbines

At present, the installed capacity of wind generation in India stands at about 39 GW with equivalent number of wind turbines. However, there is no centralized system for maintaining this vast database. Considering the requirements of the centralized system, under the directions of MNRE, NIWE has successfully developed a Geotagging of wind turbine through data collection, quality checking of the data received from various State Nodal Agencies / Manufacturers and double entry removal. Web Portal has been successfully uploaded with about 31 GW of wind turbine details.



Geotagging Portal

Integrated Wind - Solar Resource Assessment through Measurement and Mapping (IWSRA) (MNRE, RDPAC Project)

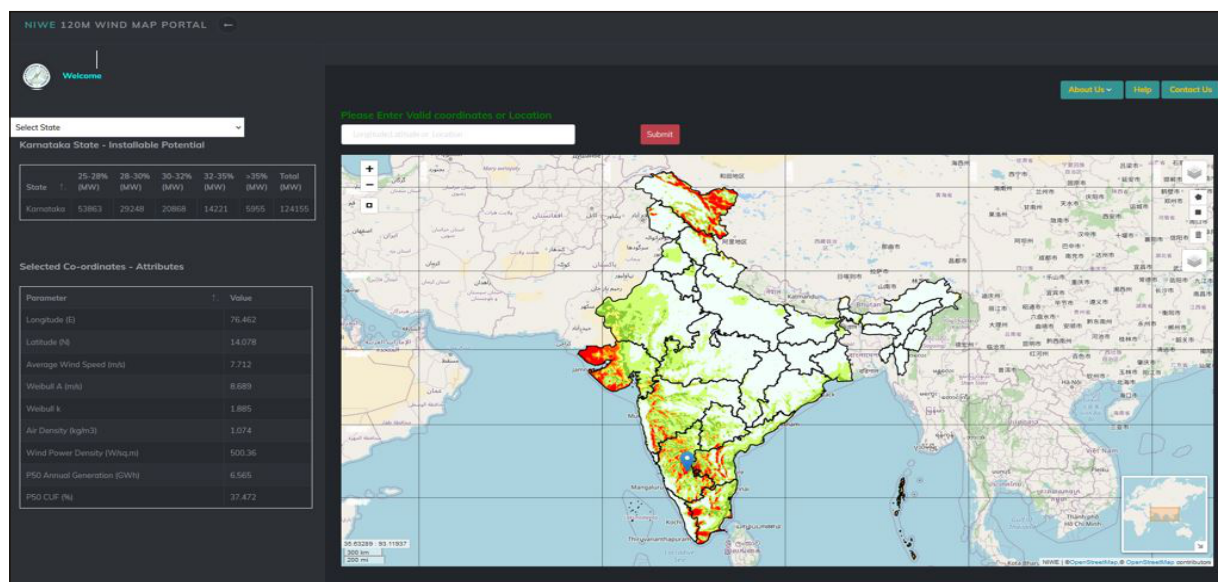
During the year, NIWE had successfully installed 20 Nos. of Integrated Wind-Solar towers and commissioned 11 Nos. of IWSRA stations in Tamil Nadu, Karnataka, Andhra Pradesh, Gujarat and Telangana which includes installation of one SoDAR in Tamil Nadu. The wind / other environmental measurements are underway.



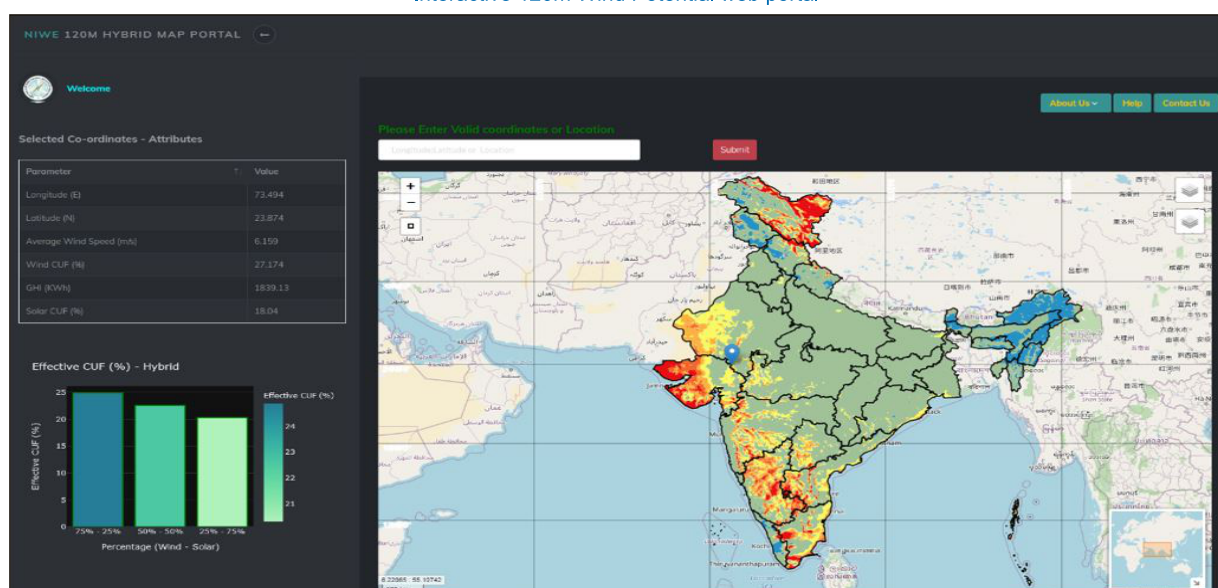
100 m Integrated Wind-Solar resource assessment station at Narendra site, Dharwad District Karnataka

Preparation of Interactive Web Portal for the 120m Wind Potential Map & Wind-Solar Hybrid Map

The development of first of its kind GIS based interactive web portal for the wind potential map at 120m a.g.l & Wind-Solar Hybrid map for easy and effective access of the stake holders has been successfully completed. The 120m wind potential map portal was developed with updated features such as spatial query, category-wise potential estimation, windiest land percentage, etc. Similarly, the Wind-Solar hybrid map portal was developed with updated features such as spatial query, multiple map layer display and effective % CUF query, etc. Presently, the portal has been submitted for the security audit and on completion of the same, the portal will be publicized.



Interactive 120m Wind Potential web portal

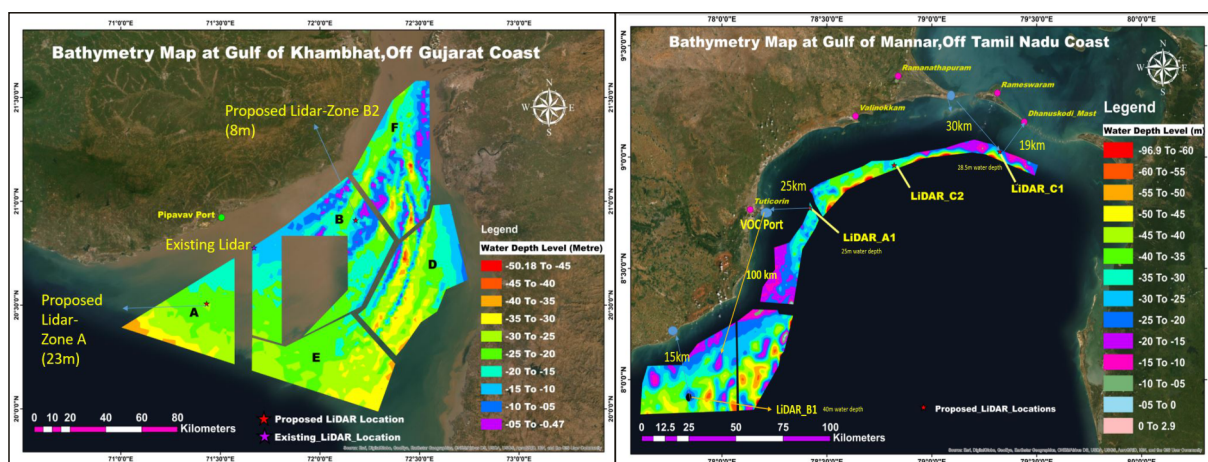


Interactive Wind-Solar Hybrid Portal

Offshore Wind Resource Assessment activities

Met-Ocean measurement (Wind, Wave, Tide and Current etc.) at Gulf of Khambhat, Off - Gujarat coast and Gulf of Mannar, Off - Tamil Nadu coast. (MNRE, RDPAC Project)

During the year, Off-Gujarat Coast, NIWE has identified suitable locations based on multi-criteria analysis at Zone A1 & Zone B2 for installing the offshore based LIDAR together with oceanographic sensors (Wave, Tide and Current). Further, NIWE has completed the Geo-technical investigation based on the in-situ sampling technique and CPT (Cone Penetration Test) at Zone A1 and Zone B2. Similarly, at Tamil Nadu Coast, NIWE had identified suitable locations based on multi-criteria analysis at Zone A, Zone C1, Zone B and Zone E for installing the offshore based LIDAR together with oceanographic sensors (Wave, Tide and Current) and completed the Geo-technical investigation based on the in-situ sampling technique and CPT (Cone Penetration test) at Zone A, Zone C1 and Zone B.



Bathymetry Map at Gulf of Khambhat & Gulf of Mannar

The design of Mono-pile offshore structure has been successfully completed using the Geo-technical investigation data in association with National Centre for Coastal Research (NCCR). Also, the procurement of LiDAR's (4 Nos.) together with its needed validation with 120m met mast at Kayathar test site in line with International Electro Technical Commission – IEC 61400-12-1 was completed during the year and the data analysis and preparation of detailed report is also completed.

Financial Modelling of Offshore in India (FIMOI) Project

The project was initiated under the Government-to-Government initiative under the Indo-Danish Energy Partnership (INDEP) between the Indian and Danish Governments in 2018 with an aim to create a transparent, facilitating and enabling environment for offshore wind in India.

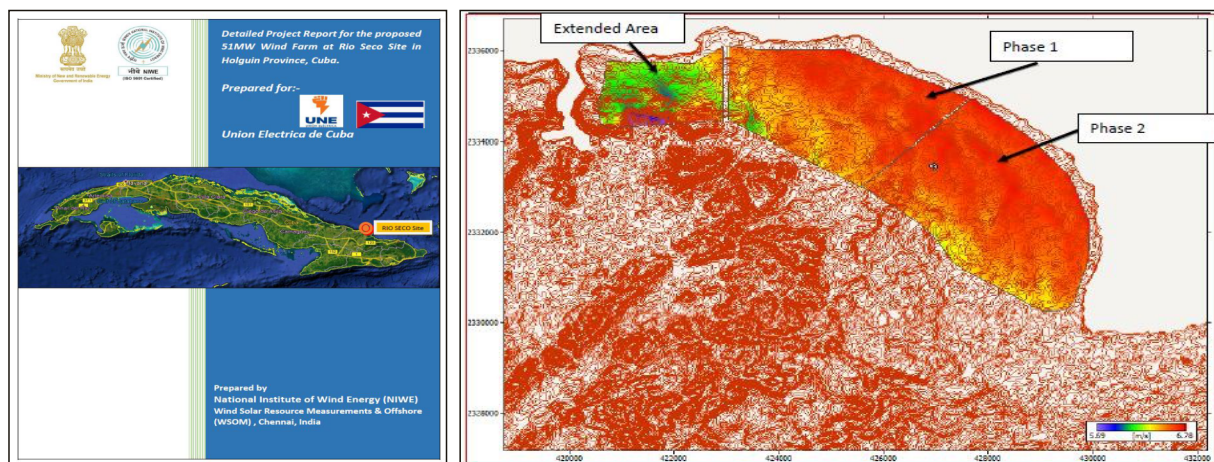
The objective of this project is to collect and publish best available data for the Indian offshore sector to outline the current and projected technical and economic data for Indian offshore wind farms for the benefit of the offshore wind industry and relevant authorities. The higher quality of

the data, the better the support for decision making in the government to assess necessary support mechanisms, promote cost-efficiency and benchmark against other technologies. Hence, high quality offshore wind data in India can support decision-making and continued development of the Indian offshore wind sector in the years to come. Within the FIMO project, key Indian and international stakeholders in the offshore wind power sector have continuously been consulted in the collection of data and cost estimates and have provided valuable inputs.

On 26th February 2021, the National Institute of Wind Energy (NIWE) in India and The Danish Energy Agency (DEA) presented the preliminary project findings of the project “Financial modelling of offshore wind farms in India (FIMO)” at a virtual workshop attended by over 100 participants from both private and public stakeholders in India and the international community. The project results presented include the first Indian offshore wind power technology catalogue, including data and cost estimates for the first Indian offshore wind farms. Based on this, the financial estimate and benchmark have been made for the expected price of the energy production from the first wind farms in India – the Levelized Cost of Energy (LCOE).

International Projects

During the year, NIWE has successfully completed the project entitled “Techno-Economic feasibility studies for establishment of 51 MW windfarm at Rio Seco, Holguin Province, Cuba” under “Line of Credit (LOC)” financial mechanism through MEA (Ministry of External Affairs), an International consultancy service first of its kind for the institute. The Detailed Project Report (DPR) for the site has been submitted to the Cuban counterpart and accepted by them for the successful project closure.



Software simulation view of proposed windfarm at 98.5 level

Further, 11 Nos. of consultancy project reports for both government and private projects in various facets of Wind Resource Assessment (WRA) sector viz., Technical Due Diligence, Verification of Wind Monitoring Procedure, Energy Production Demonstration Test (EPDT), Technical Bid Evaluation in terms of Energy Estimation were successfully reviewed and completed.

Solar Radiation Resource Assessment

Solar Radiation Resource Assessment (SRRA) unit started in the year 2011 as mission mode project is fully funded by the Ministry. The project was completed in two phases, 51 stations in Phase-I (2011) and 60 stations in Phase-II (2014). Besides, four Advanced Measurement Stations (AMS) were completed in 2014. All these SRRA stations are fully automatic, grid independent and records one second data and after integration, transmits one-minute data to the Central Server by GPRS. All stations identify and measure both solar and weather parameters. The data received is quality controlled using BSRN protocol and the QC data is made available to the different stake holders as per the MNRE Data Policy. All stations measures GHI, DHI and DNI and weather parameters, such as temperature, humidity, pressure, rain fall, wind speed & direction and also host of other derived parameters. The four AMS stations were part of the BSRN Global Network and the data is shared among member countries for climate change activities. Under this program, NIWE had prepared the Solar Radiation Atlas, a first of its kind combining satellite-derived data and the world's largest high quality network of simultaneously measured solar ground data.

During the financial year 2020-21, NIWE has carried out calibration of 39 Pyranometers and one Pyrheliometer under commercial mode at NIWE and PITAM calibration Lab.



Calibration Laboratory – NIWE



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“India has now graduated from megawatts to gigawatts in terms of renewable energy production.”

- Shri. Narendra Damodardas Modi
Hon'ble Prime Minister of India

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A. Senthil Kumar

Director &
Division Head

TEAM

M. SARAVANAN
Deputy Director (Technical)

C. DESINGU
Junior Engineer

Standards and Regulation

Wind energy sector is rapidly growing in India with the increased unit size, higher hub height and larger rotor diameter. Standards & Regulation (S&R) division provides various services for the healthy and orderly growth of Wind Energy sector. Wind Energy in India has matured over decades and is presently considered as one of the mainstream source of Renewable power generation.

Scaling Up Domestic Manufacturing of Wind Turbine Components – A Step towards Atmanirbhar Bharat- Make in India

As a part of scaling up the “Make in India” program to increase the domestic manufacturing in wind turbines and to reduce the import content in wind turbines, MNRE has suggested National Institute of Wind Energy (NIWE) during end of March, 2020 to discuss with the wind turbine components manufacturers to broadly understand the present status of wind turbine components industry, challenges & expectations and prepare a report.

In this regard, S&R division, NIWE organized the meetings with the major wind turbine component manufacturers viz., Tower, Gearbox, Pitch & Yaw Drives, Bearings, Blade, Castings, Forgings and Blade raw material manufacturers the country during May to August 2020 through Video Conference. The meetings are aimed to understand the present status of wind turbine components industry, challenges faced by them and their expectations. For each major component, the meetings were held separately with manufacturers, which were attended by the senior officials of

wind turbine industry, MNRE and NIWE. The major findings of the discussion with component manufacturers were discussed with the Original Equipment Manufacturer (OEM) of wind turbines during August 2020 and their views were obtained.

Based on the discussions, the preliminary report on “Scaling Up Domestic Manufacturing of Wind Turbine Components – A Step towards Atmanirbhar”, prepared by S&R division was submitted to MNRE.

Standards

S&R division is providing the technical support to BIS for the standards related works on a continuous basis throughout the year. Bureau of Indian Standards (BIS) is the National Standards Body which issues Indian Standards. A committee viz., Wind Turbines Sectional Committee (ETD 42) was formulated by BIS for preparation of Indian standards on wind turbines, under the Chairmanship of Director General, NIWE. S&R division, which is a part of BIS ETD 42 committee, provides the technical support to BIS in all the standards related works and for the preparation of Indian Standards on wind turbines. Fifteen Indian standards on wind turbines have been finalized so far.

International Standards IEC/IECRE

India is the “P” Member in IEC TC 88 committee (through BIS) which issues IEC standards on wind turbine. India is also a member of “The IEC System for Certification to Standards Relating to Equipment for Use in Renewable Energy Applications (IECRE System) through BIS, which aims to facilitate international trade in equipment and services for use in Renewable Energy Sectors while maintaining the required level of safety”.

S&R division has been providing technical support to BIS regularly, on the works related to IEC standards / IECRE documents by reviewing various draft IEC standards / IECRE documents and also preparing voting recommendations for those draft IEC standards / IECRE documents for IEC TC 88 Committee / IECRE.

During the year various draft IEC/IECRE documents have been reviewed. Based on the review, voting recommendations along with the comments for 70 nos. of draft IEC/IECRE documents have been sent to BIS for further forwarding to IEC/IECRE, as a voting recommendation from India and as a contribution towards formulation of International standards.

Officials of NIWE attended the IECRE meeting regularly.

Contribution to IEC / IECRE

A working group viz., REMC WG010 "Grid code compliance" was formulated by IECRE for preparation of new ODs (Operational Documents) in the field of grid code compliance. DG, NIWE is a member of the above said working group. NIWE prepared the draft document on “Grid code compliance assessment for Wind Power Generating Unit and System” and submitted the same to WG010. The work is still under progress.

IEA Wind membership

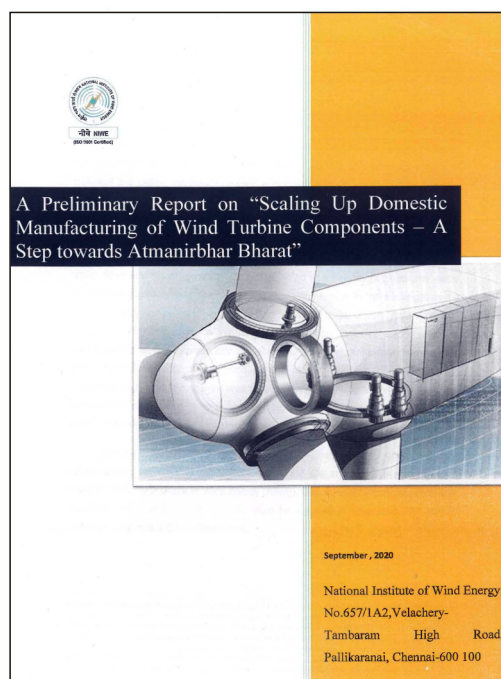
Executive Committee (ExCo) of the Wind Technology Collaboration Programme (TCP) of International Energy Agency (IEA) held on May 26-29, 2020 unanimously resolved to invite the Government of India to join the Wind TCP as a Contracting Party. Accordingly, Ministry of New and Renewable Energy (MNRE) has accepted the invitation and designated National Institute of Wind Energy (NIWE) to be the contracting party in the Wind TCP for and on behalf of Government of India. Becoming a member of Wind TCP Programme of IEA Wind, NIWE would provide an impetus to address the country specific technical issues related to the wind energy in the early stage of research itself with the technical support from international experts and also facilitate participation in core technical research under international funded projects. IEA Wind membership multiplies the work of national efforts with information exchange and joint research and development projects.

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

MNRE is issuing Revised List of Models and Manufacturers of wind turbines (RLMM) periodically for the healthy and orderly growth of wind power project in the country. S&R division, which is the part of RLMM committee, has been providing the support to MNRE in handling RLMM related works and in verification of documentation. During the year, review of documentation has been completed for 20 wind turbine models and the review comments have been submitted to MNRE / RLMM committee even during lockdown period due to COVID-19 pandemic conditions.

Prototype Wind Turbine Models

The amended guidelines of MNRE dated 02.06.2016 for installation of prototype wind turbine models in India is being implemented by S&R division. By implementing the guidelines, the division facilitates the installation of Prototype wind turbine models in India to carry out the Type Testing for obtaining Type Certificate. In this regard, NIWE has formulated a committee to take the suitable decision on issuing the recommendation letters. S&R division provides the technical support to the committee in verification of the documentation of the prototype wind turbine models towards compliance as per the requirements stipulated in the MNRE guidelines for obtaining the recommendation letter(s) in connection with grid synchronization.



During the year, the review / verification of documentation of one prototype wind turbine model in connection with installation of prototype wind turbine in India as per MNRE guidelines has been completed and submitted the details in the prototype committee meeting through video conference. Based on the decision of the committee, the division has issued recommendation letter in connection with grid synchronization of one prototype wind turbine model with a rated capacity of 3300 kW for the purpose of type testing.

Quality Management System (QMS)

The services offered by NIWE viz., “Provision of type certification, testing and wind resource assessment services related to wind energy” are already certified as per ISO 9001:2015 by “DNV GL BUSINESS ASSURANCE INDIA PVT. LTD”. During the year, NIWE has successfully undergone the periodic audit of Quality Management System as per ISO 9001:2015 conducted by “DNV GL BUSINESS ASSURANCE INDIA PVT. LTD” through video conference. Based on the audit, “DNV GL BUSINESS ASSURANCE INDIA PVT. LTD” has recommended for continuation of Certification as per ISO 9001:2015 for NIWE.

Wind Turbine Inspection

Based on the communication received from MNRE, a joint Inspection was carried out by a team of officials of NIWE and TANGEDCO at installed wind turbines in Kayathar and Ottapidaram talukas. Based on the inspection, an inspection report titled “A Report on Joint Inspection of Installed Wind Turbines in Kayathar and Ottapidaram talukas” was prepared by NIWE and submitted to MNRE.



J.C. David Solomon

Director &
Division Head

TEAM

N. RAJ KUMAR
Additional Director

BHUKYA RAMDAS
Deputy Director (Technical)

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Assistant Executive Engineer

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Assistant Executive Engineer

NAVEEN MUTHU. R.
Junior Engineer

K.A.HAJI ABDUL IBRAHIM
Record Keeper

Testing and Research Station

Asia's First Large Wind Turbine Test Station was established in NIWE's Wind Turbine Test Station (WTTS) near Kayathar in Tamil Nadu. Also acts as the lead coordinating Lab for Testing Wind Turbines, as per the National Lab Policy of Govt. of India, for arranging Inter Lab Comparison works to ensure validity of results.

It was established with the technical assistance of Danish Technical University (earlier RISO National Laboratory), Denmark under the Danish International Development Agency (DANIDA) grant and with financial assistance and guidance from the Ministry of New and Renewable Energy (MNRE), Government of India. The Test Station has the following facilities:

- ◆ ISO/IEC 17025:2017 accredited Test facility and is the only lab under NABL in India since Year 2006 for Wind Turbine Testing
- ◆ Two test beds to test Large wind turbines up to a total capacity of 1650 kW with readily available grid connection for each test bed.
- ◆ Four Test beds to test Small Wind Turbines and test beds can be expanded further on request.
- ◆ Readily available reference met masts in front of each test bed for heights of 75 meters and 50 meters 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 two office buildings.

- ◆ Availability of state-of-art data acquisition systems for measurements at the control room of each test bed.
- ◆ Availability of an office cum workshop building at WTTS with support team & facilities to carry out any needed measurements support.
- ◆ The workshop is equipped with adequate space to accommodate a MW WTG nacelle for instrumentation purposes.
- ◆ Availability of sensors and transducers as per the requirements of IEC standards which are stored as per the Quality management system procedures.
- ◆ Availability of 9 No's of 200kW Micon, one number each of 600 kW Suzlon, 2000 kW Senvion & Inox make wind turbines' for development of new measurements techniques and National Research.
- ◆ In-house laboratory for functionality check-up of instruments.
- ◆ In-house laboratory for data warehousing, signal conditioning, equipment design, training & calibration etc.

Testing

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 61400-1,2, IEC 61400-11, IEC 61400-12-1/2, IEC 61400-13 and IEC 61400-21.

- ◆ Power performance measurement
- ◆ Yaw efficiency test
- ◆ Safety and functional test
- ◆ Load measurements
- ◆ Additionally, capable of undertaking User defined measurements in Mechanical Loads, Performance Assessment, Acoustics & Power Quality

The above mentioned tests are also being offered to be carried out at customer sites, if the site meets the requirements of IEC Standards regarding terrain, obstacles, sector for measurements and wind conditions.

The testing facilities are certified as per the requirements of ISO 9001:2015 and accredited as per the requirements of ISO / IEC 17025:2017.

The Division contributes to the wind energy community by knowledge transfer through National and International training programmes and scientific papers to various National / International journals and conferences on a periodic basis.

During this period the following activities were carried out

- ◆ Power Curve Measurements of Inox 2000 kW WT with 100 rotor diameter at Rojmal, Rajkot District, Gujarat of M/s. Inox Wind Ltd.
- ◆ Type Testing of Pioneer 750/57 Rotor diameter at Cheliyanallur Village, Manur Taluk, Tirunelveli District, Tamil Nadu of M/s. Para Enterprises Pvt Ltd.
- ◆ An agreement was inked between NIWE and M/s. Inox Wind Ltd on 31st July, 2020 for Power Curve Measurement (PCM) for Model - INOX DF/2000/113, 2000 kW, a wind turbine from M/s. Inox Renewables Ltd at Savarkundla, Amreli District Gujarat. The measurements have been completed as per the signed agreement.
- ◆ An agreement was inked between NIWE and M/s. Para Enterprises Pvt Ltd on 06th August, 2020 for Acoustic Noise Measurement (ANM) for Model -P57,750 kW, a wind turbine from Para Enterprises Private Limited at Manur Taluk, Tirunelveli District, Tamil Nadu. Measurements completed.
- ◆ Type Testing of 3 MW Prototype turbine with 145 meter rotor diameter at Rojmal Site, Gujarat of M/s. Inox Wind Ltd. The Site Feasibility Study (SFS) was completed on 22.12.2020.
- ◆ Type Testing of Vaata 5.5 kW wind turbine at Wind Turbine Research Station (WTRS), Kayathar. The measurements have been completed as per the signed agreement.

Activities related to Creation of National Test Centre For Offshore Wind Turbines

- ◆ 75 acres of land paper has been handed over to NIWE by Tahsildar, Rameshwaram for National Research & Test Centre for offshore wind turbine at Dhanushkodi on 18.06.2020.
- ◆ Wind Characteristics study at test site has been completed by DTU under INDEP Programme.
- ◆ Launched stakeholders survey and obtained responses from 13 stakeholders which includes OEM's and few CB and Component Suppliers



Cable Laying Work for Power Curve Measurement (PCM) for Model - INOX DF/2000/113, 2000 kW, a wind turbine from M/s. Inox Wind Ltd at Savarkundla, Amreli District Gujarat



Acoustic Noise Measurement (ANM) for Model –P57,750 kW, a wind turbine from M/s. Para Enterprises Private Limited at Manur Taluk, Tirunelveli District, Tamil Nadu

- ◆ Internal Workshop conducted on 10th March, 2021 on National Test Centre for Offshore wind turbine at Dhanushkodi between NIWE DTU & DEA WRT to stakeholders survey.
- ◆ Based on the recommendations of the internal workshop, NIWE started plans for detailed interviews with Stakeholders who had responded to the online Survey. An external stakeholders Workshops / meeting are being planned and conducted after the completion of the interviews. One interview has been completed with OEM.
- ◆ Based on the Dhanushkodi detailed report, Survey results and Stakeholder meetings / Workshop, DTU wind will issue Pre-feasibility study report for Dhanushkodi Test Centre under the existing MoU between MNRE and Danish Ministry – the INDEP program.

Wind Turbine Testing Programme : Building Quality Assurance & Capacity

- ◆ NIWE as the lead coordinating of MNRE has successfully organized and completed its first ILC (Inter Lab Comparison) on wind turbine power performance assessment as per IEC 61400-12-1 as a part of quality assurance activity with four major laboratories (UL, DNVGL, Profec Ventus & Windguard) operating in India. This activity was carried out as a part of MNRE's Lab Policy.
- ◆ As a part of Quality Assurance Activity, an agreement has been signed on 15th September, 2020 for participation in Proficiency Testing activities like Acoustic, Power Performance and Load measurements (by International Agency viz, MEASNET (appointed by IECRE)).

- ◆ Trial measurement and data recording with respect to Power Quality carried out on Senvion 2000 kW wind turbine for fine turning PQ measurement techniques.
- ◆ Trial measurement of Acoustic Measurement completed on Suzlon 600 kW wind turbine.
- ◆ The Division was reaccredited by NABL per the requirements of ISO/IEC 17025:2017 for both Electrical and Mechanical parameters with validity from 07.03.2019 to 06.03.2021 extended for one more year due to the Pandemic. The chain of accreditation has remained unbroken for the Division since year 2006 when it was first accredited for Turbine Type Testing
- ◆ The Division received the revised ISO 9001:2015 Quality Management System Certificate which is valid until 10.08.2022 issued by M/s. DNV GL Business Assurance India Pvt Ltd.



“

"The focus is on enhancing sustainability, resilience and improving efficiency,"

- Shri. Narendra Damodardas Modi
Hon'ble Prime Minister of India

”





S.A. Mathew

Director &
Division Head

Certification of Wind Turbines

TEAM

S. ARULSELVAN
Assistant Executive Engineer

S. PARAMASIVAN
Assistant Engineer

Type certification is to confirm that the wind turbine type is designed, documented and manufactured in conformity with design assumptions, specific standards and other technical requirements. Type certification of wind turbines plays an important role to increase confidence among stakeholders including investors, utilities, financial institution, insurance agencies, governmental authorities and such others. Type Certification of wind turbines facilitate the orderly growth of wind energy sector. Currently NIWE provides Certification services in India based on IS/IEC 61400-22:2010. The following major activities have been completed by the division.

Accreditation from NABCB

NIWE has obtained international accreditation for the certification services as per the ISO/IEC 17065 standard from National Accreditation Board for Certification Bodies (NABCB), Quality Council of India (QCI). NIWE underwent the steps such as Document Review, Office Assessment as well as Witness Assessment successfully. Based on the above NIWE has obtained Accreditation for the scope of 'Type Certification of Wind Turbines and their Components' as per ISO/IEC 17065 from NABCB, QCI on 16.04.2020.

First Surveillance Assessment by NABCB

As a follow up, NABCB has conducted the first surveillance assessment as per ISO/IEC 17065 requirements during 11.01.2021 and 12.01.2021. NIWE underwent the assessment successfully. Also, Manufacturing Evaluation



Visit to Manufacturing Plant to conduct IPE for Generator

(ME) of Hub and Nacelle assembly plant was carried out in 29th Jan 2021 and the same was considered for 'Witness Assessment' by NABCB assessors. Manufacturing Evaluation was also successfully completed and Accreditation was extended for 1 more year by NABCB, QCI. The continual improvement and maintaining the Accreditation System are ongoing.

List of Certification Projects completed

Pre-evaluation of documentation in connection with the Type Certification of the wind turbine model viz., Siva 250/50

List of Certification Projects Ongoing

Evaluation of documentation in connection with the Type Certification of the wind turbine model viz., GWL 225



Conducted Onsite Inspection in connection with LTE Assessment

List of Certification Projects completed in co-operation with TUV, Germany

- ◆ Completed the Generator IPE as per GL 2010 for M/s. Inox Wind Limited
- ◆ Completed Onsite Inspection of 4 numbers of wind turbines in connection with LTE assessment.

Agreement for co-operation

Co-operation agreement has been signed between NIWE, M/s TUV Rheinland Industrie Service GmbH, Germany and M/s TUV Rheinland (India) Private Limited, Bengaluru and the routine interaction is ongoing.

Quality Management System

Wind Turbine Type Certification services of NIWE are certified as per the requirements of ISO 9001: 2015 by Det Norske Veritas (DNV), Norway. During the year, Certification division has successfully undergone the First Periodic Audit and has been recommended for continuation of certification issued by DNV-GL. The continual improvement and maintaining the Quality Management System are ongoing.

“

“Small acts can drive reforms. What appears minor can actually be vital and fundamental. Generating 20,000 MW of power attracts a lot of attention. That is important. At the same time, 20,000 MW of power can be saved through a people's movement for energy efficiency. The second is more difficult but is as important as the first. Small indeed, is beautiful.”

- Shri. Narendra Damodardas Modi
Hon'ble Prime Minister of India

”



K. Boopathi

Director &
Division Head

Research and Development, Resource Data Analytics & Forecasting and SRRA/RE projects

TEAM

A.G. RANGARAJ
Deputy Director (Technical)

M.C.LAVANYA
Deputy Director (Technical)

YELCHURI SRINATH
Assistant Director (Technical)

Research and Development

Research & Development of NIWE was established with the aim of addressing the specific purpose of supporting time bound and mission oriented research and development programmes to achieve and maintain world class, reliable and cost effective technology in wind power systems. The Division continues to improve its knowledge and skills through continuous learning, to keep pace with the state-of-the-art technology and excel through innovative approaches. The Division carries out in-house R&D and coordinates research and development programs through effective networking with academic institutions, industry, experts and consultants working in a wide spectrum of disciplines for the benefit of wind energy sector.

External / Collaborative project proposals ("RFP category")

Throughout the year, research proposals are solicited from various research / academic institutions, universities, industry, research scholars and consultancy organizations to support Research and Development programs by promoting the reliable and novel cost-effective technologies in wind power systems. Four new research proposals under RFP mode were received during this financial year.

Project Monitoring Committee

Reconstituted a Project Monitoring Committee (PMC) to review the ongoing NIWE funded R&D projects and new RFP proposals for a period of two years.

NIWE Funded Projects

Wind-Driven Air Storage System

In association with KCG Engineering College, Chennai, a compressed air storage system has been proposed. Experimental analysis was conducted on the compressor to study the effects of backpressure under various wind speed conditions. The resonance phenomena for all the dynamic loads were studied and presented as a progress report. Further, a comparative analysis was performed on a direct wind-driven compressor against the electrical compressor. Publication of papers in national/international journals are in review.

Demonstration of the assembled system and results of initial testing has been completed. Erection of the fabricated wind tower system at the KCG college campus has been initiated.

Control of Multi-Input Converter for Hybrid Wind Solar Battery Based System

The project proposes a multi-input DC-DC converter for the hybrid wind/ photovoltaic (PV)/ storage based system in order to interface multiple DC sources / storage. The proposed inverter consists of buck/buck boost fused multi-input DC-DC converter and a full-bridge DC-AC inverter. The variations in input voltages are to be accommodated and to be controlled to satisfy the load power demand, and to maintain the state of charge (SOC) of the battery bank to prevent blackout and to extend the life of the batteries. The output power characteristics of the wind turbine and the PV array will be considered during development of the control strategy. Both sliding mode and supervisor control will be developed to determine the online operation mode of both generation subsystems, and switching from power regulation to maximum power conversion mode. Furthermore, the control will include fault tolerant mechanisms to monitor and react on fault occurrences. The control circuit will be realized by using digital signal processor and auxiliary analog circuits. Both grid-connected maximum power point tracking of the systems, and stand-alone active and reactive power supply criteria will be accomplished in real time.

Development of controllers and implementation of controller in simulation environment and its simulated results. The Fabrication of experimental system and Performance of hardware, analysis of controller and result of analysis. A paper publication in national / International journal has been done and a detailed project report is submitted.

Direct Drive Doubly salient permanent magnet machine for Roof-Top wind energy application

Roof-Top wind power generation has a huge potential in India due to the rapid urbanization resulting in many sky-scrappers and high-rise buildings. The blades of these wind turbines usually rotate at lower-speed of 140-500 rpm. Conventional, induction and synchronous machines are not suitable for such low-speed and low -power applications. Further, many of the low-speed application are handled through conventional high-speed motor and reduction gear.

Along with efficiency, power density is another crucial design parameter, especially for roof-top wind power generators. However, conventionally employed induction and synchronous machines have lower efficiency and power density compared to permanent magnet (PM) machines. The absence of the field winding in a PM machine significantly reduces the overall losses. On the other hand, rare-earth PM prices are very high and volatile. The motivation of the project would be to carry-out research work on the design and fabrication of a doubly-salient PM machine without rare-earth PM for wind power generators, featuring high efficiency and power density.

The objective is to design a flux reversal machine (or any other suitable machine) with efficiency > 92%, so as to meet the international efficiency standards of NEMA. The design would focus on flux reversal machine / hybrid PM machine with a single air-gap and the use of low-cost ferrite magnets and also focus on improving the power density of the machine to make it light weight.

During the current financial year, an additional literature survey on the proposed area has been done. Modelling of PM generator using magnetic circuit and finite element software. Development of the 3-D finite element model of the proposed PM generator. Theoretical performances of the modelled PM generator has been done.

Indo-Danish Project

A Research collaboration project on “Maintenance and Repair Strategy for Wind Energy Development” has been sanctioned under Danish Innovation Fund with a project cost of DKK 5,62,200 for a term of 3 years (1st October 2020 to 30th September 2023).

The following activities were carried out during the year

- ◆ Signing of a partnership agreement with DTU, Denmark has been completed
- ◆ List of station wise data available with IMD & ISRO was reviewed
- ◆ Survey 01 on “Wind Turbine Operations & Maintenance Challenges” has been conducted and presented the results in the 2nd International Symposium on Leading Edge Erosion hosted by DTU, Denmark.



- Submitted an Abstract “Wind Turbine blade damage mechanisms and repair technologies: survey of strategies and regional differences” in 2nd International Symposium on Leading Edge Erosion and selected for presentation at the Wind Energy Science Conference (WESC), Germany.
- A survey 02 has been initiated to collect the data from IPP's, Wind Farm Owners, Analysts, Technicians, Operators and service providers.
- Last 18 years Historical wind data has been collected from IMD, India.

Project “Maintenance and Repair Strategy for Wind Energy Development”

Duration: October 1, 2020- September 31, 2023
Budget: 4.6 Mio kroner
Supported by Danida Fellowship Center

Partners:

- DTU Wind Energy
- Danish Blade Service
- NIWE (National Institute of Wind Energy), IN
- WISH Energy Solutions, IN
- WindCare India Pvt.Ltd., IN
- NAL (National Aerospace Laboratories), IN
- IIT Delhi, Department of Applied Mechanics, IN

Work Packages:

- Perspectives of maintenance and **repair market** on wind turbines.
- Field studies:** degradation mechanisms and post-repair behaviour.
- Protection, maintenance and **repair package:** Development and validation.
- Computational model** of wind turbine degradation and repair.
- Strategy and **decision support** for repair
- Capacity building** in India: Training and network of specialists

Danida Fellowship Centre
Sustaining development through research and learning

Student Internship & Final Year Project

To encourage students to choose renewable energy as their career option, NIWE is providing Internships in the field of renewable energy every year. The internship will be called as “NIWE-Academic Associate Programme (AAP)”. NIWE-AAP will provide opportunities for the students to work with scientists/engineers on NIWE's projects. An internal committee has been constituted for scrutiny and review of the applications.

During the year 2020-21, twenty-seven graduate & post graduate students / faculties have completed their internship / project work and fourteen graduate and post-graduate students are presently pursuing Internship and project work at NIWE in the field of Wind and Solar energy mentored by various subject matter experts.

Other R&D Activities

- Towards the initiative of 'Greening Islands', field visits to Lakshadweep Islands were completed towards finalizing the locations for installing the wind monitoring stations and wind turbines, which will facilitate in reducing the dependency on fossil fuels.
- Site visit carried out at Leh & Ladakh for identifying locations for establishment of Wind Monitoring Stations and Solar Radiation Stations.
- Repowering analysis in the state of Gujarat at Dhank and Mervadar sites carried out and detailed report has been prepared and submitted.
- Repowering analysis in the state of Tamil Nadu at Aralvoimozhi and Kayathar sites carried out and detailed report has been prepared and submitted.
- Prepared a report on Global technology status and tariff trends for wind energy (both onshore and offshore).

Wind & Solar Power Forecasting

Under Centre for Excellence (CFE) in VG power forecasting project, NIWE has developed an In-house-Data Management System, Indigenous Wind and Solar Power Forecasting model, Data Monitoring System, Web portal, forecast simulation tools, and security system. NIWE has created an operational forecast system with simulation tools to predict the wind and solar power up to 7 days ahead. To improve the forecasting model further, NIWE has been testing the forecasting model with different NWP data sources and also working on different machine learning algorithms. It has initiated a collaborative work with NREL to improve the forecasting model and to test data imputation techniques. The VG power forecasting project has been successfully completed on 31st March 2021.

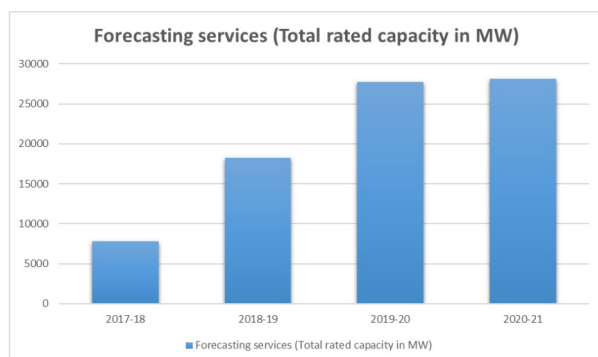
Resource Data Analytics and Forecasting (RDAF)

Under resource data analytics, NIWE has segregated all the wind, solar resource data and forecasting data in centralized data server. NIWE has developed an operational script to download and store the data in a centralized server everyday automatically.

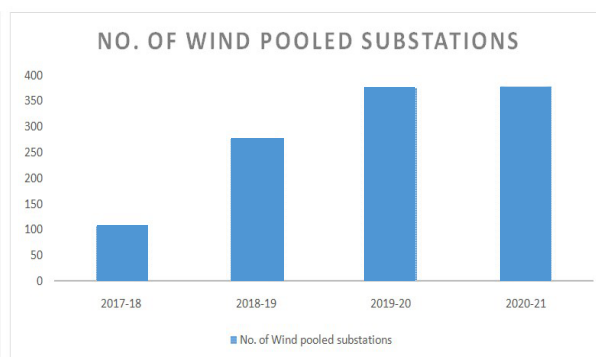
NIWE has developed an automated resource data quality management system to run the data quality checks before storing the data. In addition NIWE has developed an in house parquet based data management system to carryout data analytics. It will improve the efficiency of data analysis, especially when working with huge RE data.

Variable Generation (VG) Forecasting

NIWE has signed MoU with Gujarat, Andhra Pradesh, Karnataka, Maharashtra & SRLDC and successfully delivered Wind Power Forecasting services to respective SLDC until March 2021, Also, the Pilot Solar Power Forecasting services have been initiated for SRLDC (NP Kunta Solar Park & Chandragiri Wind Farm)



Forecasting Services in MW



Wind Pooled Sub-station

NIWE Indigenous Wind Power forecast model

- ◆ NIWE has provided VG forecasting services on a commercial basis to Tamil Nadu SLDC and pilot power forecasting for other RE prosperous state SLDCs upto 31st March 2021.
- ◆ The Pilot Operational Wind Power Forecasting services extended for the whole state of Gujarat from April 2020 to March 2021.
- ◆ The Pilot Operational Wind Power Forecasting services extended for the whole state of Maharashtra from May 2020 to March 2021.
- ◆ The Pilot Operational Wind Power Forecasting services extended for the whole state of Karnataka up to January 2021.
- ◆ The Pilot Operational Wind Power Forecasting services extended for the whole state of Andhra Pradesh up to March 2021.
- ◆ The Pilot Operational Wind and solar Power Forecasting services extended up to September 2020.

Web Portal Development

In addition, during the year, the following portals were developed to facilitate various internal activities of NIWE,

Development of Resource Data analytics and Forecasting portal has been completed and security audit is under progress

The following are the features of the Forecasting portal:

- ◆ The purpose of this forecasting portal is to provide access to the wind/solar forecasted data and to create a convenient & easy-to-use application for stakeholders to forecast wind/solar power and also to visualize the wind/solar power forecast data.
- ◆ In this interactive platform, it is possible to extract the higher resolution Meteorological forecast data viz., Wind Speed, Wind Direction, Global Horizontal Irradiance (GHI) and Temperature anywhere in India for the next 7 days.
- ◆ This Portal also delivers the following information of wind/solar resource data analytics as different sections namely, data monitoring, Univariate data analytics, Multivariate data analytics, Aggregation data analysis and Error analysis model wise and station wise sections.

Development of version 1 of 120m map portal has been completed and submitted to the competent authority

The following are the features of the 120 m map portal:

- ◆ The 120m wind portal gives an updated overview of the wind climatological conditions of India based on numerical Meso-Micro coupled model data set. The information provided here are expected to serve as the basis for preliminary site assessment during the prospecting phase of wind project developments in the country. Further, the information will be useful for all stakeholders of the sector including the policy makers, private players, and government agencies in their efforts towards achieving the country's RE goals.
- ◆ The basic functions of the portal are Wind Data for a Point and Wind Data for an Area.

Resource Data Analytics

- ◆ Newly Commissioned 11 stations added to an automatic data pre-process system.
- ◆ Prepared a tab files using older wind measurement stations data.
- ◆ Developed a RDAF_DBMS python package with different data analytics built-in functions.
- ◆ Long term wind pattern analysis has been in carried out in Kaythar, Tamil Nadu and a report has been prepared.

MOU / Agreement Signed

- ◆ Partnership Agreement for the Research collaboration project on “Maintenance and Repair Strategy for Wind Energy Development” has been signed with DTU, Denmark
- ◆ Memorandum of Understanding (MoU) has been signed between NIWE and VOC Port Trust regarding their intention to enter into transactions/ services pertaining to RE development and greening energy requirement.

AWARD/ ACHIEVEMENT BY THE DIVISION'S STAFF

- ◆ Presented a paper on **"Efficient and Secure Storage for Renewable Energy Resource Data using Parquet for Data Analytics."** and won **Second Position** in Track III during 5th International conference on data management, analytic and innovation 2021 – Authors - A.G.Rangaraj, A.ShobanaDevi, Y.Srinath, K.Boopathi, Dr. K. Balaraman
- ◆ Presented a paper on **"Automated data quality mechanism and analysis of meteorological data obtained from Wind Monitoring Stations of India."** and won **First Position** in Track III during 5th International conference on data management, analytic and innovation 2021 – Authors - Y.Srinath, Krithika Vijayakumar, S.M.Revathy, A.G.Rangaraj, Sheelarani.N, K.Boopathi, K. Balaraman



2 MW Solar Power Plant at IIM-Trichy Project Site Grid Synchronized from TNEB Sub Station

2 MWp Ground Mounted Grid Connected Solar Power Plant at Indian Institute of Management (IIM) - Trichy

NIWE has successfully commissioned 2 MW solar power plant and Synchronized with the Grid on 31.07.2020 at IIM, Trichy, Tamil Nadu. Solar generation details / reports from the commissioned plant at IIM –Trichy are shared to IIM and REC officials on daily basis. Work Completion Certificate is issued and the O&M activities has been initiated for the next five years to monitor the Performance Ratio.

During the year, the following projects were taken up under consultancy mode

- ◆ 1 MW (AC) Ground Mounted Grid Connected Solar Power Plant at Madurai Kamaraj University (MKU), Madurai
- ◆ 1 MWp Ground Mounted Grid Connected Solar Power Plant at Indian Maritime University, Chennai (IMU)
- ◆ Solar PV Power Plant on Roof Top of Underground Tank at Chembarabakkam 530 MLD Water Treatment Plant, Chennai, CMWSSB under RESCO Model



1 MW (AC) Ground Mounted Grid Connected Solar Power Plant at Madurai Kamaraj University (MKU), Madurai

SKILL DEVELOPMENT & OUTREACH



- Training
- Events
- Papers & Publications
- International Meetings / Trainings
- Visitors



KRITHICK. M - VII Std, Velammal Vidyalaya Annexure, Chennai

has been awarded the Award of Appreciation for the above drawing titled "Sustainable Energy and Wind Generation" under the category of 6th to 8th Standard in the E-poster competition conducted on 15th June 2020 on the occasion of "Global Wind Day".



Dr. P. Kanagavel

Director &
Division Head

Skill Development and Training

The Skill Development and Training (SDT) Division is the focal point for information dissemination and Skill Development Programme to create skilled / trained manpower not only in the country but also international level. Division is also creating awareness among the students and general public in promoting wind energy through academic promotion and outreach activities such as Library services, education visit, student projects, awareness lecture, knowledge forum, Global Wind Day celebration, IREDA-NIWE Awards for wind energy, sponsorship, advertisement and participation in relevant exhibitions.

Webinars

In order to utilize the time during COVID-19 pandemic lockdown restrictions, the SDT division had organized thirteen Webinars during June to December 2020 as per below schedule. A total of 2211 participants did their registration through google form and 600 participants have attended.

S.No.	Date	Speaker	Topic
1	03.06.2020	Dr. K. Balaraman Director General, NIWE	Sustainable Energy
2	10.07.2020	Dr. P. Kanagavel Director & Head, SDT, NIWE	Skill Development and Reskilling for Wind Sector
3	22.07.2020	Shri. K. Boopathi Director & Head R&D and RDAF, NIWE	Wind Resource Assessment
4	05.08.2020	Dr. G. Giridhar Scientist 'F' (Rtd.), MNRE	Solar Radiation and Resource Assessment
5	26.08.2020	Shri. A. Senthil Kumar Director & Head, S&R, NIWE	International Standards on Wind Turbines
6	09.09.2020	Shri. A.G. Rangaraj Deputy Director (Technical) R&D and RDAF, NIWE	Forecasting of Renewable Energy Production

S.No.	Date	Speaker	Topic
7	16.09.2020	Shri. S.Arulselvan Assistant Executive Engineer C&IT, NIWE	Type Certification of Wind Turbines
8	23.09.2020	Shri. J.C. David Solomon Director & Head, T&R, NIWE	Wind Turbine Testing Station
9	07.10.2020	Dr. Rajesh Katyal Deputy Director General & Head WSOM, NIWE	Offshore Wind Energy
10	21.10.2020	Shri J Bastin Deputy Director (Technical) WSOM, NIWE	Design and Layout of Wind Farms
11	18.11.2020	Ms. Deepa Kurup Additional Director, WSOM, NIWE	Electrical Systems of Wind Turbine
12	16.12.2020	Shri K. Boopathi Director & Head R&D and RDAF, NIWE	Research Opportunities in Wind Energy
13	23.12.2020	Shri. J.P. Singh Former Director, MNRE	Wind Energy Policies and Schemes

Customized Training Courses

The following customized training courses has been conducted successfully through online mode.

Online Training Course on “Wind Turbine Technology” [Especially for the employees of M/s. Adani Renewable Groups, Ahmedabad]

As requested by M/s. Adani Green Energy Ltd., Ahmedabad, the training was conducted through online due to the pandemic COVID – 19 situations with 27 Participants. The total duration for this online training course was 30 hours and held from 17th to 28th August 2020. The training course was designed for online lectures including exercises and case studies to stimulate active participation and dialogue. Assessment and evaluation was done for all the participants by end of the course. The wind energy market trends and demands had been analyzed and prepared

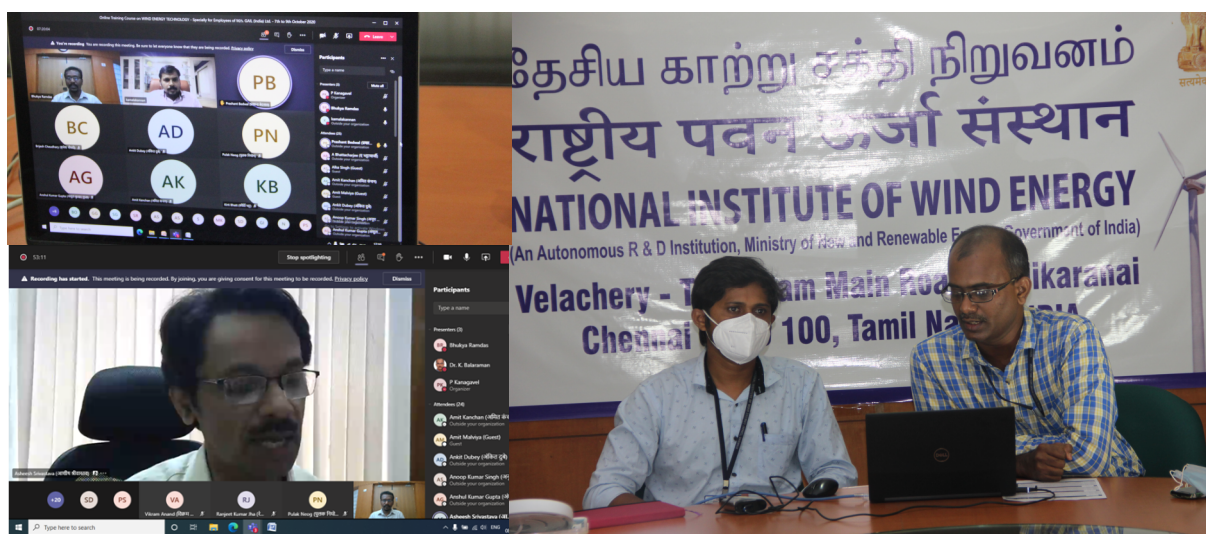


Glimpse of online training course for M/s. Adani Renewable Groups, Ahmedabad

the syllabus in consultation with the officials of the M/s. Adani Green Energy Ltd, towards successful knowledge transfer. The course provided complete overview about Wind Turbine Technology and its allied areas including wind turbine performance, SCADA and condition monitoring. The course was designed and intended to bring awareness and knowledge transfer for Supervisor, Assistant Managers, Deputy Managers, Associate Managers, General Managers, Senior engineers. The resource persons for this training course were Engineers of NIWE and national experts, who have years of experiences in the respective fields. The platform used for online training course was Microsoft Teams (MS Teams). Participants were very much satisfied with the training course conducted on the virtual mode, which was reflected in their feedback.

Online Training Course on “Wind Energy Technology” [Specially for the employees of M/s. GAIL (India) Limited, Noida]

As requested M/s. GAIL (India) Limited, Noida, the training was conducted through online with 36 Participants. The total duration scheduled for this online training course was 12 hours scheduled from 07th to 09th October 2020 which includes assessment / evaluation of the participants. The training course was designed for online lectures including exercises and case studies to stimulate active participation and dialogue. Assessment and evaluation was done for all the participants by end of the course. The wind energy market trends and demands had been analyzed and prepared the syllabus in consultation with the officials of the M/s Gail (India) Ltd, towards successful knowledge transfer. The course was designed and intended to bring awareness and knowledge transfer for Technical personnel Assistant Managers, Deputy Managers, Associate Managers, General Managers, Senior engineers. The resource persons for this training course were Engineers of NIWE and national experts, who have years of experiences in the respective fields. The platform used for online training course was Microsoft Teams (MS Teams). Participants were very much satisfied with the training course conducted on the virtual mode, which was reflected in their feedback.



Glimpse of online training course for M/s. GAIL (India) Limited, Noida

Vayumitra Foundation Course on "Wind Energy Technology"

NIWE has submitted a proposal to MNRE for conducting 10 numbers of "Vayumitra Foundation Course" on Wind Energy Technology with five days duration at NIWE, Chennai and GRI, Dindigul (five courses at each institute). MNRE has approved the proposal and sanctioned to train 350 numbers of participants. As per the sanction, 10 courses have to be completed by June 2020, due to COVID-19 lockdown and its restriction, time extension has been requested to complete all 10 courses till December 2020. Accordingly, MNRE has provided its approval for time extension and suggested to check the possibilities for conducting the training through online mode for the knowledge component of the training adopting to the COVID-19 pandemic situation.

As suggested by MNRE, the five days courses were split into two phases for engineers. The Phase-I with two days online training for knowledge component and Phase-II with three days physical / contact training at NIWE, Chennai Campus for skill component. All five courses at the Gandhigram Rural Institute (GRI), Dindigul were physical / contact courses as it was for ITI & Diploma holders.

The "Vayumitra Foundation Course" aimed to provide a complete overview about the Wind Energy Technology starting from introduction to wind power and its technology, wind resource assessment, installation and commissioning of wind turbine generator, operation and maintenance aspects of wind farms along with policy issues. This course was designed to cater to the needs of various personnel's such as technicians, engineers etc. focusing on un-employed youth with rural background with the focused group of technicians, diploma and graduates/post graduates engineers/professionals.

Training at NIWE

The Skill Development and Training (SDT) division of NIWE has conducted 5 batches of Vayumitra Foundation Course on "Wind Energy Technology" with 175 participants.

The following are the schedule of the online and physical training courses;

Batch	Phase I (online)	Phase II (Physical)
I	3 rd & 4 th August 2020	8 th to 10 th February 2021
II	3 rd & 4 th September 2020	11 th to 13 th February 2021
III	17 th & 18 th September 2020	15 th to 17 th February 2021
IV	29 th & 30 th September 2020	19 th to 21 st February 2021
V	15 th & 16 th October 2020	22 nd to 24 th February 2021

An overwhelming nomination of 481 applications received for the training courses scheduled at NIWE and shortlisted 175 appropriate candidates by following the eligibility criteria prescribed and also as per the norms of Government of India. The 175 participants for the online training



Glimpse of VFC training at NIWE

were from 17 States (Andhra Pradesh, Assam, Bihar, Chhattisgarh, Goa, Gujarat, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Odisha, Rajasthan, Tamil Nadu, Telangana, Uttarakhand, Uttar Pradesh and West Bengal) and 2 Union Territories (New Delhi and Pondicherry). Due to various reasons, 69 participants who had attended the online training courses, could not able to participate the physical / contact courses conducted at NIWE, Chennai and hence fresh 69 participants have been selected and conducted online courses exclusively for them on 09th & 10th February 2021 and allowed them to attend the physical / contact training courses.

During the 5 days course (online and physical), 17 class room lectures and 3 practical sessions at different laboratories were scheduled. The course content of the training were handled by Scientists and Engineers of NIWE.

The practical sessions on Wind Monitoring Station installation, assembling of Sensors, data collection and analysis were also scheduled during the training. The Renewable energy facilities and the Wind Turbine Training System at NIWE campus were also showcased / demonstrated to all the participants.

The course structure and organization of training was highly appreciated by the participants. The participants were very much satisfied by the quality of lectures and hospitality they found in NIWE, Chennai.

The participants have given positive feedback with the training course conducted both on online and the physical / contact mode.

Training at GRI

The Gandhigram Rural Institute – Deemed to be University has conducted the 5 batches of Vayumitra Foundation Course on "Wind Energy Technology" with 185 participants of ITI / Diploma holders. An overwhelming nominations were received for the training courses scheduled at GRI and short listed 185 appropriate candidates by following the eligibility criteria prescribed and also as per the norms of Government of India. MNRE has sanctioned only



Glimpse of VFC training at GRI



Glimpse of VFC training at GRI

175 participants through 5 training courses (35 participants per course) but GRI has trained 185 participants from different districts of Tamil Nadu.

During the 5 days course, 40% of theory class and 60% of hands on training at different laboratories has been imported. The course content of the training was handled by the experts from NIWE, GRI, Wind Industries and premier academic institutions.

The practical sessions on Wind Monitoring Station, data collection and analysis and performance evaluation of Small and Micro Wind Turbines were also scheduled during the training. The Renewable energy facilities and the Wind Turbine Training System at GRI campus were also showcased / demonstrated to all the participants apart from field visits to working wind farms. Additionally, Yoga classes and Gandhian value courses were also arranged as part of the course. The feedback is very much satisfactory.

The schedule of the training courses and no. of participants attended in each batch are as follows;

Batch	Scheduled Dates	No. of Participants attended
I	08.02.2021 to 12.02.2021	38
II	15.02.2021 to 19.02.2021	38
III	22.02.2021 to 26.02.2021	35
IV	01.03.2021 to 05.03.2021	38
V	08.03.2021 to 12.03.2021	36
Total		185

Special Training Course on "Wind Energy Technology"

The SDT Division of NIWE had conducted a special training course on "WIND ENERGY TECHNOLOGY" specially for the scientists of Ministry of New and Renewable Energy (MNRE) held during 22nd to 28th March 2021. The course addressed all aspects of Wind Power starting from

wind from wind resources assessment to project implementation and operations & maintenance aspects in a focused manner. 13 numbers of participants with one coordinator had attended the course.

The training course was inaugurated by Director General of NIWE and released the course material.

As part of the training course, course material was released and distributed to all the participants, faculties and guest, which is a book compilation of the write - ups of all the presentations / lectures collected from the lecturers and specially prepared for this particular content of the course for the benefit of the participants as a ready reference material.

There were 17 presentations scheduled during the course, which were handled by 12 NIWE Engineers and 5 external experts from wind turbine industry.

The participants were taken to the Technical & Safety Training Centre of M/s. Vestas Wind Technology India Private Limited located at Nellikuppam, Chennai, where they had a chance of visiting all the components of wind turbine and the experts trainers explained the working principals of the components along with the troubleshooting techniques.

The participants were also taken to the office of the Tamil Nadu Energy Development Agency (TEDA), Chennai – SNA Secretariat where they learnt about the programmes / schemes and the



Glimpse of Special Training for MNRE Scientist

process of deployment of the renewable energy projects in the State and also they got knowledge of awareness and migrate the State from using fossil fuels to renewable energy.

The participants have also visited large wind turbine manufacturing factory of M/s. Siemens Gamesa Renewable Energy, Chennai, where they had a chance of listening from the industry experts who are actually in the process of making wind turbines and also visited the manufacturing facilities with all major components and its process.

The participants were taken to southern part of Tamil Nadu to visit Wind Turbine Test Station and Wind Turbine Research Station at Kayathar, where they got exposure on small and large wind turbine testing process apart from visiting wind farms in and around Kayathar and Kanyakumari, where various capacities, models and makes of wind turbines are deployed in large numbers. They also visited : (i) Operation & Maintenance facilities at RS Windtech Engineers Pvt. Ltd., Aralvoimozhy, (ii) SCADA system at Suzlon wind farm, Radhapuram, (iii) Generator and Transformer facilities at Apollo Kumarapuram Junction and understood the complete overview of the wind turbine technology.

Dr. K. Balaraman, Director General, NIWE distributed the Course Certificates to all the participants during the Valedictory Function.

Vayumitra Skill Development Program

As a next step to Vayumitra Foundation Course, a project proposal has been submitted to MNRE to conduct Vayumitra Skill Development Programme (VSDP) to create 5010 Vayumitrans - Skilled man power for the Wind energy sector in 2 years 2021-22 to 2022-23 and the project will be started once receiving approval from MNRE. This will be an intensive course on different aspects of wind energy like Wind Resource Assessment, Operation and Maintenance of Electrical and Mechanical aspects of wind farms, taking the Qualification Packs developed by the Skill Council for Green Jobs (SCGJ) and approved by the Ministry of Skill Development and Entrepreneurship (MSDE), Government of India.

To Formulate and Design the ITI Course Curriculum in Wind Energy

MNRE has constituted a committee with DG, NIWE as the Chairman of the Committee to formulate and design the ITI course curriculum in Wind Energy. As per the directive of the committee, SDT division drafted the curriculum, which has been approved by the committee and MNRE. The approved curriculum has been forwarded to DGT for further process of implementation.



Events

IREDA - NIWE Awards 2020 & 2021

The third & fourth edition of the IREDA - NIWE Annual Award for Wind Energy 2020 & 2021 was planned well in advance and the invite for nominations for the following category were announced through NIWE / IREDA websites, advertisement through national daily newspapers and group communications.

The categories for which the nominations received were as follows -

Category	2020	2021
Best Performing State Nodal Agencies for the Year	1	1
Best Institution of Higher Learning in Wind Energy	3	4
Best Research Work in Wind Energy	12	14

The selection of the awardees for all the three categories of awards was done through an eminent Jury Committee consisting of technocrats from the wind energy field and mass media. The award process has been completed in transparent manner starting from the announcement to committee formation and selection of winners

Due to the continuous restrictions of the pandemic, it was decided to distribute the awards of 2020 in the award ceremony to be conducted in the fourth edition of the award 2021.

Global Wind Day 2020

The Global Wind Day is a worldwide event that is celebrated every year on June 15. The celebration is to encourage and raise awareness on wind energy, which is a natural form of energy and also sheds light on all the ways that wind energy helps to shape the energy systems.

NIWE, being the technical focal point for the development of wind energy in the country with the responsibility of creating awareness about the wind, its power and the possibilities it holds to change the world, the Global Wind Day has been celebrated since 2009 with various events on 15th June of every year.



Paintings of Award of Appreciation

As part of 2020 'Global Wind Day' celebration, e-Poster contest on “Sustainable Energy and Wind Generation” was organized for school students under the following Categories

- ◆ 6th to 8th Standard
- ◆ 9th & 10th Standard
- ◆ 11th & 12th Standard

The announcement was hosted in NIWE website and circulated in Social Media pages. A good response received from the school students from all over India. A committee constituted has scrutinized the e-Posters and selected posters which are having creativity, presentation and relevance to the given theme. The Nine e-posters had been chosen for Award of Appreciation and five e-posters for Award of “Appreciation – Consolation”.

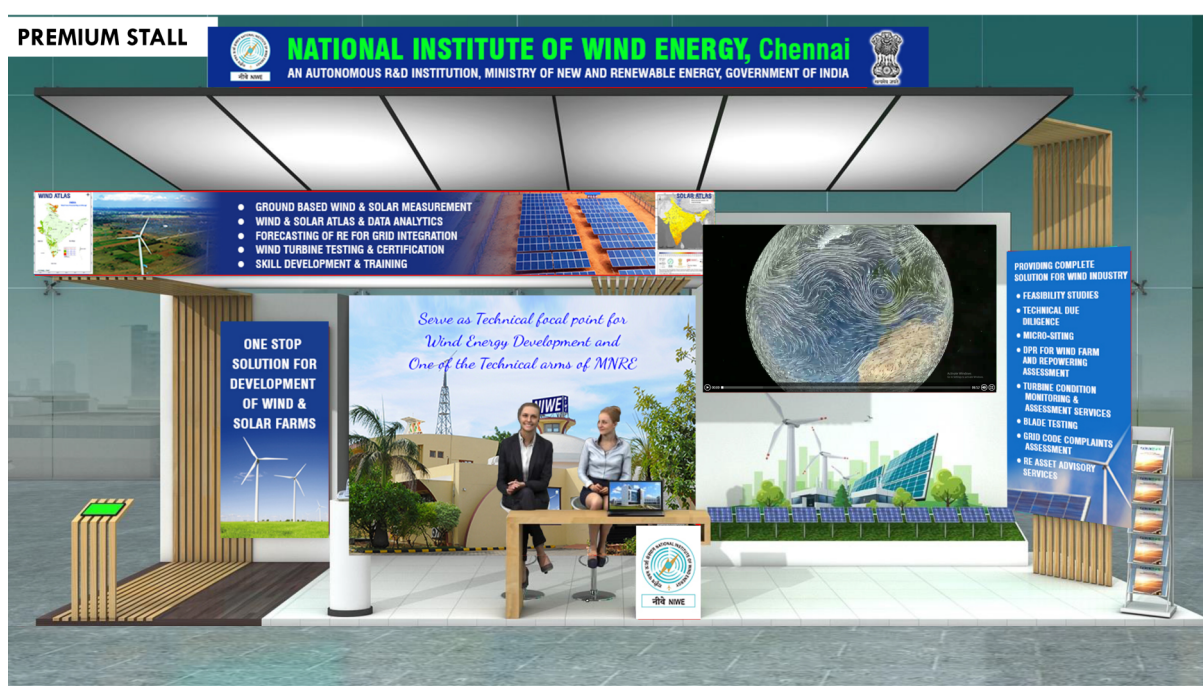
MoU signed

- ◆ MoU signed between Shell India Markets Pvt. Ltd. & NIWE on 17.8.2020 for three years
- ◆ MoU signed between Solar Energy Corporation of India Ltd. (SECI) & NIWE on 21.10.2020 for five years
- ◆ MoU signed between MNRE & NIWE for one year
- ◆ MoU signed between Sardar Swaran Singh National Institute of Bio Energy, Kapurthala & NIWE on 08.02.2021 for five years

3rd Global Re-Invest Meet & Expo 2020

SDT division arranged for NIWE's participation in 3rd Global Re-invest Meet & Expo 2020 held in virtual platform during 26-28 November 2020.

- ◆ Stall was designed and uploaded in the premium space link allotted to NIWE.
- ◆ Co-ordinated with scientists and Engineers of NIWE to take part in the conference.
- ◆ Mobilized participants to take part in the conference.





“

“India’s energy future has four pillars – Energy access, energy efficiency, energy sustainability and energy security.”

- Shri. Narendra Damodardas Modi
Hon’ble Prime Minister of India

”





Papers & Publications

1. Balaraman K., "A new Technique for Wind Turbine Power Curve Incomplete Bin Evaluation" *Renewable Energy and Sustainable Environment, NCRESE*, pp.85-99.
2. Boopathi K., Ramaswamy S., Rakhi Kushwaha., Balaraman K., Kanagavel P. (2020). "Repowering opportunities of Wind Turbines in the state of Tamilnadu, India: A systematic Review" *Juni Khyat*, 10 (5).
3. Boopathi K., Ramaswamy S., Kirubaharan V., Bastin J., ShobanaDevi A., Kanagavel P., Balaraman K. (2020). "Optimization of the Wind Farm Layout by Repowering the old Wind Farm and integrating Solar Power Plants: A Case Study" *International Journal of Renewable Energy Research (IJRER)*, 10 (3).
4. Boopathi K., Rakhi Kushwaha., Bastin J., Kanagavel P., Balaraman K., Reddy Prasad D.M. (2020). "Assessment of Wind Power Potential in the Coastal region of Tamil Nadu, India". *Ocean Engineering - An International Journal of Research and Development*, DOI: 10.1016/j.oceaneng.2020.108356
5. Revathy S.M., Rangaraj A.G., Srinath Y., Boopathi K., Shobana Devi A., Balaraman K.(2021). "Impact on Solar Radiation Parameters in India during COVID-19 lockdown: A case study". *International Journal of Sustainable Energy*, DOI: 10.1080/14786451.2021.1893726
6. Sourav Malakar., Saptarsi Goswami., Bhaswati Ganguli., Amlan Chakrabarti., Sugata Sen Roy., Boopathi K., Rangaraj A.G. (2021). "Designing a long short-Term Network for Short-Term Forecasting of Global Horizontal Irradiance". *SN Applied Sciences*.
7. Hari Bhaskaran Anangapal., Vinod Kumar R., Rajesh Katyal., Janani G.J. (2020). "Optimum design of a 100-meter high meteorological mast", *International Journal of Advance Research, Ideas and Innovations in Technology*, www.IJARIIIT.com, 6(6) pp 215-222.
8. Hari Bhaskaran Anangapal., Vinod Kumar R., Rajesh Katyal. (2020). "A Comprehensive Overview on the National Wind Resource Assessment Programme (NWP)", *Indian Wind Power*, vol.6, Issue 2 pp. 29-34.

9. Hari Bhaskaran Anangapal., Bastin J., Rajesh Katyal. (2020). "Meso & Micro Scale Mapping Under National Wind Resource Assessment Programme of India (NWP)", *Indian Wind Power*, vol.6, Issue 6, pp 8-13.
10. Shobana Devi A., Maragatham G., Boopathi K., C. Lavanya M., Saranya R. (2020). "Long-Term Wind Speed Forecasting - A Review" *Springer, July 2020, Vol. 130*, pp 79-99.
11. Akash R., Rangaraj A.G., Meenal R., Lydia M. (2020). "Machine Learning-Based Univariate Models For Long Term Wind Speed Forecasting", *IEEE, 22nd June 2020*.



International Meetings / Trainings

- ◆ DG, NIWE along with NIWE staff attended the online IEA Wind TCP ExCo meeting during 26th to 29th May 2020 and 12th to 15th October 2020.
- ◆ Testing & Research Station officials attended the training on Power Quality Data Acquisition System, organized by Dewitron, Austria through M/s. Kyoritsu New India Instruments Pvt Ltd on 21st August 2020 and 25th & 26th February 2021 at WTTS, Kayathar.
- ◆ NIWE officials attended the online training on “Computational fluid dynamics of wind farm site-assessment application in complex terrain using Open FOAM”, Fraunhofer IWES (09.09.2020 - 11.09.2020)
- ◆ Shri. K. Boopathi, Shri N. Rajkumar, Shri. Hari Bhaskaran.A, Shri Saravanan attended the online DTU Offshore Wind Energy course under the DFC Scholarship during 28th September to 20th November 2020.
- ◆ NIWE staff attended the online REINVEST Global Conference and e-Expo during 26th to 28th November 2020 on a virtual platform.
- ◆ Shri. A. Senthilkumar participated in the Offshore Renewables Energy Catapult Test facility virtual tour hosted by Mr. Oliver Ballhatchet, British Deputy High commissioner, in the presence of Lord Ahmad of Wimbledon Minister of State for the Commonwealth and South Asia on 01.12.2020.
- ◆ Shri David Solomon J.C., N.Rajkumar, Bhukya Ramdas attended the online internal workshop on National Test Centre for Offshore Wind Turbines at Dhanushkodi held on 10th March, 2021.



Visitors



Mr. Srijith Menon

30-12-2020

Mr. Srijith Menon, Senior Trade and Investment Adviser – Energy, British Deputy High Commission, Chennai.



Mr. Oliver
Ballhatchet

06-01-2021

Recce visit of Mr. Oliver Ballhatchet, Deputy High Commissioner, British Deputy High Commission and British High Commission Officials.



Mr. H.E. Alex
Ellis

12-02-2021

Mr. H.E. Alex Ellis, British High Commissioner to India and his officials.



Neelima Jain

22-02-2021

Ms. Neelima Jain, Deputy Director & Senior Fellow, Wadhvani Chair in U.S. India Policy Studies, The Center for Strategic & International Studies (CSIS).



17-03-2021 Visit of High Level Delegation from United Kingdom led by Mr. Lord Tariq Ahmad of Wimbledon, Minister of State for South Asia and the Commonwealth to NIWE and discussed on proposal for inking an MoU creating partnership between NIWE & ORE-Catapult under the aegis of the existing Indo-British MoU, for the development of Offshore Sector in Indian sub-continent.

Mr. H.E. Lord Ahmad, Minister for South Asia and the Commonwealth at the Foreign, Commonwealth and Development Office.

22-03-2021 Recce visit of British High Commission Officials.



SUPPORT SERVICES



- **IT Infrastructure**
- **Prof. Anna Mani
Information Centre**
- **Finance and Administration**



E-poster competition conducted on 15th June 2020 on the occasion of "Global Wind Day"

M. SHARAN - VII Std

Sri Chaitanya Techno School, Chennai



IT Infrastructure



S.A. Mathew

Director &
Division Head

TEAM

C. STEPHEN JEREMIAS
Assistant Engineer

During the COVID-19 Pandemic NIWE staff were provided with Secured Virtual Private Network (VPN) to connect to their respective endpoints in order to Work from Home (WFH).

Coordination with respective divisions and purchase division in connection with the renewal of AMC for the software licenses available in NIWE.

Continuous support service provided to maintain the IT infrastructure in NIWE on 24x7 basis.



Prof. Anna Mani Information Centre

NIWE has state of art library named after renowned meteorologist Prof. Anna Mani as information Centre. The Library has following collections.

Description	Quantity
Books	2134
Standards (ISO, IEC & IS, NABL)	350
Technical reports	347
Conference proceedings	425
Annual Reports	160
Manuals	33
Digital Resources	208
Periodicals (Journals + Magazines)	48
Newspapers	11
Industrial/Institutional Membership	03
e-Journals	25



J.C. David Solomon

Director &
Division Head- Addl. Charge

Finance & Administration

TEAM

R. GIRIRAJAN
Assistant Director

ANURADHA BABU
Executive Staff Officer

K. TAMILSELVI
Administrative Officer
(Stores & Purchase)

B. MUTHULAKSHMI
Executive Secretary

T. SURESH KUMAR
Assistant Engineer

V. SARATHKUMAR
Executive Assistant

V. K. SREERAM
Executive Assistant

R. SUNDERESAN
Executive Assistant

A. JASEELA BANU
Executive Assistant

P. CHIDAMBARAM
Junior Executive Assistant

K. SARANYA
Junior Executive Assistant

J. SARITA KUMARI
Hindi Translator

M. SELVAKUMAR
Record Keeper

M. MALARAVAN
Transport Co-ordinator

A. MANI
Driver

Serving as the artery connecting scientific divisions of this institute, the activities of F&A division are briefed under:

- (i) Budget & Revised Estimates for grants-in-aid, Allocation & re-appropriation of funds, Expenditure management & budget control, Project financial management.
- (ii) Statutory compliances on GST and Income Tax etc., Dealing with audits, Drawing up balance sheet, laying of audited accounts on the table of Parliament.
- (iii) Framing of Rules, Schemes and Grievance Redressal, Contract Management, Legal issues, Court Cases & RTI, Recruitment, Promotion and up gradations.
- (iv) 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.
- (v) 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

Anti Terrorism Day

In pursuance of Ministry of Home Affairs, Gol OM No.19/19/2020-Public dt.16.05.2020 Anti Terrorism Day was observed at NIWE on 21.05.2020 through online mode. With a view of objective behind the observance of this day, an Anti-Terrorism pledge was taken virtually by the NIWE employees by following Covid-19 protocols, despite state-wide lock down imposed by Govt. of Tamil Nadu.

Independence Day

As per the precedence followed by NIWE, Independence Day was celebrated at NIWE on 15th August 2020 by following Covid-19 protocols.

Sadbhavana Diwas

As per the precedence followed by NIWE, Sadbhavana Diwas was observed at NIWE on 20th August 2020 and the pledge was taken by NIWE employees at their work places by following Covid-19 protocols.

Vigilance Awareness Week

Vigilance awareness week for the year 2020 was observed in NIWE from 27th October 2020 to 02nd November 2020 as instructed by the Central Vigilance Commission and the pledge was taken virtually by the employees of NIWE.

On the observance of Vigilance awareness week, an Essay Competition was conducted on 29.10.2020 on the theme “Vigilant India, Prosperous India” and cash award was presented to the winners.

Swachhta Hi Seva Week

The Swachhata Pakwada was to be observed from 01.06.2020 to 15.06.2020, as part of the observance the Swachhata activities like cleaning of NIWE Campus, Rooms and corridors were cleaned by NIWE staff members even with limited number of attendance due to Covid -19 Pandemic.

Constitution Day

The Constitution Day was celebrated on 26th November 2020, as part of the observance, the employee of NIWE read the Preamble of Constitution of India through virtual mode.

Republic Day

As per the precedence followed by NIWE, Republic Day was celebrated at NIWE on 26th January 2021 by following Covid-19 protocols.

Martyrs' Day

As a part of observance followed by NIWE, two minutes silence was observed at NIWE on 30th January 2021 at their work places by following Covid-19 protocols.

Internal Compliant Committee (ICC) at Work Place

In accordance with Government instructions, an Internal Complaints Committee for women for redressal of complaints concerning sexual harassment in work place has been constituted in NIWE. The committee met at regular intervals and visited all the women employees in the campus. No compliant have been reported by the Committee.

Women's Day

To celebrate the spirit of women empowerment every year, the Women's Day was celebrated starting from 8th March 2021 at NIWE under various themes. The women's day was celebrated by organizing Seminars and Talk by eminent scientists and professionals on Financial Awareness, Legal Issues, Role of Science and Research for Women and Women's Health and Complication. Other social events were conducted and bestowed with prizes.

Foundation Day

To remember the glorious past, successes and achievements, Foundation Day is being celebrated every year and the 24th Foundation Day was celebrated at NIWE on 22.03.2021 in a low-profile manner considering the Covid-19 Pandemic.

Welfare and Safety Measures

As a preventive measure to combat Covid-19 pandemic, the following activities have been carried out regularly at NIWE.

1. Sanitizing of the campuses regularly on daily basis.
2. PPE kits have been procured for the persons those who are sanitizing entire campus.
3. Thermal scanners have been procured and thermal scanning has been done for all the staff on daily basis as well as for visitors and being monitored regularly.
4. NIWE with the support of the Greater Chennai Corporation Authorities at Corporation Primary Health Centre, Pallikaranai Vaccination was administered for NIWE staff and their family members on 20th March 2021 (1st Batch).

Official Languages 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 communication in Hindi.

Hindi fortnight was celebrated in NIWE from 14.09.2020 to 25.09.2020. Various competitions like Hindi Essay writing, Handwriting, Stenography, Quiz etc. were conducted and prizes were distributed to the winners and participants.

During the year 2020-21, 01 (one) regular staff member passed Pragya examination, Conducted by Hindi Teaching Scheme.

Spoken classes are being taken in Hindi for non-Hindi speaking staff and also separate attention is being given to the staff for appearing Official Language exams.

International Yoga Day

In pursuance of Ministry of Ayush, GoI, International Yoga Day was observed on 21st June 2021. Banners & Posters were displayed depicting the Yoga Postures under common Yoga Protocol in the virtual mode.

Right to Information Act

During the year 2020-21, 12 applications were received seeking information under RTI Act, 2005 and requisite details have been given. No appeals 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.

FINANCE REPORT



- **Balance Sheet**
- **Income & Expenditure**
- **Receipts & Payments**
- **Schedules**
- **Auditor's Report**



E-poster competition conducted on 15th June 2020 on the occasion of “Global Wind Day”

SWETHA. A - VIII Std

The Rani Meyyammal Girls Higher Secondary School, Chennai

Balance Sheet

NATIONAL INSTITUTE OF WIND ENERGY

An Autonomous R&D Institution, MNRE, Government of India
(Formerly CENTRE FOR WIND ENERGY TECHNOLOGY)
Chennai - 600 100

BALANCE SHEET AS AT 31ST MARCH, 2021

(Amount in Rs.)

FUND AND LIABILITIES	Schedule	31 st March, 2021	31 st March, 2020
CAPITAL ASSET FUND	1	25,15,59,937	26,75,46,544
RESERVES AND SURPLUS	2	44,65,24,759	44,49,51,924
CURRENT LIABILITIES AND PROVISIONS	3	16,23,07,739	31,05,63,950
TOTAL		86,03,92,435	1,02,30,62,418
ASSETS			
FIXED ASSETS			
(a) Created out of Central Governments Grants	4	21,24,41,865	24,52,98,185
(b) Out of Internal Generation Grants		3,91,18,072	2,22,48,359
CURRENT ASSETS, LOANS AND ADVANCES	5	60,88,32,498	75,55,15,874
TOTAL		86,03,92,435	1,02,30,62,418
SIGNIFICANT ACCOUNTING POLICIES	13		
NOTES ON ACCOUNTS	14		

For National Institute of Wind Energy

As per our Report attached
Rajesh & Ganesh
Chartered Accountants
Firm Regn No.008640S

Sd/-
R Girirajan
Asst. Director
(F&A)

Sd/-
J.C. David Solomon
Division Head
(F&A)

Sd/-
Dr.K.Balaraman
Director General

Sd/-
S. Rajesh
Partner
Membership No.208090

NATIONAL INSTITUTE OF WIND ENERGY

(Formerly CENTRE FOR WIND ENERGY TECHNOLOGY)
All Autonomous R&D Institutions, MNRE, Government of India
Chennai - 600 100

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31ST MARCH, 2021

(Amount in Rs.)																
INCOME	Schedule	CFA CAPITAL	CFA Revenue	MOM - Revenue	IWSRA - Revenue	NE Region	SRRA	NIWE IRDEA Fund	Hybridize	Canteen	Gurantees	IE	TOTAL GRANTS 31/03/2021 (1+2+3+4+5+6+7)	IE 31/03/2020 8	TOTAL GRANTS 31/03/2020	IE 31/03/2020
Income from Services	6	-	-	2	-	-	-	-	-	-	-	14,13,31,397	-	14,13,31,397	-	12,89,15,229
Income from publication	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Interest earned	8	-	-	-	-	-	-	-	-	9,913	5,46,646	2,59,62,561	-	2,65,19,120	-	2,39,02,437
Other income	9	-	-	-	-	-	-	-	-	15,000	-	19,44,760	-	19,59,760	-	3,27,92,371
Interested earned & Other Income (Grant)		-	-	-	1,16,442	-	48,438	9,63,544	1,07,847	-	-	-	19,80,810	-	31,32,047	-
Grants from Government of India allocated for Revenue expenditure during the year		0	-	7,44,539.00	45,00,000	-	2,23,00,000	-	-	-	-	-	7,84,55,528	-	11,27,40,601	-
Grants - Adjustment previous year payment	3.1	-	-	5,16,55,528	-	-	-	-	-	-	-	-	-	-	4,06,99,971	-
Add-EMD,SD,PG Received		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Closing stock		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL (A)	-	-	-	5,24,00,067	46,16,442	-	2,23,48,438	9,63,544	1,07,847	24,913	5,46,646	16,98,10,277	20,31,33,567	16,98,10,277	15,65,72,619	18,65,10,037
EXPENDITURE																
Opening stock		-	-	-	-	-	-	-	-	-	-	-	8,04,36,338	-	-	15,25,070
Establishment expenses	10	-	-	-	-	-	-	-	-	-	-	7,94,20,891	-	7,94,20,891	-	6,63,49,947
Consultancy project expenses	11 (b)	-	-	-	-	-	-	-	-	42,024	-	6,74,47,065	-	6,74,89,089	-	9,94,70,189
Other administrative expenses	11 (a)	0	4,21,50,956	-	-	-	-	-	-	-	-	1	-	-	-	5,79,71,491
Expenditures from Grants		-	-	7,05,72,385	44,10,915	1,44,62,672	2,64,26,381	14,500	24,84,391	-	-	-	4,21,50,956	-	6,52,49,836	-
On advances / Deposits / Prepaid / EMD, SD, Pg's etc.		-	26,96,732	-	-	-	-	-	-	-	-	-	-	-	11,49,732	-
Refunded to Ministry		-	-	26,66,198	3,60,100	-	-	-	-	-	-	-	11,83,71,244	-	33,51,458	-
In house project Expenditure		-	7,41,14,605	-	-	-	-	-	-	-	-	-	26,96,732	-	8,42,94,167	-
Expenditure out of previous year advance	3.1	-	3,67,007	-	-	-	-	-	-	-	-	-	30,26,298	-	-	-
TOTAL (B)	-	-	11,93,23,300	7,32,38,583	47,71,015	1,44,62,672	2,64,26,381	14,500	24,84,391	42,024	-	14,68,67,956	24,66,81,569	14,69,09,980	21,20,16,684	16,73,45,206
EXPENDITURE																
Balance being excess of Income over Expenditure (A-B)		-	11,93,23,300	2,08,385,16	1,54,573	1,44,62,672	40,77,943	9,49,044	23,76,544	17,111	5,46,646	2,77,57,840	16,52,45,231	2,29,00,297	-	1,82,64,831
EMD Performance Guarantee Security Deposit Returned		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Add: Opening Balance B/f (C)	3.1	-	7,02,009	2,09,07,579	28,12,176	-	5,69,602	1,11,45,191	38,80,442	-	-	-	-	-	8,09,37,127	-
Prior period adjustment	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Transfer to Capital Asset Fund (D)	4	-	-	-	-	-	-	-	1,61,988	1,95,720	-	2,11,98,750	-	2,13,94,470	-	1,61,988
Transfer to Welfare Fund		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BALANCE BEING SURPLUS																
TRANSFERRED TO GENERAL		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RESERVE FUND (A- (B+D))		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UN-UTILIZED GRANTS OUT OF		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GOVT. GRANTS FOR REVENUE		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EXPENDITURE ((C+A)-B)	13	-	(12,00,31,309)	69,063	26,57,603	1,44,62,672	46,47,545	1,20,94,235	15,03,838	-	-	-	(10,37,06,540)	-	2,63,28,587	-
SIG. ACCOUNTING POLICIES	14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NOTES ON ACCOUNTS		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

For National Institute of Wind Energy

As per our Report attached
Rajesh & Ganesh
Chartered Accountants
Firm Regn No.008640S

Sd/-
R Girirajan
Asst. Director
(F&A)

Sd/-
Dr.K.Balaraman
Director General
(F&A)

Sd/-
S. Rajesh
Partner
Membership No.208090

SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31ST MAR'2021

SCHEDULE 1 - CAPITAL ASSET FUND	CFA-Capital	NE Region	SRRA	IE	Canteen	IE	31.03.2020	31.03.2019
(Amount in Rs.)								
Opening Balance								
Balance as at the beginning of the year	21,83,06,126	62,54,718	2,07,37,340	2,22,38,571	9,788	2,22,48,359	26,75,46,543	23,07,14,406
ADD : Prior period adjustment	-	-	-	-	-	-	-	-
ADD : Addition from Capital Grant	3,44,46,017	-	-	-	-	-	3,44,46,017	14,67,68,984
Add : Addition from Internal Revenue Generation prior years	-	-	-	-	-	-	-	-
Add : Addition from Capital Grants SRRA	-	-	1,50,000	-	-	-	1,50,000	35,282
Add : Addition from Capital Grants MNRE	-	-	-	-	-	-	-	-
Add : Addition from Capital Grants MoM	-	-	-	-	-	-	-	-
Add : Addition from Internal Revenue Generation	-	-	-	-	1,95,720	2,13,94,470	2,13,94,470	1,61,988
Less : Deletion from Internal Revenue Generation	-	-	2,11,98,750	-	-	-	-	17,096
Less: Deletion from Capital Grants	-	-	-	-	-	-	-	1,09,843
Less: Deletion from Internal Revenue Generation	-	-	-	-	-	-	-	-
Less: Deletion from Capital Grants SRRA	-	-	-	-	-	-	-	19
Less: Depreciation on assets purchased out of Grants MNRE	4,73,97,852	11,24,045	1,89,30,439	-	-	-	6,74,52,336	4,42,46,104
Less: Depreciation on assets purchased out of Internal generation	-	-	-	45,12,874	11,883	45,24,757	45,24,757	2,97,52,555
Less: Depreciation on assets purchased out of Grants SRRA	-	-	-	-	-	-	-	3,60,08,497
TOTAL	20,53,54,291	51,30,673	19,56,901	3,89,24,447	1,93,625	3,91,18,072	25,15,59,937	26,75,46,546

For National Institute of Wind Energy

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Firm Regn No.008640S

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Chennai - 600 100

SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31ST MARCH 2021

(Amount in Rs.)

SCHEDULE 2 - RESERVES AND SURPLUS	31st March, 2021	31st March, 2020
General Reserve Fund		
Balance at the beginning of the year	44,39,72,822	42,58,69,075
Addition during the year being surplus	15,05,827	1,81,02,843
	44,54,78,650	44,39,71,918
Welfare Fund (General Reserve)	10,46,109	9,80,006
TOTAL	44,65,24,759	44,49,51,924

For National Institute of Wind Energy

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Firm Regn No.008640S

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Asst. Director
(F&A)

Sd/-
J.C. David Solomon
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Dr.K.Balaraman
Director General

Sd/-
S. Rajesh
Partner
Membership No.208090

SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31ST MAR'2021

(Amount in Rs.)

SCHEDULE 3 - CURRENT LIABILITIES AND PROVISIONS: SCHEDULE	CFA-Capital	CFA-Revenue	NE Region	MOM	IWSRA	SRRA*NIWE-IREDA Fund*Hybridize	Total IE	31st March, 2021	31st March, 2020
A. CURRENT LIABILITIES	-	-	-	-	-	-	-	-	-
Sundry Creditors for expenses:	-	-	-	-	-	-	-	-	-
Expenses payable	-	2,60,058	-	-	-	66,231	-	80,26,312	25,96,457
Salary Payable	-	-	-	-	-	-	-	2,60,058	23,37,727
Security Deposit, EMD & PG	-	-	-	-	-	-	-	38,86,829	35,33,268
Advances Received on Projects	-	-	-	-	-	-	-	1,77,16,793	2,33,12,600
Statutory Liabilities	-	-	-	-	-	-	-	5,60,92,001	13,36,78,217
Other Current Liabilities	1,46,74,032	87,77,700	1,32,27,305	-	-	1,430	-	11,05,831	1,36,38,533
Other Payables	-	12,52,732	15,45,763	-	-	48,438	-	3,95,65,894	4,21,65,381
NIWE-IREDA Award Fund	-	-	-	-	-	-	-	27,98,495	18,58,294
Welfare Fund Payable	-	-	-	-	-	-	-	-	1,14,50,132
TOTAL (A)	1,46,74,032	1,02,90,490	1,47,73,068	-	-	1,16,099	-	84	-
UN UTILISED GRANTS	-	-	-	-	-	-	-	84	-
a) Central Finance Assistance MNRE (Grants-in-Aid)	3.1	-	-	-	-	-	-	-	-
Earmarked Projects SRRA USP	-	26,65,920	-1,44,62,672	1,74,27,744	53,80,399	(46,47,545)	-	73,16,051	6,78,88,567
IREDA NIWE FUND	-	-	-	-	-	-	-	-	-5,69,602
TOTAL (B)	(5,51,693)	26,65,920	(1,44,62,672)	1,74,27,744	53,80,399	(46,47,545)	-	1,20,94,235	-
TOTAL { (A)+(B) }	1,41,22,339	1,29,56,410	3,10,396	1,74,27,744	53,80,399	(45,31,446)	1,20,94,235	14,89,28,814	30,18,89,575
B. PROVISIONS	-	-	-	-	-	-	-	-	-
Gratuity	-	-	-	-	-	-	-	90,92,408	39,52,531
Leave Encashment	-	-	-	-	-	-	-	42,86,517	47,21,844
Bonus & Ex-gratia	-	-	-	-	-	-	-	-	-
TOTAL (C)	-	-	-	-	-	-	-	1,33,78,925	86,74,375
GRAND TOTAL { (A)+(B)+(C) }	1,41,22,339	1,29,56,410	3,10,396	1,74,27,744	53,80,399	(45,31,446)	1,20,94,235	16,23,07,739	31,05,63,950

For National Institute of Wind Energy

Sd/-
R Girirajan
Asst. Director (F&A)

Sd/-
J C David Solomon
Division Head (F&A)

Sd/-
Dr.K.Balaraman
Director General

As per our Report attached
Rajesh & Ganesh, Chartered Accountants
Firm Regn No.008640S

Sd/-
Rajesh
Partner
Membership No.208090

SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31ST MAR'2021

SCHEDULE 3.1 - UNUTILISED GRANT - CFA	CFA-CAPITAL	CFA REVENUE	NE Region	MOM CAPITAL	MOM REVENUE	TOTAL MOM	IWSRA CAPITAL	IWSRA REVENUE	TOTAL IWSRA	SRRA	HYBRIDIZE	NWRE-REDA FUND	As on 31.03.2021	As on 31.03.2020
Funds														
Balance as at the beginning of the year	6,04,447	(7,02,009)	-	1,93,93,369	2,09,07,579	4,03,00,948	2,09,92,563	28,12,176	2,38,04,739	(5,69,602)	38,80,442	1,11,45,191	7,84,64,156	15,45,62,679
Add : Grants received during the year	1,38,30,000	12,11,70,000	-	-	5,16,55,528	5,16,55,528	55,22,247	45,00,000	1,00,22,247	2,23,00,000	-	-	21,89,77,775	23,75,06,992
Add : Misc. Income on Grants	22,620	3,43,288	-	-	-	-	-	-	-	-	-	-	3,65,908	6,50,893
Add : Interest Earned on Grants	4,14,014	-	-	7,30,721	7,44,539	14,75,260	6,05,239	1,16,442	7,21,681	48,438	1,07,847	9,63,544	37,30,784	55,41,539
Add: Profit on Sale of Assets	-	-	-	-	-	-	-	-	-	-	-	-	-	4,22,274
Add: SNA Refund	-	11,83,941	-	-	-	-	-	-	-	-	-	-	11,83,941	-
Total (A)	1,48,71,081	12,19,95,220	-	2,01,24,090	7,33,07,646	9,34,31,736	2,71,20,049	74,28,618	3,45,48,667	2,17,78,836	39,88,289	1,21,08,735	30,27,22,564	39,86,84,377
Less : Refunds														
Interest earned on Grants refunded to Ministry	14,43,482	-	-	20,11,827	26,66,198	46,78,025	17,55,050	3,60,100	21,15,150	-	-	-	82,36,657	65,52,634
Other Income Earned refunded to Ministry	4,22,274	-	-	-	-	-	-	-	-	-	-	-	4,22,274	-
Refund of Unutilized Grants	6,04,447	-	-	-	-	-	-	-	-	-	-	-	6,04,447	-
Total (B)	24,70,203	-	-	20,11,827	26,66,198	46,78,025	17,55,050	3,60,100	21,15,150	-	-	-	92,63,378	65,52,634
Total Fund Available (C= A-B)	1,24,00,878	12,19,95,220	-	1,81,12,263	7,06,41,448	8,87,53,711	2,53,64,999	70,68,518	3,24,33,517	2,17,78,836	39,88,289	1,21,08,735	29,34,59,186	39,21,31,743
Less: Expenditure														
Grants from Government of India allocated for Capital	71,46,287	-	-	7,53,582	-	7,53,582	2,26,42,203	-	2,26,42,203	1,50,000	-	-	3,06,92,072	3,06,44,985
Grants from Government of India allocated for Revenue expenditure	-	4,24,11,014	-	-	7,05,72,385	7,05,72,385	-	30,05,791	30,05,791	2,46,34,840	27,687	14,500	14,06,66,217	9,92,67,672
Grants from Government of India allocated for NER	-	-	-	-	-	-	-	-	-	-	-	-	1,29,16,906	3,23,32,856
Grants from Government of India allocated for SRRA	-	-	-	-	-	-	-	-	-	-	-	-	-	1,77,25,637
Expenditure relating to Grants from Government of India for the inhouse projects during the year	-	7,41,14,605	-	-	-	-	-	-	-	-	-	-	7,41,14,605	4,99,52,827
Transfer to capital asset fund	-	-	-	-	-	-	-	-	-	-	-	-	-	8,45,16,491
Transfer to Income & Expenditure	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Excess of Expenditure out of Previous Year Advance	-	3,67,007	-	-	-	-	-	-	-	-	-	-	3,67,007	-
EMD/Performance Guarantee/Security Deposit Returned	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sub Total (I)	71,46,287	11,68,92,626	1,29,16,906	7,53,582	7,05,72,385	7,13,25,967	2,26,42,203	30,05,791	2,56,47,994	2,47,84,840	27,687	14,500	25,87,56,807	31,44,40,468
Less: Payables														
Expenses Payable	-	2,60,058	-	-	-	-	-	-	-	-	-	-	2,60,058	2,21,504
Security Deposits & Performance Guarantee	-	-	-	-	-	-	-	-	-	15,98,159	-	-	15,98,159	15,98,581
Sundry Creditors	-	-	-	-	-	-	-	-	-	66,231	-	-	66,231	-1,45,480
Other Current Liabilities	-	-	-	-	-	-	-	-	-	1,430	-	-	1,430	19,87,219
Advances received	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Salary Payable / EPF Payable	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sub Total (ii)	-	2,60,058	-	-	-	-	-	-	-	15,30,498	-	-	12,70,440	72,602
Less: Advances & Deposits														
Less: Advances paid	58,06,284	26,96,732	15,45,766	-	-	-	-	14,03,000	14,03,000	1,10,543	24,56,704	-	1,40,19,029	1,41,06,235
Less: Deposits	-	-	-	-	-	-	-	-	-	500	-	-	500	500
Less: Prepaid Expenses	-	-	-	-	-	-	-	2,124	2,124	-	-	-	2,124	-
Sub Total (iii)	58,06,284	26,96,732	15,45,766	-	-	-	-	14,05,124	14,05,124	1,11,043	24,56,704	-	1,40,21,653	1,41,06,735
Total (D) [(I)-(ii)-(iii)]	1,29,52,571	11,93,29,300	1,44,62,672	7,53,582	7,05,72,385	7,13,25,967	2,26,42,203	44,10,915	2,70,53,118	2,64,26,381	24,84,391	14,500	27,40,48,900	32,48,12,777
UNUTILIZED GRANTS (Refundable to Ministry)	-	26,65,920	-	1,73,58,681	69,063	1,74,27,744	27,22,796	26,57,603	53,80,399	(46,47,545)	15,03,898	1,20,94,235	2,54,74,063	6,47,10,134
UNUTILIZED GRANTS (Receivable from Ministry)	(5,51,693)	-	(1,44,62,672)	-	-	-	-	-	-	-	-	-	-1,96,61,910	-12,71,611
UNUTILIZED GRANTS / FUNDS (Others)	-	-	-	-	-	-	-	-	-	-	-	-	1,35,98,133	38,80,442

For National Institute of Wind Energy

Sd/-
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Director General

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Partner
Membership No.208090

NATIONAL INSTITUTE OF WIND ENERGY

An Autonomous R&D Institution, MNRE, Government of India

Fixed Assets 2021-2022

CFA Capital

Schedule - 4

Description of Assets	Gross Block			Depreciation			Net Block	
	As on 01.04.2020	Addition	*Deletion / Adjustment*	As on 31.03.2021	As on 01.04.2020	Addition	Total as on 31.03.2021	As on 31.03.2020
Land	1,15,79,939	60,30,125	-	1,76,10,064	-	-	1,76,10,064	1,15,79,939
Building	7,31,28,434	-	-	7,31,28,434	6,08,07,699	16,92,132	6,24,99,831	1,23,20,735
Furniture & Fitting	1,29,93,313	39,540	-	1,30,32,853	1,09,50,173	4,49,315	1,13,99,488	20,43,140
Instruments & Equipments	20,60,00,647	59,61,443	-	21,19,62,090	10,20,74,820	2,42,83,071	12,63,57,891	10,39,25,828
DANIDA Instruments & Computers (Free of Cost)	1,26,69,970	-	-	1,26,69,970	1,26,69,949	-	1,26,69,949	21
MNRE Asset (Free of Cost)	21,445	-	-	21,445	21,444	-	21,444	1
Computers	14,11,19,349	11,49,384	-	14,22,68,733	11,24,61,233	1,70,39,973	12,95,01,206	2,86,58,115
Vehicles	37,30,868	-	-	37,30,868	29,94,575	2,45,227	32,39,802	7,36,293
R&D Wind Turbine	10,98,26,430	-	-	10,98,26,430	10,98,26,415	-	10,98,26,415	15
Infrastructure Facilities	3,20,10,460	1,85,94,570	72,952	5,06,77,982	2,01,88,321	32,27,001	2,34,13,064	1,18,97,348
Books	14,29,742	-	8,04,290	22,34,032	15,93,401	4,61,132	20,54,533	6,40,632
Capital Work In Progress	4,65,04,060	1,43,23,825	1,16,52,870	4,91,75,015	-	-	-	4,65,04,060
TOTAL (A)	65,10,14,657	4,60,99,887	1,25,30,112	68,63,37,916	43,35,88,029	4,73,97,852	48,09,83,623	21,83,06,127
Instruments & Equipments (NER)	77,99,810	-	-	77,99,810	15,45,092	11,24,045	26,69,137	62,54,718
TOTAL (B)	77,99,810	-	-	77,99,810	15,45,092	11,24,045	26,69,137	62,54,718
Computers (USP)	62,78,287	-	-	62,78,287	58,52,594	85,319	59,37,913	3,40,374
Furniture & Fitting (USP)	12,79,997	-	-	12,79,997	9,15,942	94,928	10,10,870	2,69,127
Instruments & Equipments (USP)	41,51,36,273	1,50,000	-	41,52,86,273	39,68,17,567	1,83,44,622	41,51,62,189	1,24,084
Infrastructure Facilities (USP)	40,55,703	-	-	40,55,703	24,26,815	4,05,570	28,32,385	12,23,318
TOTAL (C)	42,67,50,260	1,50,000	-	42,69,00,260	40,60,12,918	1,89,30,439	42,49,43,357	2,07,37,340
Computers	1,22,21,530	3,83,997	-	1,26,05,527	1,20,23,693	2,14,646	1,22,38,339	3,67,188
R&D Wind Turbine	22,22,55,060	-	-	22,22,55,060	22,22,55,058	-	22,22,55,058	2
WTTS Land	57,01,000	-	-	57,01,000	-	-	-	57,01,000
INFRASTRUCTURE FACILITIES	4,98,757	-	-	4,98,757	1,26,937	49,876	1,76,813	3,21,944
Vehicle (All)	48,74,209	-	-	48,74,209	27,02,670	4,57,531	31,60,201	17,14,008
Project Vehicle & Battery Operated Vehicle	-	-	-	-	-	-	-	-
Instruments & Equipments (All)	2,50,34,280	2,06,04,873	-1	4,56,39,152	1,14,14,120	37,44,374	1,51,58,494	3,04,80,658
Instruments & Equipments	2,10,57,679	2,03,19,383	-96,948	4,12,80,114	95,94,164	32,47,062	1,28,41,226	2,84,38,888
Instruments & Equipment (Jyoti)	3,500	-	-	3,500	3,500	-	3,500	-
Instruments & Equipment (50M Mast)	6,97,468	-	-527	6,97,468	6,96,941	-	6,97,468	527
Instruments & Equipment (10M R&D Mast)	11,999	-	-2,802	9,197	9,197	-	10,997	2,802
Instruments & Equipment - TESTING	44,240	-	-	44,240	44,240	-	44,240	-
Instruments & Equipment - SRRA-IE	32,19,394	2,57,290	1,00,276	35,76,960	10,66,078	4,97,312	15,63,390	20,13,570
Instruments & Equipment - SECI	-	28,200	-	28,200	-	-	-	-
Instruments & Equipments(CANTEEN)	37,634	-	7	37,641	27,853	2,097	29,950	7,791
Furniture & Fittings (IE)	3,85,272	2,09,880	-	5,95,152	2,09,052	44,120	2,53,172	3,41,980
Furniture & Fittings (CANTEEN)	-	1,95,720	-	1,95,720	-	9,786	1,85,934	-
Total (D)	26,53,06,742	2,13,94,470	-1	29,23,64,577	24,87,59,383	45,22,430	25,32,81,813	2,22,48,359
Current year figures (A+B+C+D)	1,35,08,71,469	6,76,43,357	1,25,30,111	1,41,34,02,563	1,08,99,05,422	7,19,74,766	1,16,18,77,930	26,75,46,545
Previous Year Figures	1,22,33,12,125	14,69,66,244	1,28,11,420	1,35,08,71,470	99,25,54,282	11,19,41,936	1,08,99,05,422	23,07,03,992

For National Institute of Wind Energy

Sd/-
R Girirajan
Asst. Director (F&A)

Sd/-
Dr.K.Balarajan
Director General

As per Report attached
Rajesh & Ganesh, Chartered Accountants
Firm Regn No.0086405

Sd/-
Rajesh
Partner
Membership No.208090

NATIONAL INSTITUTE OF WIND ENERGY

An Autonomous R&D Institution, MNRE, Government of India

SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31ST MAR'2021

SCHEDULE 5 - CURRENT ASSETS, LOANS & ADVANCES	CFA-Capital	CFA-Revenue	NE Region	MOM	IWSRA	SRRA	NIWE IREDA Fund	Hybridize	IE	31st March, 2021	31st March, 2020
A. CURRENT ASSETS:	-	-	-	-	-	-	-	-	-	-	-
Sundry Debtors	-	-	-	-	-	-	-	-	-	-	-
Inventories	-	-	-	-	-	-	-	-	-	-	-
Stock of Stationery	-	1,46,730	-	-	-	-	-	-	-	-	-
Stock of Stores and Spares	-	-	-	-	-	-	-	-	-	-	-
Stock of Wind Atlas Book	-	-	-	-	-	-	-	-	-	-	-
Cheques in hand	-	-	-	-	-	-	-	-	-	-	-
Stamps in hand	-	5,549	-	-	-	-	-	-	-	-	-
Closing Stock	-	-	-	-	-	-	-	-	-	-	-
Bank Balances:	-	-	-	-	-	-	-	-	-	-	-
With Scheduled Banks:	-	-	-	-	-	-	-	-	-	-	-
In Current Account	-	-	-	-	-	-	-	-	-	-	-
In Savings Bank Account	32,52,339	27,74,342	1,35,67,468	1,74,27,744	53,80,399	68,77,402	20,94,235	13,96,483	99,970	99,970	93,200
In Cash	-	-	-	-	-	-	-	-	-	-	-
In Deposit Account	-	-	-	-	-	-	-	-	-	-	-
TOTAL (A)	32,52,339	29,26,621	1,35,67,468	1,74,27,744	53,80,399	72,04,671	1,20,94,235	13,96,483	99,970	99,970	93,200
B. LOANS, ADVANCES AND OTHER ASSETS											
Advances and other amounts recoverable in cash or in kind or for value to be received:											
a) On Capital Account											
a) Prepayments	-	-	-	-	-	-	-	-	-	-	-
b) Interest accrued on term deposits	-	-	-	-	-	-	-	-	-	-	-
c) Advances	1,53,71,360	85,27,225	9,35,846	-	-	-	-	-	-	-	-
d) Consultancy WIP	-	-	-	-	-	-	-	-	-	-	-
e) Balance with Govt. Authority - TDS	-	3,208	-	-	-	-	-	-	-	-	-
TOTAL (B)	1,53,71,360	85,30,433	9,35,846	-	-	-	-	-	-	-	-
GRAND TOTAL { (A)+(B) }	1,86,23,699	1,14,57,054	1,45,03,314	1,74,27,744	53,80,399	74,96,664	1,20,94,235	38,53,187	51,79,96,202	60,88,32,498	75,55,15,874

For National Institute of Wind Energy

As per our Report attached
Rajesh & Ganesh, Chartered Accountants
Firm Regn No.008640S

R Girirajan
Asst. Director (F&A)

J C David Solomon
Division Head (F&A)

Dr.K.Balaraman
Director General

Rajesh
Partner
Membership No.208090

NATIONAL INSTITUTE OF WIND ENERGY

An Autonomous R&D Institution, MNRE, Government of India

SCHEDULES FORMING PART OF INCOME & EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31ST MARCH, 2021

(Amount in Rs.)

SCHEDULE 6 - OTHER ADMINISTRATIVE EXPENSES	31 st March, 2021	31 st March, 2020
Income from Services		
Income from Scientific & Technical Consultancy Services	10,69,00,044	9,60,31,479
Energy receipts	3,03,36,073	3,28,83,750
Wind Power Forecasting Receipts	40,95,280	0
TOTAL	14,13,31,397	12,89,15,229
SCHEDULE 7 - INCOME FROM PUBLICATION		
Sale of Books & Reports	-	-
TOTAL	-	-
SCHEDULE 8 - INTEREST EARNED		
On Term Deposits with Scheduled Banks	2,47,11,518	2,28,25,013
On Savings Bank account with Scheduled Banks	18,07,602	10,77,424
TOTAL	2,65,19,120	2,39,02,437
SCHEDULE 9 - OTHER INCOME		
Interest Received	8,88,248	-
Participation Fees	9,13,500	3,11,45,613
Registration Fees	1,25,000	1,20,000
Miscellaneous Income	33,012	15,26,758
Application Fees	-	-
TOTAL	19,59,760	3,27,92,371
SCHEDULE 10 - ESTABLISHMENT EXPENSES		
ADMINISTRATION AND R&D STAFF		
Salaries and Allowances	5,57,47,622	5,65,85,435
Salaries and Allowances - Contract Staff	36,82,308	-
Contribution to Provident Fund (EPF)	50,35,416	55,42,381
Contribution to Pension & Gratuity (With LIC)	71,48,862	(24,71,779)
Incentives to Employees	50,000	-
Leave travel concession	21,80,915	3,11,368
Children Education Allowance	9,18,000	9,32,815
Medical reimbursement	7,23,628	1,73,985
Newspaper reimbursement	1,96,060	1,55,840
Leave Salary (Contribution to LIC)	33,61,839	48,32,113
LIC Admin. Charges (Gratuity & Leave Encashment)	2,53,064	2,46,533
Staff welfare expenses	1,23,176	41,256
TOTAL	7,94,20,891	6,63,49,947

For National Institute of Wind Energy

As per our Report attached
Rajesh & Ganesh
Chartered Accountants
Firm Regn No.008640S

Sd/-
R Girirajan
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NATIONAL INSTITUTE OF WIND ENERGY

An Autonomous R&D Institution, MNRE, Government of India

SCHEDULES FORMING PART OF INCOME & EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31ST MARCH, 2021

(Amount in Rs.)

SCHEDULE 11 - OTHER ADMINISTRATIVE EXPENSES	31 st March, 2021	31 st March, 2020
Advertisement and Publicity	4,64,502	11,10,154
Auditor's Remuneration	88,500	82,600
Bio Gas Expenses	52,498	8,000
Electricity and Power	30,77,625	30,14,447
Expenses on Books, Data & Periodicals	57,27,535	42,12,132
Expenses on Fees (Sitting Fees & Honorarium)	67,500	2,67,994
Expenses on Seminar & Meetings	2,19,867	54,61,361
Hospitality Expenses	1,29,560	1,72,165
Loss on Exchange Fluctuation		625.00
Office expenses & Maintenance	1,05,68,540	1,69,22,448
Other Expenses (Hindi Prom.,OLA Act, Bk Chrg.)	1,27,325	3,40,250
Parliamentary / Standing Committee Expenses		8,05,440
Postage & Courier	44,652	88,114
Printing and Stationery	4,88,104	17,66,906
Professional Charges	5,71,938	10,85,904
Rates & taxes/ Licence Fee	25,31,047	8,72,721
Repairs (AMC etc.,)	62,97,057	65,48,409
Security Charges	74,66,558	63,41,181
Telephone and Communication Charges	26,30,550	11,31,291
Training and Development	46,640	25,96,765
Travel & Conveyance and Taxi hire	7,03,129	38,06,890
Vehicles Running and Up Keeping	6,23,948	6,68,235
Water Charges	4,83,939	6,67,459
TOTAL (A)	4,24,11,014	5,79,71,491
CONSULTANCY PROJECT EXPENSES		
Expenses on In Consultancy Projects (B)	6,74,89,089	9,94,70,189
GRAND TOTAL { (A)+(B) }	10,99,00,103	15,74,41,680

For National Institute of Wind Energy

As per our Report attached
Rajesh & Ganesh
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Firm Regn No.008640S

Sd/-
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NATIONAL INSTITUTE OF WIND ENERGY

An Autonomous R&D Institution, MNRE, Government of India

**SCHEDULES FORMING PART OF INCOME & EXPENDITURE ACCOUNT FOR
THE YEAR ENDED 31ST MARCH, 2021**

(Amount in Rs.)

SCHEDULE 12 - OTHER ADMINISTRATIVE EXPENSES	31 st March, 2021	31 st March, 2020
Prior Period Expenses/ Income		-
TOTAL	-	-

For National Institute of Wind Energy

As per our Report attached
Rajesh & Ganesh
Chartered Accountants
Firm Regn No.008640S

Sd/-
R Girirajan
Asst. Director
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NATIONAL INSTITUTE OF WIND ENERGY

An Autonomous R&D Institution, MNRE, Government of India

Internal Revenue Generation During FY2020-21

Details	Fees in Rs.
Verification of Procedure of Wind Monitoring Station	98,27,280
Wind Resource Assessment	36,50,000
Detailed Project Report	5,00,000
Energy Production Demonstration Test	3,00,000
Solar Radiation Resource Assessment Studies	13,50,000
Calibration of Solar Instruments	3,95,000
Solar Time Series	2,19,000
RE Projects	6,90,14,118
Type Certification	5,75,000
Type Testing	61,50,000
Power Curve Measurement	19,17,157
Data Analysis Report	28,94,225
Site Feasibility Studies	2,00,000
RLMM	34,50,000
Prototype Testing	6,00,000
Wind Time Series Data	27,67,085
Energy Yield Assessment	15,00,000
R&D Project	10,89,679
Pre Feasibility Studies	5,00,000
Wind Atlas	1,500
Wind Power Forecasting	40,95,280
Sale of Energy	3,03,36,073
Total	14,13,31,397

For National Institute of Wind Energy

As per our Report attached
Rajesh & Ganesh
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Sd/-
R Girirajan
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NATIONAL INSTITUTE OF WIND ENERGY

An Autonomous R&D Institution, MNRE, Government of India

SCHEDULE 13: SIGNIFICANT ACCOUNTING POLICIES

1. General information

- 1.1 The NATIONAL INSTITUTE OF WIND ENERGY (NIWE) formerly known as Centre for Wind Energy Technology (C-WET) is an Autonomous R&D Institution under Ministry of New & Renewable Energy, Government of India. The C-WET is formed as a Society on 18th February, 1998 and registered as a society under Section 10 of the Tamil Nadu Societies Registration Act, 1975 on 21st March, 1998 (further name change as NIWE has been incorporated and fresh certificate obtained from Registrar of Societies vide No.475 of 2014) with the object to serve as the technical focal point for Wind Power Development in India, support Research and Development Programme, assess Wind Resources, establish Standards, Testing and Certification of wind power systems, sub-systems and components and undertake Human Resource Development Programs.
- 1.2 The Department of Scientific and Industrial Research, Ministry of Science And Technology, Govt. of India, vide their letter no. 11/378/2000-TU-V Dated 21.05.2015 recognized NATIONAL INSTITUTE OF WIND ENERGY as a Scientific and Industrial Research Organization for a period up to 31.03.2021. The Director of Income Tax (Exemptions), Chennai, vide order no. DIT (E) No. 2 (268) / 98-99 dated 21.10.1999, granted registration under section 12AA of the Income Tax Act, 1961, as Public Charitable Trust.
- 1.3 The Department of Revenue, Central Board of Direct Taxes, New Delhi vide their letter notification no.22/2009 (F.No.203/32/2008/ITA-II) dated 25.02.2009 has notified NATIONAL INSTITUTE OF WIND ENERGY in the category of 'OTHER INSTITUTION' partly engaged in research activities under clause (ii) of the sub-section (1) of section 35 of the Income Tax Act, 1961 with effect from 01.04.2005.

2. Accounting Convention

- 2.1 The financial statements are prepared on the basis of historical cost convention and on the accrual method of accounting.
- 2.2 The income on consultancy / professional projects is accounted on Accrual basis based on percentage of completion & the balance amount fees received is transferred to Fees / Income Received in Advance ledgers. Similarly, expenses relating to such income are transferred to Prepaid expenses ledger & accrued during the year in which is Income is declared.

3. Inventory Valuation

- 3.1 Inventories are valued at lower of cost computed on first in first out method and realizable value.
- 3.2 Stocks of Wind Atlas are valued at cost.

4. Fund Accounts

4.1 Capital Asset Fund

Grants utilized for purchase of fixed assets are transferred to capital asset fund and depreciation is set off against these funds.

4.2 General Reserve Fund

Surplus or deficits as generated from the Scientific and Technical Consultancy activities are taken to this fund.

5. Fixed Assets

- 5.1 Fixed Assets are stated at cost of acquisition inclusive of freight, duties and taxes and incidental and direct expenses related to acquisition less depreciation.
- 5.2 NIWE creates the relative fund account by transfer of sums from Income & Expenditure account in respect of fixed assets acquired out of Internally generated funds and not covered by capital donations and/or government grants so as to exhibit the same balance under the fixed assets accounts and the capital asset fund account.
- 5.3 Grants utilized for purchase of fixed assets are transferred to capital asset fund so as to exhibit the same balance under the fixed asset's accounts and the capital asset fund account.
- 5.4 Fixed Assets received by way of non-monetary grants are capitalized at values stated, and credited to corresponding fund.

6. Depreciation

- 6.1 Depreciation is provided on straight-line method as per rates specified in the Income-Tax Act, 1961.

Tangible Assets	Percentage of Depreciation
Building (Other than residential purpose)	10
Furniture and Fitting	10
Plant & Machinery (Instrument and Equipment) & Vehicle for official purpose	15
Computers (Including Computer Software)	40
Renewable Energy Device – Wind/Solar	40
Library Books	60

- 6.2 In respect of additions to / deductions from fixed assets during the year, depreciation is considered on pro-rata basis.
- 6.3 Assets costing Rs.5,000/- or less are fully provided for in the year of Purchase as per the uniform format of Accounts for Central Autonomous Bodies from the year 2001-2002.
- 6.4 Depreciation on assets are charged to the assets and deducted from capital asset funds.
- 6.5 The life time of the equipments such as Cup Anemometer, Wind Vane and Mast Materials ranges between 12-18 months. Hence, the same are fully written off during the year of purchase.

7. Grants-in-Aid from Government

- 7.1 Grants-in-aid from Government are accounted on realization basis and shown under the head “Un-utilized Grant”.
- 7.2 Grants related to Revenue are credited in the Income and Expenditure Statement separately.
- 7.3 Grants related to specific projects are credited to the respective projects accounts and utilized for the specific project purposes.
- 7.4 Grants utilized for purchase of fixed assets are transferred to Capital Asset Fund.

8. Foreign Currency Transactions

Transactions denominated in foreign currency are accounted at the exchange rate prevailing at the date of the transaction. Foreign currency monetary assets and liabilities are translated at year end exchange rates and resultant difference if any is recognized as exchange loss or gain as the case may be.

9. Retirement Benefits

- 9.1 Gratuity liability for the employees of NIWE is covered under the Group Gratuity policy with Life Insurance Corporation of India. The contribution payable for the year towards the policy is charged off to revenue and Gratuity liability is created. Contribution paid is debited to Gratuity fund account, Gratuity fund is reduced from the Gratuity liability for the purpose of presentation in the financial statement.
- 9.2 Leave salary liability for the employees of NIWE are covered under the Group Leave Encashment Scheme policy with Life Insurance Corporation of India. The contribution payable towards the policy is charged off to revenue and leave salary liability is created. Contribution paid is debited to leave salary fund with LIC account, liability is reduced from the fund for the purpose of presentation in the financial statement.
- 9.3 Employees Provident Fund Account of the employees of NIWE is maintained at the Office of the Regional Provident Funds Commissioner, Chennai. The contribution paid is based on the actual remuneration paid and as per Act. The same is charged off to revenue.

10. Uniform Format of Accounts for Central Autonomous Bodies

The accounts are prepared based on the Uniform Format of Accounts for Central Autonomous Bodies from the year 2001-2002.

11. The salary expenditure and project consultancy expenditure are met from the internal sources generated by NIWE. The balance of revenue after meeting the expenditure is transferred to General Reserve Fund.

NATIONAL INSTITUTE OF WIND ENERGY

An Autonomous R&D Institution, MNRE, Government of India

Schedule 14: Notes forming part of accounts

1. Contingent liabilities:

Contingent liabilities not provided for: NIL (previous year NIL)

2. Capital commitments:

- I. Government of Tamil Nadu granted permission vide G.O. No.MS.No.89 dated 26.02.2001 to enter-upon land measuring about 4.41 acres at Survey No 657/1A2 at Pallikaranai Village, Tambaram Taluk, Kancheepuram District for construction of Campus and the same was taken possession during March, 2001. The value of land is yet to be fixed by the Government of Tamil Nadu. Pending fixation, a sum of Rs.18,56,169/- worked out on the basis of market value as per TN G.O Ms.No.206 of Revenue Department dated 19.02.1997 was taken as land value in the accounts for the year 2008-2009. The Construction of building on the aforesaid land was entrusted with CPWD and the building was taken possession during March, 2004.
- II. Tamil Nadu Energy Development Agency granted permission to enter-upon land measuring about 8.64 acres at Ayyanaruthu and Panickerkulam Village, Kovilpatti Taluk, Thoothukudi District for establishment of Wind Turbine Test Station and the same was taken possession during March, 2000. The value of land is yet to be ascertained by the Government of Tamilnadu and hence not recorded in the accounts.
- III. SOLAR RADIATION RESOURCE ASSESSMENT UNIT
 - (a) Ministry of New and Renewable Energy, Delhi vide letter No.29/1/2009-10/JNNSM[ST] dt.27.07.2010 has entrusted to NIWE Chennai, the implementation of a Mission Mode Project for setting up of 50 SOLAR MONITORING STATIONS at high potential sites of solar power in the country at a cost of Rs.2484.17 lakhs to be spent over a period of 5 years.
 - (b) Ministry of New and Renewable Energy, Delhi vide letter No.29/1(3)/2011-12/JNNSM[ST] dt.30.03.2013 has entrusted to NIWE Chennai, the implementation of a Mission Mode Project for setting up of further 60 SOLAR MONITORING STATIONS at high potential sites of solar power in the country at a cost of Rs.3060.00 lakhs to be spent over a period of 5 years.
 - (c) Ministry of New and Renewable Energy, Delhi vide letter No.29/02/2015-16/JNNSM dt.30.06.2016 has Sanctioned Merger of Phase-I and II of Solar

Radiation Resource Assessment (SRRA) Project and Extension as Unified SRRA Project (USP) up to March 2020.

- (d) Ministry of New and Renewable Energy, Delhi vide letter No.29/02/2015-16/JNNSM dt.11.08.2020 has sanctioned Rs.2.23 Crores for Unified SRRA Project (USP) and extended up to 31.10.2020.

3. Current Assets, Loans and Advances:

In the opinion of the management, the current assets, loans and advances have a value on realization in the ordinary course of business equal at least to the aggregate amount shown in the Balance Sheet.

4. Taxation:

In view of there being no taxable income under the Income Tax Act, 1961, no provision for income tax has been considered necessary

5. Remuneration to Auditors:

Audit fees, Tax Audit and Fees for Utilization Certificates - Rs.75,000/- per annum plus taxes as applicable.

6. Income:

The Ministry of Non-Conventional Energy Sources vide letter no. 51/18/2000-WE (PG) dt.05.07.2002 has permitted to retain the sale proceeds of Wind Energy Resource Survey data, Handbook and Micro-survey reports and accordingly the same has been accounted as income from publication.

7. Internal Control:

NIWE has adequate internal control procedures in the areas of Cash, bank purchases, expenses [salaries, traveling allowance, projects, administration and other recurring/non recurring] billing for consultancy services, receipt and utilization of government grants and utilization of grants received for the specific projects, stores accounting, fixed asset verification, etc. The Deputy Director General [F&A] is responsible for continuously monitoring and reviewing the effectiveness of internal control procedures.

NIWE is following the Rules and Regulations contained in GFR [General Financial Rules] and DFR [Delegation of Financial Rules] as made applicable by the Governing Council of NIWE. During the financial year 2018-19, the review of internal control procedures by the Deputy Director General [F&A] has not brought out any material lapse in the system. Besides Internal Audit is also conducted by the Auditors i.e. 3rd party Chartered Accountant registered with C&AG. Further, NIWE is an organization having the accreditation of ISO: 9001:2015 for Testing, Standards & Certification, Wind Resource

Assessment, and Wind Turbine Test Station at Kayathar & Purchase and for Testing, Standards & Certification from National Accreditation Board for Laboratories, which has stringent monitoring systems and is subject to periodical audits by those organizations.

8. (a). Stock in Hand (Internal Earnings):-

The Centre has taken list of inventory spares during the current year and valued it at cost as detailed below:

Instrument Name	QTY	Amount (Rs)
Connectors	8532	17,83,073
Total	8532	17,83,073

The above stocks of spares are accounted in the financial statements as Closing Stock in Income & Expenditure Statement. They were purchased out of Internal Earnings.

(b). Stock in Hand (CFA):-

The Centre has the following Instruments & Equipment and its spares which are neither classifiable as assets (because, they are not long term benefits) nor as stocks in hand (because they have recurring nature of usage for short period of time beyond 12 months after re-calibration) were purchased during previous years and valued it at cost as detailed below:

Instrument	No.	Closing Stock
Anemometer	114	52,87,816.00
Wind Vane	16	9,42,955.66
Temperature Sensor	51	3,89,695.00
Pressure Sensor	41	6,75,539.00
EOL Zenith Data Logger	35	54,72,818.00
CR - 3000	1	2,08,173.40
Pyranometer	44	8,93,010.80
Relative Humidity & Temp.	2	43,204.00
Davis make rain gauge	1	17,545.00
	305	1,39,30,756.86

The above instruments & Equipments and its spares are accounted in the financial statements of the respective year of purchase and expended in that year itself as they were purchased out of Grants received in various years and contain partly used/yet to be installed in the masts.

9. The balance of revenue after meeting the salary and consultancy project expenditure is transferred to General Reserve Account, as shown below: (Ref: I&E)

Income generated		18,56,10,037
Less: Salary component of service functions	6,63,49,947	
Consultancy Project Expenses	9,94,70,189	16,75,07,194
Transfer to Capital fund	1,61,988	
Stock	15,25,070	
Balance transferred to General Reserve Fund		1,81,02,843

10. As per the approval of 8th meeting of GC, NIWE held on 14/12/2001 & pursuant to the agreement entered into with the client /manufacturers, NIWE is entitled to retain the entire energy receipts realized and for the financial year 2019-20, a sum of Rs.3,28,83,750/- (Ref: Energy Receipt - Sch.6) has been earned.
11. The total interest income earned is Rs.2,39,02,437 /-. Out of which Rs.2,28,25,013/-, earned from Term Deposit with Scheduled Banks and Rs.10,77,424/- from Savings Bank account with Scheduled Banks (Ref: Sch.8) is shown under income and expenditure.
12. The figures shown in the accounts are rounded off to the nearest rupee.
13. The previous year figures are regrouped / reclassified wherever considered necessary to make them comparable with current year's figures.
14. Schedule 1 to 14 annexed form an integral part of Balance Sheet as at 31st March, 2020 and Income and Expenditure Account for the year ended on that date.

Signatures to Schedule 1 to 14

For National Institute of Wind Energy

Sd/-
R. Girirajan
Asst. Director

Sd/-
J.C. David Solomon
Division Head

Sd/-
Dr. K. Balaraman
Director General

As per our Report attached
Rajesh & Ganesh
Chartered Accountants
Firm Regn No.008640S
Sd/-

S. Rajesh
Partner



Rajesh and Ganesh
Chartered Accountants



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 31.03.2021, 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 receipts and payments 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.

Landline : 044-4212 4342
Mobile : +91 98400 52031

II Floor, Sterling Point, No 124, G N Chetty
Road, T. Nagar, Chennai – 600 017.
E-Mail: raieshganesha@yahoo.com



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, 2021;
 - 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

**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.
- e. According to the information and explanations given to us, in respect of statutory dues, NIWE has generally been regular in depositing statutory dues, including Provident Fund, Income-tax, Goods & Services Tax as well as compliance of the respective laws and other material statutory dues applicable to it with the appropriate authorities.

For Rajesh and Ganesh
Chartered Accountants
(Firm Registration No: 008640S)

Sd/-
S Rajesh
Partner
Membership No:208090

Place: CHENNAI
Date: 07/12/2021



M. RISWANA PARVEEN - XII Std
Ranimaiyyamai Girls Higher Secondary School, Chennai

Expertise and Research & Development for Wind and Solar Energy Stakeholders

Resource Assessment

Wind Energy

- ◆ Carry out Nationwide Wind Resource Assessment
- ◆ Estimation of Wind Potential in the country through Wind Atlas preparation
- ◆ Design and implement the comprehensive Resource Assessment Programme
- ◆ Analysis of wind data to identify Wind Farmable locations
- ◆ Verification and vetting of wind data generated by private entrepreneurs
- ◆ Consultancy services for Feasibility Studies, Technical Due Diligence, Micro-siting and preparing DPR for Wind Farming and Repowering assessment

Offshore Wind Energy

- ◆ Nodal Agency for Offshore Wind Energy development in India
- ◆ Met-Ocean Measurement.
- ◆ Demarcation of Offshore Wind Energy Blocks
- ◆ Geophysical and Geotechnical Studies

Solar Energy

- ◆ Solar Radiation Resource Assessment
- ◆ Investor & bankable grade Solar / Meteorological data
- ◆ GIS enabled Indian Solar Atlas
- ◆ Calibration of solar sensors as per International Standards
- ◆ Consultancy on Solar Energy Projects

Forecasting

- ◆ Wind Power Forecasting Services
- ◆ Solar Power Forecasting Services

Testing (Large & Small)

- ◆ Power Performance measurements
- ◆ Load measurements
- ◆ Power Quality measurements
- ◆ Safety and function tests
- ◆ Yaw efficiency test
- ◆ User defined measurements
- ◆ Duration Test

The services are as per internationally accepted procedures & stipulations and certified as per the requirements of ISO 9001 & NABL accredited as per the requirements of ISO/ IEC 17025 : 2005

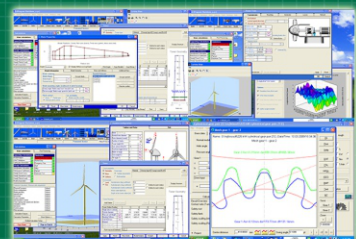
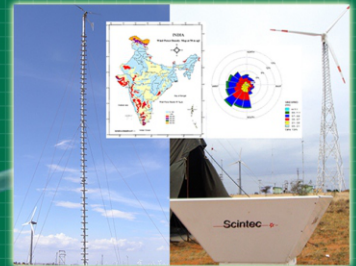
Standards & Certification

- ◆ Preparation of Indian standards on wind turbines
- ◆ Accord Type Certification to Wind Turbines. Type Certification Services are certified as per ISO 9001
- ◆ Issue the recommendation for grid synchronization to facilitate installation of prototype wind turbines
- ◆ Technical Due Diligence for Wind Farm Projects

Training

National, International and Customized Training on:

- ◆ Wind and Solar Resource Measurement & Analysis
- ◆ Wind and Solar Energy Technology
- ◆ Testing and Certification of Wind Turbines
- ◆ Installation, Commissioning and Operation & Maintenance of Wind Turbines
- ◆ Grid Integration of Renewable Energy System
- ◆ Forecasting of Wind and Solar Energy Production
- ◆ Seminar / Workshops on Wind and Solar Energy



नीवे NIWE

NATIONAL INSTITUTE OF WIND ENERGY

An Autonomous Research & Development Institution under the Ministry of New and Renewable Energy, Government of India
Velachery - Tambaram Main Road, Pallikaranai, Chennai - 600 100

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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, Ministry of New and Renewable Energy, Government of India

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

Velachery - Tambaram Main Road, Pallikaranai, Chennai - 600 100, Tamil Nadu India

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