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EDITORIAL

The global wind energy sector is experiencing rapid growth and significant technological advancements. Wind turbines are becoming larger and more efficient. Recently, an OEM has completed 15 MW prototype wind turbine with a 236 meter rotor diameter, which is currently undergoing testing in Denmark. Increased interest is seen in coupling wind energy with green hydrogen production, which will provide a means to store and transport renewable energy in an effective way. This phenomenon is seen as a pivotal step towards a larger decarbonization goal achievement.

India is making considerable and notable strides in wind energy, particularly with its ambitious plans for offshore wind. The Government has announced a 4 GW offshore wind tender in Tamil Nadu, which is a significant step towards its renewable energy targets. The Union Cabinet approved the Viability Gap Funding (VGF) scheme for offshore wind energy projects at a total outlay of Rs.7453 crore, including an outlay of Rs.6853 crore for installation and commissioning of 1 GW of offshore wind energy projects (500 MW each off the coast of Gujarat and Tamil Nadu), and grant of Rs.600 crore for upgradation of two ports to meet logistics requirements for offshore wind energy projects. India's wind energy capacity is expected to grow significantly in the years to come. The government's support for renewable energy continues to attract international investments and technological collaborations.

On the Offshore energy front, wind power development will be undertaken under 3 models of development i.e., Model A, B & C. NIWE has initiated the offshore wind resource assessment and geophysical & geotechnical investigation for development of offshore wind farm of 500 MW at sub zone 1 at Gulf of Mannar off Tamil Nadu coast under Model A. The Rapid Environmental Impact Assessment study to cover 14 zones at Gulf of Mannar off Tamil Nadu coast under funding from UK-FCDO, as a part of ASPiRE programme, has successfully collected the samples at 91 locations and the draft report has been prepared. 'Offshore Wind Energy Facilitation Portal' is being developed by National institute of Wind Energy (NIWE). The portal will serve as a single window clearance system and will facilitate fast tracking approval process from various Ministries.

The Wind Resource Assessment division has been installing Wind Monitoring Stations across the country and collecting wind profile data to assess wind potential. Recently, the division has successfully commissioned one Wind Monitoring Station (WMS) at Manglutan in Port Blair in Andaman. The Division has completed one consultancy project and actively managing six consultancy projects aimed at providing comprehensive support to various stakeholders of the wind industry. Assisted RECL for the impact assessment studies of 1MW (AC) Ground mounted grid connected Solar Power Plant at Madurai Kamaraj University, Madurai.

The Research Vision for NIWE and the Thrust Areas were unveiled, which would provide impetus to further development of wind energy including offshore, large-scale hybrid systems.

On the area of certification, NIWE has obtained International Accreditation for Inspection works from NABCB as Inspection Body (IB) for the scope of Wind Turbines and their components. NIWE has successfully undergone the First Surveillance Assessment i.e. Office Assessment (SOA-1) conducted by NABCB in connection with maintenance of the Accreditation as a Product Certification Body (PCB).

The S&R division of NIWE had completed the review of documentation for 13 RLMM applications of various wind turbine models submitted by wind turbine manufacturers for RLMM.

With regard to skill development, the Skill Development and Training Division has proposed to conduct 5 National Training courses and has coordinated the student visit of 232 students to gain insights into Wind Energy. 9 students had completed an internship at NIWE and 26 are undergoing presently. NIWE is in the process of conducting Training of Participants (ToP) programme under VSDP, and about 12 Nos. of TOP programme have been completed, and 360 participants have been trained during this quarter.

We value your thoughts and feedback. Please do not hesitate to share your insights with us. Your input helps us improve and serve you better. Looking ahead, stay tuned for our next newsletter, where we will explore the latest industry trends and share exclusive insights as is always being done by NIWE.

Dr. Rajesh Katyal, Director General

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Editorial Board

Research and Development

The Research Vision for NIWE and the Thrust Areas were unveiled during the 30th R&D Council Meeting. Based on the survey of the recent advancements in technology, it was identified that research in the following thrust areas would provide impetus to further development of wind energy in the country including offshore, large scale hybrid systems:

Wind Resource Characterization (Onshore & Offshore)

- Resource Assessment including remote sensing
- Offshore Resource Assessment using floating LIDAR
- RSD Calibration
- Wind Flow Modeling (Micro siting)
- Site Suitability analysis (Turbulence, Wind shear, extreme wind conditions)

Wind Turbine Design

- Rotor design (including Airfoil & Wind turbine aerodynamics)
- Aero elastic load simulations
- Type Certification (Design Assessment)
- Type Testing (Power Performance, Loads)
- Acoustic Noise Measurements
- Drivetrain Technology innovation
- Support Structure design (Onshore & Offshore)

Wind Energy Systems

- Distributed energy systems including hybrid system
- Hybrid Power Plant design and operation
- Wind Power Forecasting

Wind Turbine Materials & Components

- Structural design and full scale Testing (Blades)
- Composites Analysis, manufacturing and Testing

Market & Policy

- Standards, guidelines, schemes preparation on above areas
- Repowering
- Life Time extension
- Wind Farm economics including LCOE studies

The way forward would be to continue partnering and seeking proposals in the identified thrust areas from academic, R&D Institutions and Industry.

Offshore Wind Development

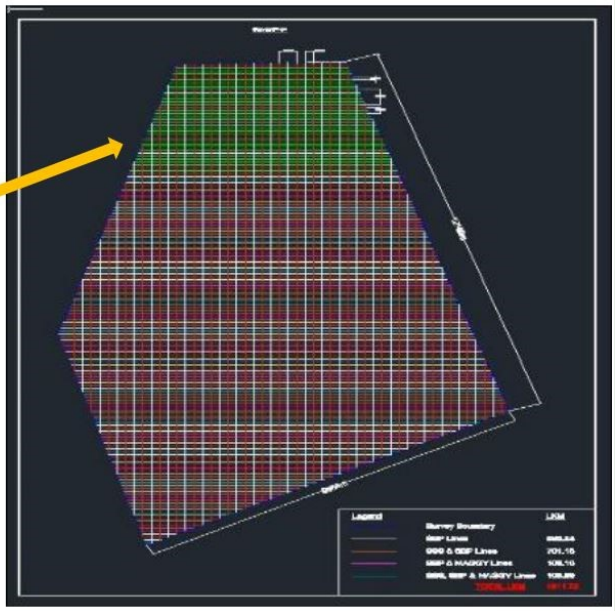
As per the Revised Strategy for Establishment of Offshore Wind Energy Projects published on 26th September 2023, offshore wind power development will be undertaken under 3 models of development i.e., Model A, B & C. NIWE has initiated the offshore wind resource assessment and geophysical & geotechnical investigation for development of offshore wind farm of 500 MW at sub zone 1 Gulf of Mannar off Tamil Nadu coast under Model A. A latest progress on studies and surveys of Tamil Nadu coast is given below

Geophysical and Geotechnical Investigation:

The objective of this investigation is to determine the seabed and soil properties in subzone 1 of the Gulf of Mannar off Tamil Nadu coast. Comprehensive geophysical surveys including bathymetry, side-scan sonar, sub-bottom profiler, and magnetometer will be conducted over an area of approximately 108 sq.km. Based on these surveys, initially six borehole locations will be identified for geotechnical investigation, out of which three were selected for detailed analysis.

SURVEY TEAM

M T TEJA SURVEY VESSEL



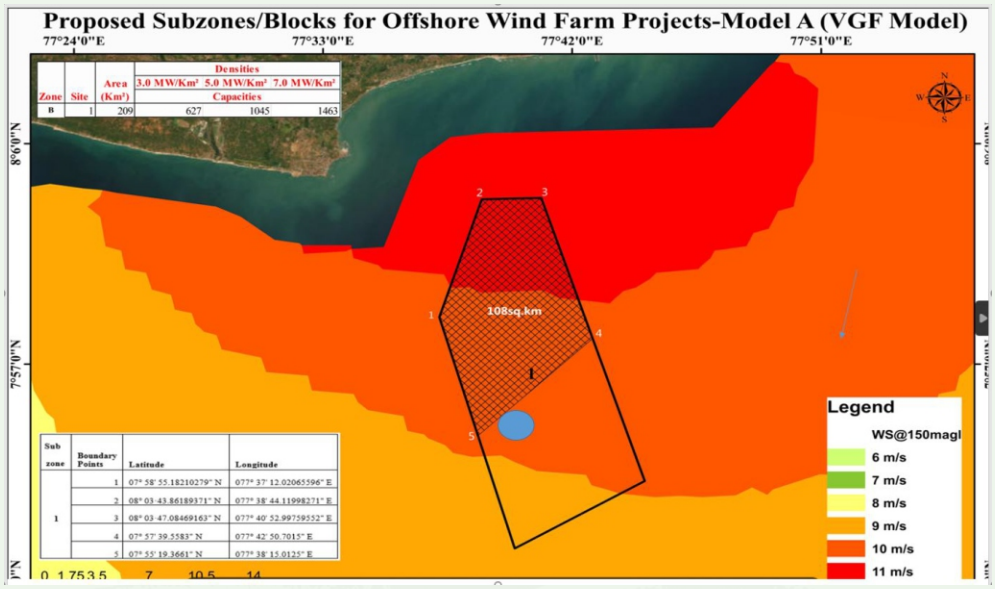
PROPOSED SURVEY AREA

This study is needed to provide essential data on seabed conditions, ensuring safe and effective design and construction of offshore structures. The project includes drilling boreholes up to 60 meters below the seabed, collecting soil samples, and performing laboratory tests such as grain size analysis, Atterberg limits, and strength and permeability assessments. Offshore Geophysical survey has been initiated.

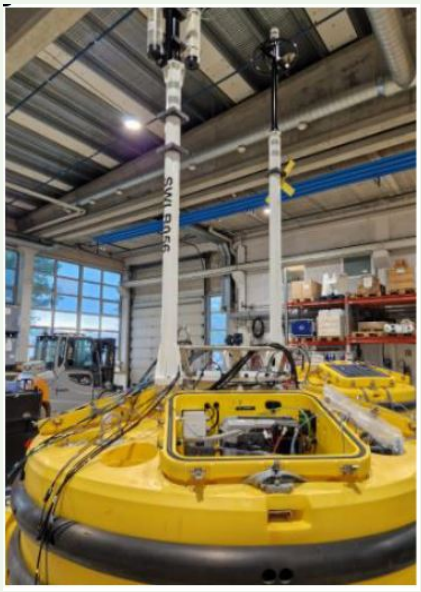
Offshore Wind Resource Assessment using Floating Bouy LiDAR system:

NIWE invited tender for Supply of meteorological and oceanographic data for a continuous period of minimum one year by deploying Integrated Floating Buoy with offshore LiDAR, Meteorological and Oceanographic Sensors (Wave, Current etc.,) on LEASE BASIS at Sub Zone-1 in Gulf of Mannar off, Tamil Nadu Coast in India including Comprehensive Operation and Maintenance for a period of 12 months. A Floating LiDAR buoy shall be deployed in the sub-zone 1 area of the Gulf of Mannar and shall measure wind speed and wind direction together with oceanographic data (waves, sea current, water level).

The work has been initiated, Pre-Deployment Validation is planned at Froya, Norway.



Location of floating buoy with offshore LiDAR



Integrated Floating Wind Lidar

MET-OCEAN MEASUREMENTS (Wind Resource Mapping in Tamil Nadu coast line):

NIWE has identified suitable locations for deploying the Offshore Lidar at VOC port (4 to 5 km from the sea shore) and Udangudi Thermal Coal jetty (8 to 9 km from the sea shore) which together with the measurements at sub-zone 1 will cover wind profile of Tamil Nadu coast. The site details are given below:

Location	LiDAR Serial number	Latitude/Longitude
VOC_Port_1	ZX300M-996	8° 44' 58.2" N /78° 13' 36.19" E
VOC_Port_2	ZX300M-997	8° 45' 19.58" N/78° 13' 16.24" E
UDANGUDI	ZX300M-998	8°23' 35.763"N / 78° 8'0.686"E

The Installation and commissioning of LiDAR at above mentioned sites have been completed and measurement are under progress. One year wind measurement campaign likely to be completed by February 2025.

LiDAR installed at VOC_Port_1 & VOC_Port_2

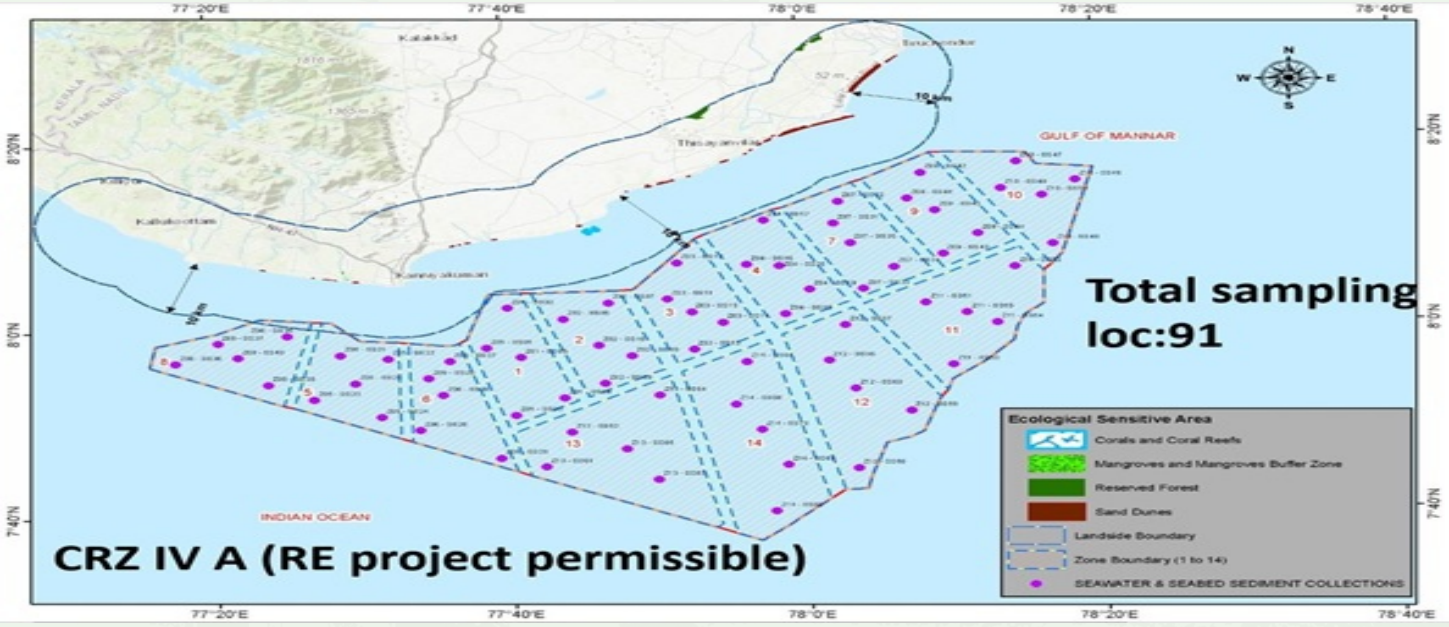
LiDAR installed at Udangudi

NIWE has already collected the wind data for last 3 months and the mean wind speed of three sites at 100m are indicated below:

Site	April-2024	May-2024	June-2024
	Mean wind speed (m/s)	Mean wind speed (m/s)	Mean wind speed (m/s)
VOC_Port_1	5.25	5.96	7.3
VOC_Port_2	5.2	5.9	7.5
Udangudi	5.5	6.97	10.41

Rapid Environment Impact Assessment (EIA) study:

The Rapid Environmental Impact Assessment study to cover 14 zones at Gulf of Mannar off Tamil Nadu coast under funding from UK-FCDO as a part of ASPiRE programme has successfully collected the samples at 91 locations and the draft report has been prepared. Locations where the samples were collected and their survey pictures are provided below:



EIA sample collection at Gulf of Mannar to covered 14 Zones


Water quality


Sediment sampling


Plankton collection


Inter-Tidal Benthos collection


Survey boat

National Test Centre at Dhanushkodi / Greening of Rameshwaram:

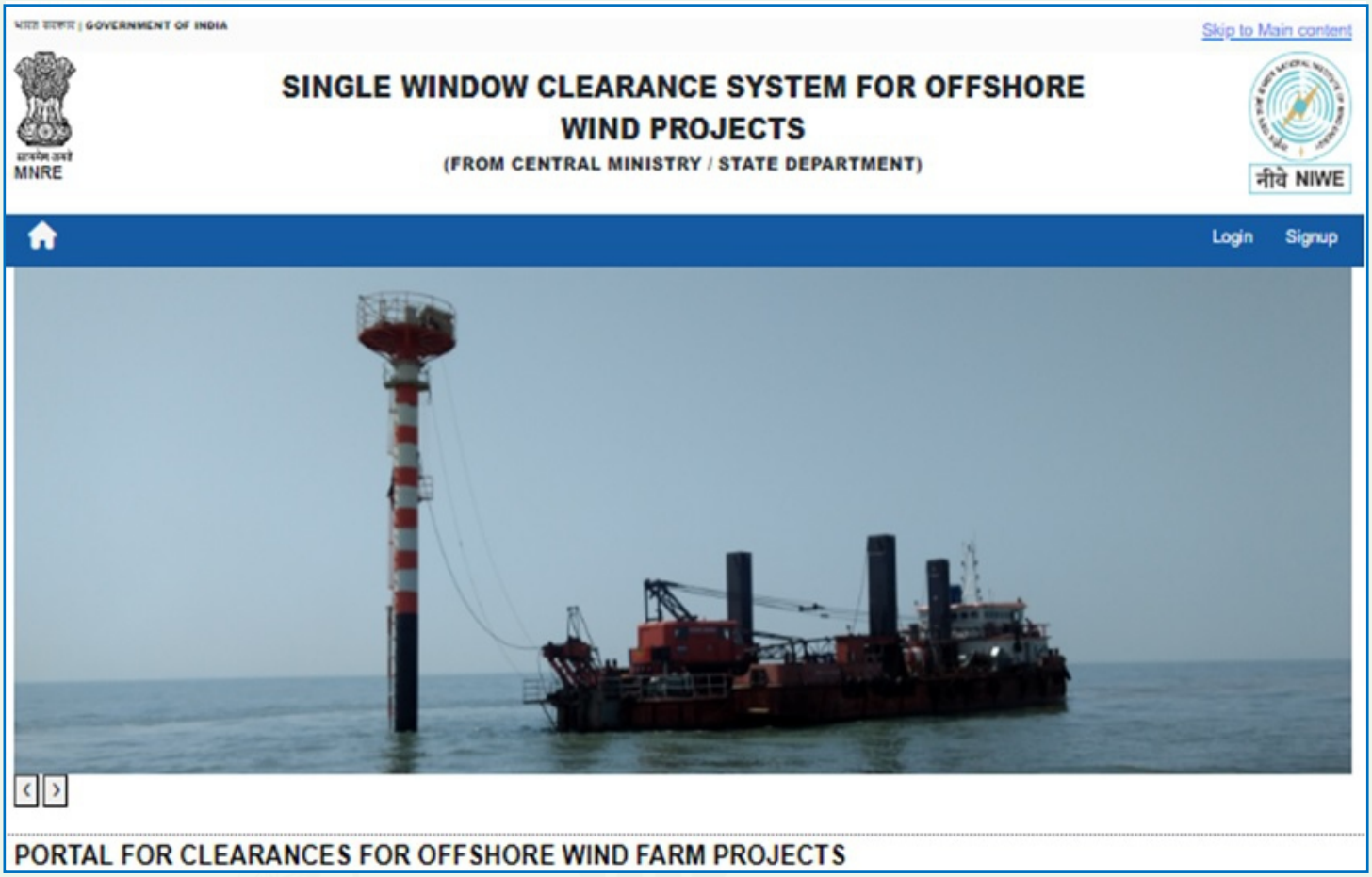
Environmental Impact Assessment study for Establishment of 20 MW Demonstration Wind Farm with Associated Facilities at Dhanushkodi, Rameswaram Taluk, Ramanathapuram District, Tamil Nadu, India has been successfully completed and the final report has been prepared. Necessary CRZ clearance are underway.

Development of Offshore Wind Energy Facilitation portal:

As part of streamlining and expediting the process for offshore wind developments, the 'Offshore Wind Energy Facilitation Portal' is being developed by National institute of Wind Energy (NIWE) in line with the National offshore wind energy policy 2015. The portal will serve as a single window clearance system and will facilitate fast tracking approval process from various Ministries. The developers (user), Nodal officers from concerned Ministries and administrator (NIWE) are the major stakeholders for smooth operation of the portal.

A meeting with all the Ministries and State departments was held on 16.04.2024 under the chairmanship of honorable Joint Secretary, MNRE to review / understand the requirement of individual ministries to incorporate the suitable changes in the portal. NIWE has demonstrated the portal and the salient features of it to all the ministries.

NIWE has circulated the presentation on the " Single Window Clearance System for offshore wind farm projects" along with demo login credentials to All the Ministries / departments, and requested to provide specific formats / templates, if any, required for the Stage 1 (for carrying out studies / surveys) or Stage 2 (for development of offshore wind farm) application clearance process to update the offshore clearance portal.



Publication

"Phase-Locked Loop (PLL) Techniques for Grid Synchronization: A Comprehensive Review" published in 2024 Second International Conference on Emerging Trends in Information Technology and Engineering (ICETITE).

Viability Gap Funding (VGF) scheme for implementation of Offshore Wind Energy Projects:

The Union Cabinet approved the Viability Gap Funding (VGF) scheme for offshore wind energy projects at a total outlay of Rs.7453 crore, including an outlay of Rs.6853 crore for installation and commissioning of 1 GW of offshore wind energy projects (500 MW each off the coast of Gujarat and Tamil Nadu), and grant of Rs.600 crore for upgradation of two ports to meet logistics requirements for offshore wind energy projects.

The VGF support from the Government will reduce the cost of power from offshore wind projects and make them viable for purchase by DISCOMs. While the projects will be established by private developers selected through a transparent bidding process, the power excavation infrastructure, including the offshore substations, will be constructed by Power Grid Corporation of India Ltd (PGCIL). Ministry of New and Renewable Energy, as the nodal ministry, will coordinate with various Ministries / Departments to ensure successful implementation of the scheme.

Wind Resource Assessment

Wind Resource Assessment

Wind Resource Assessment Studies in Andaman & Nicobar Islands

The wind Resource Assessment division has been installing Wind Monitoring Stations across the country and collecting wind profile data to assess wind potential for various purposes.

During the period the division has successfully commissioned one Wind Monitoring Station (WMS) at Manglutan in Port Blair in Andaman and Nicobar Islands.

Integrated Wind Solar Resource Assessment (IWSRA)

- The IWSRA (Integrated Wind Solar Resource Assessment) project is a significant initiative aimed at advancing wind and solar resource planning to facilitate India's renewable energy objectives. Under this project, several activities have been executed and are as follows.
- Completed the chip / data collection at Headpura, Madhya Pradesh, where comprehensive data on wind and solar resources was gathered to assess their potential for energy generation.

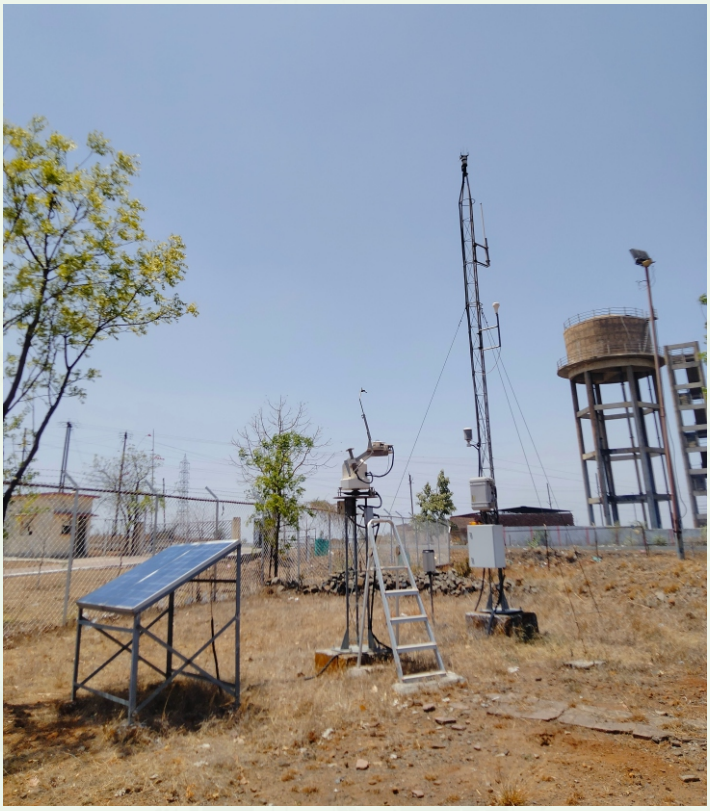
Solar Radiation Resource Assessment (SRRA)

- The WRA Division has conducted thorough site visits and inspections of SRRA stations, focusing specifically on the instruments used for measuring solar radiation and meteorological data.
- The visits involved a meticulous examination of the solar radiation instruments, such as pyranometers, pyrheliometers, and sun trackers, ensuring their proper functioning.
- The Division also inspected the meteorological instruments, including sonic anemometers,

WMS at Manglutan, Port Blair, Andaman & Nicobar Islands

Mandasur SRRA site

Khandwa SRRA Site



Rajgarh SRRA Site

Gwalior SRRA Site

temperature sensors, data loggers and solar panels, and humidity sensors, etc., to ensure accurate and reliable data collection at Gwalior, Khandwa, Mandasur and Rajgarh in Madhya Pradesh.

Research Activities

Maintenance and Repair Strategy for Wind Energy Development

- The research focuses on understanding the impact of Indian environmental factors on blade damage. Currently, Phased Array Ultrasonic testing (PAUT) is being conducted on the blade samples to assess / identify the change in properties before and after damage.
- Also a fatigue analysis will be performed to determine the lifetime of the blade, post damage.
- Attended monthly meeting with collaborating institutions organised by DTU, Denmark.

The wind farm SCADA control system at Bhuj, Gujarat

- Convened meetings with the developers for Phase II activities for the implementation of the SCADA system at other pooling substations of Bhuj.
- NIWE / Contractor carried out Maintenance of Phase I activities.

Data Analytics

Consultancy projects

At present WRA Division has completed one consultancy project and are actively managing six consultancy projects aimed at providing comprehensive support to various stakeholders within the wind industry. The range of activities encompass a diverse set of tasks and expertise.

- **Energy Yield Estimation:** Utilise our in-depth knowledge and advanced tools to accurately assess the potential energy output of wind projects. This analysis is crucial for project planning, financial projections, and overall project viability.
- **Preparation of Tender documents and conducting Technical Bid evaluations:** Assist our clients in developing well-structured and comprehensive tender documents that effectively communicate project requirements. Additionally, evaluate technical bids submitted by potential vendors, to ensure that they meet the necessary criteria and align with project objectives.
- **Wind-Solar Hybrid projects:** By combining the strengths of both wind and solar energy, help our clients to explore the possibilities of hybrid power generation systems that maximise energy production and optimise resource utilisation.
- **Preparing Detailed Project Reports (DPR):** Provides comprehensive insights into project feasibility, financial aspects, technical specifications, and risk assessment.
- **Project Management Consultancy (PMC) services:** Project Management Consultancy (PMC) services ensure that wind turbine components meet required standards, verify manufacturing facilities, and monitor the installation process to ensure compliance and safety. Additionally, it supervises the commissioning

process to evaluate performance and resolve any issues. By providing comprehensive project management support, PMC services contribute to the successful implementation of wind turbine project.

- **Verification procedure of wind monitoring stations:** The verification procedure of wind monitoring stations for private developers involves verification of the Wind Monitoring stations, equipment, calibration of instruments to ensure accuracy, continuous data collection of wind speed, direction, and other parameters like geographical locations etc.

Geotagging

Geotagging is a process that involves capturing GPS coordinates of wind turbine locations and assigning a unique ID to each turbine. In the case of a wind farm site with multiple turbines, this process was implemented to accurately map the precise location of each turbine. During the period, 65 geotagging IDs have been created.

Issuance of Elevation Certificate for MoD NoC Applications for Wind Power Projects

- The purpose of the project is to validate the elevation certificate and the inputs given by the surveyor and client. To do this, DGPS will be used to conduct joint site visits. High-resolution terrain modeling and desktop GIS tools will be used to validate the coordinates of all proposed wind turbine locations, and a report and certificate will be provided.
- We have visited 44 WTGs in Gadag District, Karnataka in connection with Issuance of Elevation Certificate.

RE Projects

2 MWp Ground Mounted Grid Connected Solar Power Plant at Indian Institute of Management (IIM)-Trichy and 1 MW (AC) Ground Mounted Grid Connected Solar Power Plant at Madurai Kamaraj University (MKU), Madurai

- The 2 MWp ground-mounted grid-connected solar PV power plant at IIM Trichy campus and 1 MW AC plant at Madurai Kamaraj University are being monitored through daily solar power generation data review and periodic site visits to inspect the solar arrays, inverters, transformers along with oversight of O&M activities like module cleaning, string checks, equipment tests as per the operational and maintenance agreements to validate proper maintenance and optimal performance of the solar assets for maximising clean power generation from the grid-connected plants.
- Assisted RECL for the impact assessment studies of 1 MW (AC) Ground mounted grid connected Solar Power Plat at Madurai Kamaraj University, Madurai

Other Works

- Co-ordinated with OEM and successfully commissioned 2 MW WTG at VOC Port Trust, Tuticorin on 11th April 2024.
- Division Head and Engineer carried out Site visit along with SECI, NRSE officials and Tribal Council members for identification of locations towards establishment and development of Wind farm in Andaman & Nicobar Islands from 30th April 2024 to 12th May 2024.
- Division Head and Project Engineers coordinated with RECL officials for impact assessment studies of 1 MW (AC) Ground Mounted Grid connected Solar Power Plant at Madurai Kamaraj University, Madurai on 7th June 2024.

Certification & Information Technology

- NIWE has obtained International Accreditation for Inspection works from NABCB as per the requirements of ISO/IEC 17020 as Inspection Body (IB) for the scope of Wind Turbines and their components.
- NIWE successfully undergone the First Surveillance Assessment i.e. Office Assessment (SOA-1) conducted by NABCB in accordance with ISO/IEC 17065: 2012 in connection with maintenance of the Accreditation as a Product Certification Body (PCB). NABCB recommended the continuation of Accreditation which is valid upto April 2027.
- NIWE has signed an Agreement with M/s. Powerwind Limited for 3rd and final stage of the Type Certification Process viz. Certification of 'PowerWind 56' Wind turbine model in connection with Type Certification" as per the scheme IS/IEC 61400-22:2010 and the process is ongoing.
- M/s. Siva Windturbine India Private Limited has requested NIWE to initiate the 2nd stage of the Type Certification Process viz. "Evaluation of 'SIVA U57' Wind Turbine Model as per Certification Scheme based on IS/IEC 61400-22: 2010. Inking of Agreement is under process.

INFORMATION TECHNOLOGY

- Continued to maintain the IT infrastructure to keep servers, storage, systems, and software up and running.
- Continued to provide IT support for users at NIWE and its stakeholders.
- Completed the Restructuring of LAN.
- Prepared tender documents for the procurement of new hardware, software and AMC services.
- Completed the Security Audit for Web Applications of NIWE Website.

Web Portals

Design and development of the NIWE website in line with GIGW guidelines is in progress and published.

New Infrastructure

Initiated the restructuring of CCTV infrastructure in NIWE.

Testing, Standards and Regulation

TESTING

- Type Testing as per IEC Standards (IEC 61400-12-1:2017 & IEC 61400-13:2015) for "INOX DF/3000/145 3.0 MW Rotor Blade Type SR71 (T-Bolt), Hub Height 100 m IEC WT Class IIIB" wind turbine at Rajkot, Gujarat for M/s. Inox Wind Limited have been completed. Test reports for Power Performance measurements, Safety & Function test have already been issued. Load measurements report is issued during the period.
- Power Performance Measurements as per IEC Standard (IEC 61400-12-1:2017) for "INOX DF/3000/145 3.0 MW Power Booster Mode 3.3 MW Rotor Blade Type SR71 (T-Bolt), Hub Height 100 m IEC WT Class IIIB" wind turbine with 3.3 MW capacity under Power Booster mode operation are ongoing at Rajkot, Gujarat for M/s. Inox Wind Limited.
- Test reports for Power Performance measurement, Load Measurements as per IEC Standards (IEC 61400-12-1:2017 & IEC 61400-13:2015) have been issued for GWL 225 wind turbine of M/s. Southern Wind Farms Limited for which the measurment was already completed on the wind turbine installed at Varapatti Village, Coimbatore, Tamil Nadu.

Exchange of Signed Agreement with MPIDC (Development of Calibration Wind Tunnel at Proposed SEZ, Madhya Pradesh)

- Test report on Acoustic Noise Measurement as per IEC Standard (IEC 61400-11:2018) have been issued for the measurements carried out for "Senvion 2.3 M 130 / 2.7 MW turbine (HH 120 m, RD 130 m)" wind turbine located at Tithawa, Gujarat for M/s. Senvion Wind Technology Private Limited.
- A Service agreement has been signed on 12.06.2024 to carry out Load Measurements, Safety & Function testing for "INOX DF/3000/145 3.0 MW Power Booster Mode 3.3 MW Rotor Blade Type SR71 (T-Bolt), Hub Height 100 m IEC WT Class IIIB" wind turbine with 3.3 MW capacity under Power Booster mode operation and Measurements for the same has been initiated recently.
- An agreement has been signed by Madhya Pradesh Industrial Development Corporation (MPIDC), Madhya Pradesh with NIWE on 25.06.2024 for development of Common Test Facility (CTF) on Calibration Wind Tunnel for Special Economic Zone (SEZ) proposed by Madhya Pradesh Industrial Development Corporation (MPIDC), Madhya Pradesh.

STANDARDS AND REGULATION

- Review of documentation has been completed for 13 RLMM applications of various wind turbine models submitted by wind turbine manufacturers for RLMM. Further, technical support has been provided to MNRE for implementation of Revised Lists of Models and Manufacturers of wind turbines (RLMM) process.
- Organized the 14th ETD 42 Wind Turbine Sectional Committee meeting of BIS held on 28.05.2024 through hybrid mode at NIWE, Chennai. The meeting was attended by DG, NIWE / Chairman ETD 42, Shri Ritwik Anand, Scientist C, BIS member secretary, Director and Division Head, S&R and division engineer and status of Indian standards and various standards related works have been discussed.
- Application Form sent for one prototype wind turbine model based on the request received from the wind turbine manufacturer in connection with installation of prototype wind turbines in India.
- The continual improvement and maintaining the quality management system are ongoing.

Skill Development and Training

Vayumitra Skill Development Programme (VSDP)

Ministry of New & Renewable Energy (MNRE), Government of India has sanctioned, "Vayumitra Skill Development Programme (VSDP)" to create skilled workforce for the Indian wind energy sector especially the trained manpower for the operation & maintenance of wind farms in the country as per the industry demand / needs so as to achieve the Government of India targets and other future targets.

Under VSDP, a total of 5010 participants are proposed to be trained through Training of Participants (ToP). The ToP training courses will be conducted through 22 identified institutions located close to the Wind Farms of windy States. To train the participants, NIWE will conduct Training of Trainers (ToT) programme and train 690 trainers who will train the participants.

Activities :

- 12 Nos. of TOP programme have already been completed and trained 360 participants.
- 2nd EOI for selecting TPs is in process and will be finalized shortly.

Students & Training Participants Visit

To create awareness and to motivate towards research on wind energy, achieving the indigenization and also to create awareness about the activities and services of NIWE, schools and college students are encouraged to visit the campus.

During the period from April to June 2024, the following visits were coordinated.

S.No.	Name of Institution	No. of Students	No. of Staff	Visited on
1	Vel Tech High Tech Rangarajan Dr Sakunthala Engg. College, Avadi	60	1	24.04.2024
2	Vel Tech High Tech Rangarajan Dr Sakunthala Engg. College, Avadi	59	1	25.04.2024
3	"Dhanalakshmi Srinivasan College of Engg. Mamallapuram"	53	3	03.05.2024
4	Veltech Hightech Ranganathan Dr Sagunthala Engg. College, Avadi	60	1	15.05.2024

Internship Programme

The "NIWE-Academic Associate Programme" (NIWE-AAP) aims to encourage students and provide an opportunity to choose renewable energy as their career option. To create awareness and interest in the field of renewable energy research among the young talented Sciences, Management and Engineering students NIWE invites applications from the eligible candidates for the "NIWE-Academic Associate Programme" (NIWE-AAP).

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The duration of the Internship will be two weeks to six months. NIWE-AAP will provide opportunities for the students/post studies students/ Lecturers/Professors to work with scientists / engineers on NIWE's projects.

During the period from April to June 2024, 84 applications were received out of which 32 students got enrolled. 25 students were issued Internship Certificates and 15 are undergoing Internship.

From the commencement of the NIWE-Academic Associate Programme (NIWE-AAP), 125 Internship Certificates were issued to the successfully completed Interns.

Glimpse of Student Visit

Circularity in Wind Sector

Author : J.C. David Solomon, Director & Head, R&D Division, WTRS (Incharge) - Email : david@niwe.res.in

In the linear economy, resources are extracted, used to create products, and then disposed of as waste, leading to significant environmental degradation and depletion of finite resources. This 'take, make, dispose' model operates without considering the end-of-life impacts of products, often resulting in high waste and pollution levels. Conversely, the circular economy emphasizes a 'make, use, return' approach, where products are designed for durability, repairability, and recyclability, thus minimizing waste and conserving resources. By keeping materials in use for as long as possible and viewing waste as a valuable resource, the circular economy reduces environmental impact, supports sustainable development, and encourages innovative business models that extend the lifecycle of products.

In wind industry

About 80% of wind turbine's mass, excluding the foundation, underground wiring, and other project-related infrastructure, is made up of materials that are easily recycled. Only 6%–14% of a wind turbine's mass is made up of composite components and are currently found unviable to recycle.

In many sites blades and fiberglass materials from decommissioned wind turbines often end up weathering in the open or landfills due to the challenges associated with recycling these composite materials. The complex structure of fiberglass-reinforced composites, which combine glass fibers with a polymer matrix, makes them uneconomical to deconstruct or recycle using conventional methods. As a result, the prevalent industry practice has been to dispose of these materials since there is no market pull from any subsidiary industry to consume them as feeder stock for any of their product creations on a continual basis. While landfilling remains common, the industry is increasingly focusing on sustainable decommissioning practices and innovative recycling solutions to mitigate environmental impact.

Projects like Recyclable Blades are aimed at developing and designing blades to be fully recyclable at the end of

their lifecycle. Other companies focus on designing turbines for disassembly and using materials that can be reused or recycled. Such initiatives ensure that wind turbine materials are efficiently managed, minimizing waste and conserving resources. Many Circular Economy Platforms promote collaboration within the industry, enabling stakeholders to share best practices and collectively advance circular economy goals.

Specific circular economy practices in the wind energy sector include partnerships and innovative recycling techniques. An example includes projects aiming at recycling decommissioned turbine blades into cement, significantly reducing the carbon footprint of cement production.

Integration with sustainable goals

Integrating these circular economy practices with the United Nations Sustainable Development Goals (SDGs) provides a comprehensive framework for sustainable development. For instance, improving resource efficiency and minimizing waste align with SDG 12 (Responsible Consumption and Production), while developing innovative recycling technologies and sustainable materials supports SDG 9 (Industry, Innovation, and Infrastructure). Reducing the carbon footprint of turbine production and disposal directly contributes to SDG 13 (Climate Action), underscoring the wind energy industry's role in mitigating climate change. Additionally, proper disposal and recycling prevent environmental pollution, supporting SDG 15 (Life on Land).

To foster this integration practical steps including promoting circular economy practices, encouraging corporate commitments to sustainability, investing in research and innovation, and providing education and training to stakeholders have to curated and execute. Establishing robust monitoring and reporting systems to track progress toward circular economy goals and their alignment with the SDGs is also essential. Through these efforts, the wind energy industry not only moves toward a more sustainable and resilient future but also sets a benchmark for how circular economy practices can be effectively implemented in renewable energy sectors. This comprehensive approach ensures that wind energy remains a key component of a sustainable global energy system, contributing significantly to the achievement of the SDGs.

UPCOMING TRAINING COURSES

CUSTOMIZED TRAINING

Special Training Course on "Wind Energy Technology"
for the officials of Gail (India) Limited
from 24th to 26th July 2024

NATIONAL TRAINING

26th National Training Course on "Wind Energy Technology"
from 21st to 23rd August 2024

27th National Training Course on "Wind Energy Technology"
from 18th to 20th December 2024

Detailed information available in NIWE website.

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