Indian Wind Power

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Post Event Issue

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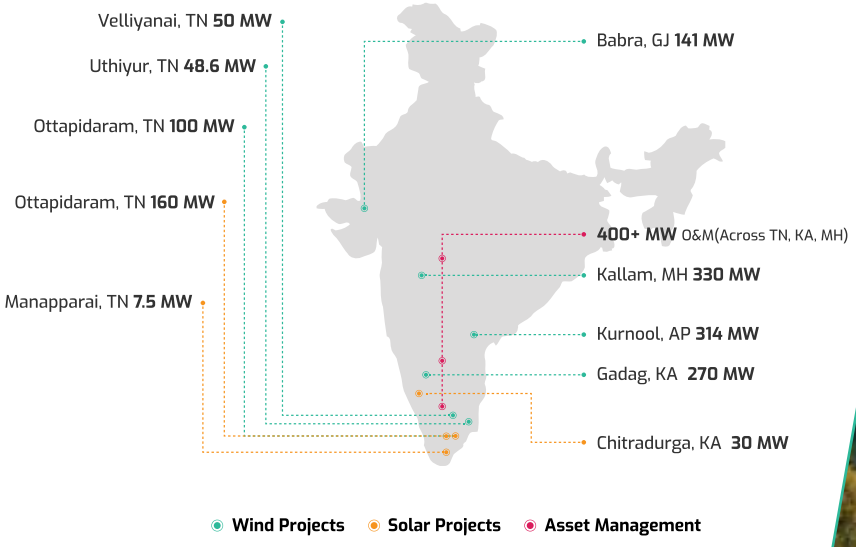

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IWTMA
INDIAN WIND TURBINE MANUFACTURERS ASSOCIATION

Indian Wind Power

A Bi-monthly Magazine of Indian Wind Turbine Manufacturers Association

Volume: 9 Issue: 4 October - November 2023

Contents

Indian Wind Turbine Manufacturers Association

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From the Desk of the Secretary General – IWTMA

Dear Readers,

Greetings from IWTMA!

Windergy India 2023 was a resounding success mainly due to the support of industry stakeholders; from exhibitors, sponsors, speakers, delegates, visitors and others. The 3-day Trade Fair had a record footfall and the feedback from the exhibitors on networking and future business relationships is on an optimistic note. The conference itself was unique with over 50 speakers and a platform to exchange knowledge and information and set a positive environment for the growth of the sector in Tamil Nadu as well as other States.

We are also happy to inform the readers that IWTMA celebrated its Silver Jubilee on 3rd October 2023 and felicitated 25 veterans across the country for their contribution. It was mentioned during the celebration that the unsung heroes who have made significant contribution is recorded and appreciated in India's march towards 'Clean Green World'.

Many positive policy initiatives and interventions have taken place and to cite a few –

- Introduction of Energy Conservation Act with a clear trajectory for DISCOMs and other obligated entities in RPO fulfilment of RE and a separate platform for wind. We thank the Hon'ble Minister Shri R.K. Singh and MNRE for the same.
- The Gujarat Government has initiated a policy to help the MSME sector in investment and procurement of power on determined tariffs. This has been welcomed by our Association and the industry.
- The Gujarat Government decision to allow land for interstate sale of power will open the market in a very large way.
- The Government of Rajasthan has announced proactive policies on RPO, Target of 15,000 MW of Wind and Hybrid and Repowering.
- Government of Tamil Nadu is keenly looking at Repowering policy to maximize land utilization and higher generation.
- Government has set the pace for the offshore both in Gujarat and Tamil Nadu.
- The industry is confident of creating a new record of capacity addition in FY 23-24 and works closely with the Government to make the 500 GW trajectory of 2030 a reality. This when realized will not only add fossil free power but will also have greater benefit by creation of larger base for component industry, creation of jobs and benefit to tertiary business.

We wish our readers a colourful and bright Diwali.

Happy Reading,

With regards,

D.V. Giri
Secretary General

5th International Trade Fair and Conference

Chennai Trade Centre, Chennai

4th to 6th October 2023

Inauguration of the Trade Fair

Wednesday 4th October 2023

The three-day Trade Fair was formally inaugurated by H.E. Mr. Freddy Svane, Danish Ambassador to India along with other dignitaries on 4th October 2023 morning by cutting the ribbon at Hall No. 3 of Chennai Trade Centre, Chennai. Thereafter Chief Guest accompanied by other dignitaries walked through the various stalls at Trade Fair having the stalls from various companies all over world.

Inauguration of the International Conference

Power of Wind 2.0 – Energising the Future of India

4th October 2023, Wednesday | 10.30 am

Windergy India 2023 Conference on ***'Power of Wind 2.0 – Energising the Future of India'*** was inaugurated at the Convention Hall of Chennai Trade Centre, Chennai on 4th October 2023 at 11.00 am by lighting the lamp by His Excellency Mr. Freddy Svane, Ambassador, Royal Danish Embassy, New Delhi; Mr. Hans Raj Verma, IAS, Chairman and Managing Director, Tamil Nadu Industrial Investment Corporation and CMD, Tamil Nadu Energy Development Agency; Mr. Dinesh Jagdale, Joint Secretary-Wind, Ministry of New and Renewable Energy, Government of India; Mr. Girish Tanti, Vice Chairman, Suzlon Energy Limited and Mr. D.V. Giri, Secretary General, IWTMA.

Lighting of the Lamp by the Dignitaries

Traditional Welcome of His Excellency Mr. Freddy Svane with shawl

Traditional Welcome of Mr. Hans Raj Verma with shawl

Traditional Welcome of Mr. Dinesh Jagdale with shawl

Traditional Welcome of Mr. Rajesh Lakhoni with shawl

Mr. Freddy Svane delivering the Inaugural Address

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Conference on 'Power of Wind 2.0: Energizing the Future of India'

Inaugural Session

4th October 2023 | 10.30 am
Wednesday

Synopsis

- We should relate the wind to sustainability instead of perceiving it as just business or as a renewable energy source.
- 70-80% of manufacturing is localised with lowest cost of turbines in the world.
- Dr. M S Swaminathan brought in Green Revolution, Mr Kurien brought in White Revolution. Today, all of us are creating Green Revolution 2.0.
- Wind power needs Government's support in the form of PLI for offshore wind and PLI for component manufacturers. For MSME & small investors a separate trajectory is needed with or without storage to enable round-the-clock power and industry friendly policy for repowering.
- The declining trend in installations observed in the last few years was temporary and that things are picking up again.
- For 2030 and 2070 targets, government intends to have more of renewables.
- There is a need to provide firmness to the intermittent wind and solar.
- With 15-16 GW of manufacturing capacity, maximising efficiency is needed. There is need for testing and validation, where NIWE is supportive.
- MNRE has training, capacity building programmes and creating testing centres.
- Like onshore, we will create an efficient offshore wind system and with both, there is a bright future for the wind industry.
- Tamil Nadu, first to introduce banking since 1986, can generate RTC power for 3-4 months through onshore and for 6-7 months through offshore wind.
- Forecasting to be done on wind generation curve and AI and database to be used for better forecasting.
- Tamil Nadu repowering policy is under discussion with the associations as to how to go.
- Manufactures are advised to come with suggestions to be put up to bring Tamil Nadu wind power first in the country again.
- India is well poised for the development. This could be India's century, with a lot of variables in favour.
- Manufacturing is 17% of the GDP; it should be 25%, to be done 30%. SMEs to be made strong for supply of components to OEMs.
- Wind is forever and is the national program. India can become a global hub with right ecosystem and faster work pace.

Welcome Address	**Mr. D.V. Giri** Secretary General, IWTMA
Special Address	**Mr. Dinesh Jagdale** Joint Secretary-Wind, Ministry of New and Renewable Energy, Government of India
	Mr. Rajesh Lakhoni, IAS Chairman and Managing Director TANGEDCO
	Mr. Hans Raj Verma, IAS Chairman and Managing Director Tamil Nadu Industrial Investment Corporation and CMD, Tamil Nadu Energy Development Agency
Inaugural Address	**H.E. Freddy Svane** Ambassador, Royal Danish Embassy New Delhi
Vote of Thanks	**Mr. Sivaperumal Murali** Head - Sales and Marketing ZF Wind Power Coimbatore Private Limited

Tulsi Tanti Memorial Session

4th October 2023 | 11.45 am
Wednesday

'Powering the Future of India through Wind'

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Context Setting	**Mr. Girish Tanti** Vice Chairman, Suzlon Energy Limited
Master Speaker	**Mr. Sumant Sinha** Founder, Chairman and CEO, Renew India
	Mr. Vipul Tuli CEO, Hydrogen Business & Chairman South Asia, Sembcorp Industries

Synopsis

A short bio film on late Mr. Tulsi Tanti's pioneer work was screened. He put the Indian turbines industry on the world map, by sending turbines to developing as well as developed countries, becoming the father of RE in India. Mr. Tanti started Suzlon in 1995 and tried to bring all stakeholders on a common platform. His legacy will help the world reach wind power from 1 to 2 TW by 2030.

- To maintain the cost supremacy India has to create a robust supply chain for domestic and strong export market.
- Mr. Tanti has the passion in whatever he did and he connected well with people from all strata. Mr. Tanti was mentor to most of the people in wind industry.
- Future is RTC Power. More wind is needed with solar to balance RTC power. Utilities are asking for the load following bids.
- Wind industry has to play a major role to achieve the 2030 target as we cannot go on adding solar. We need 100 to 150 GW of wind by 2030. Now only 7 years are left and there is no chance to add 15 GW of wind from 1.5 to 2 GW now. One solution, offshore wind is lot more expensive and has other constraints. Enough capital is available both on equity and debt side. So for the wind people, the market opportunity is there.
- Mr. Tanti was constantly in search of innovation in technology or new business model, new industry, regulatory framework, etc. Wind industry has put India on Global map as global leader for wind manufacturing. India became major exporter of wind equipments and components. Industry is operating at 85% localization; very few industries have achieved this.
- Techno-commercial innovations in the business models were created, India introduced Tariff based bidding and many things: cost reduction, digital O&M practices, major maintenance, craneless technology, etc. were adjusted.
- New very capable IPPs were created installing 400-500 MW of projects up from 30-40 MW few years earlier. Competition made the IPPs second to none in the world.
- Golden years of wind are coming and wind energy will have a very important role in achieving our target of 2030.
- Main issues: low capacity addition, inability to complete and commission on time, every local OEM and even wind MNCs at some or the other time have faced bankruptcy. Supply chain is suffering due to uncertainty, inability to attract good talent and investment in innovation is difficult to justify as the margin got reduced.
- The 5 challenges for wind to be looked upon are - (1) Stick to Bidding Trajectory, (2) IPPs Commitment - Wind resource, site availability, turbine cost, financing cost and connectivity; (3) Transmission capacity - 30-40 GW in wind zones; (4) Site security and social engagement, Right of Way (RoW); (5) Offshore wind - scale-massive cost overrun risk. Put the Viability Funding Mechanism. Learn from the west.

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'Accelerating Decarbonization through Wind Energy'

Panel Discussion

4th October 2023 | 12.30 pm
Wednesday

Synopsis

- Wind power has a great role in decarbonisation and net zero targets.
- Earlier the wind developers were providing the entire solutions for wind sector. Subsequently the land, connectivity issues started, Government wind parks or developers to be allowed to develop Wind Park. Turbines for low wind sites are to be innovated. Land allocation and connectivity to be created to achieve 2030 goals.
- Though we are one fourth of China in carbon footprint, it is still very high and is accelerating fast. 35% of this comes from electricity, which we can replace with wind.
- 100 GW in 7 years is a tough call. Whether it is done by OEM or IPP, the problems are the same. Execution on the ground is tough for all. Manufacturing and capacity is not the issue. We shall be very happy to cross 4 or 4.5 GW this year.
- 10 GW wind installations will increase employment and reduce the cost of electricity.
- After 2025, ISTS waiver goes away which is crucial for the actual landed cost of the energy. Need to think. Storage is necessary for RTC power.
- Many C&I customers are keen to switch for clean power, ammonia, hydrogen.
- Irrespective of the type of bidding, tariff should work for everyone.
- Offshore will take some time and needs government support but its role in decarbonisation will be limited.
- Green hydrogen needs wind. A PLF of 70 to 80 or probably 100% is needed to make the green hydrogen more economical. Hybrid is needed. Electrolyser cannot be put on and off. Wind helps in stabilizing the grid.
- Repowering at the best windy sites is needed.
- Wind sector was born outside government sector helping industries to get cheap power especially in Tamil Nadu to enable them to be competitive.
- OEMs manufacturing capacity needs component suppliers. PLI support is needed.
- For MSMEs, OEMs are providing turnkey project support with O&M and other related services as getting land and then installing turbine is not an easy task for them. Now we are ignoring the small investors who have built this sector.
- MSME sector should get support to create the capacity.
- The technology will be held by the customers for 25 years.
- We should invent in India for the world as we have the innovation and R&D capabilities. OEMs should come with more products for low wind regime. Decarbonising NTPC's systems as they are among the largest power producers.
- MSMEs have a large role in achieving the target and innovation is the mantra in moving forward.
- Power is only one part of the decarbonisation; there are many other sectors like nitrogen manufacturing etc., also to be decarbonised.
- Lowest cost of generation is important than the turbine capacity of 5GW.
- Repower the high speed sites to increase the PLF.
- RTC power is still affordable @Rs 4.10/kWh with storage.

Moderator	**Mr. Dinesh Jagdale** Joint Secretary - Wind, Ministry of New & Renewable Energy Government of India
Panelists	• **Mr. Amit Kansal** Chief Executive Officer Senvion Wind Technology P. Ltd. • **Mr. Bimal Jindal** Chief Operating Officer Welspun New Energy Limited • **Mr. J. P. Chalasani** Chief Executive Officer Suzlon Energy Limited • **Mr. Mohit Bhargava** Chief Executive Officer NTPC Renewable Energy NTPC Green Energy Limited

Panel Discussion

4th October 2023 | 2.30 pm
Wednesday

'Business & Financial Economics of Wind - Hybrid – Storage'

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Moderator	**Mr. Chintan Shah** Former Technical, Director, IREDA
Panelists	• **Mr. Pankaj Sindwani** Chief Business Officer Tata Cleantech • **Mr. Balajee Rangarajan** Director - Strategy, Solon India • **Mr. Parag Sharma** Founder & Chief Executive Officer O_2 Power • **Mr. Neerav Nanavaty** Chief Executive Officer BluPine Energy • **Dr. P.K. Dash** Scientist, Ministry of New and Renewable Energy Government of India • **Mr. Gonzalo Alfonso Navarro Hernández** Economic and Commercial Counselor, Embassy of Spain in India, New Delhi

Synopsis

- There is need for the storage to take care of the peaking load when both wind and solar are not available.
- Full supply chain is needed in this sector and supplier should be able to meet the goal.
- The cost of storage should be affordable.
- Pump Storage Plants have a long gestation period. Capability and affordability to be verified.
- The batteries offer best viability due to its affordability and depth of discharge. Degradation of battery, 2-3% per year and replacement cost to be factored in.
- Transmission system is to be used properly.
- Choose between the technologies which are ahead of others.
- Innovation, market mechanisms and regulations to develop.
- The answers for various questions can come from the developers, Discoms and contractors, who face various problems.
- Payback period is not 4-5 years, it is too long. There can be some indication then we can take a call. The market will mature slowly.
- The lenders will be willing to take a look at it, what is needed.
- The tariff of Rs. 3 to 4 per kV is not possible. One company has put it as Rs. 4.10. It may be Rs. 4.5 to Rs. 6, when the technology develops.
- The lenders have helped the system to evolve and its transition.
- The possible financial models for hybrid with storage systems are: equity, government funding or alternate mechanisms. We don't do the balance sheet financing.
- Equity capital is not coming to India.
- The merchant market can give some visibility for the transparent tariff. Market structure has to develop.
- Supply side with variable side of generating – this combination will make the whole cycle.
- In dispatch power tenders storage should be left to developer.
- Introduce battery storage in hybrid mix so that over sizing of solar and wind is not required.
- Ideal mix for wind solar hybrid projects is at least for short-term.
- India debt market is the cheapest when compared to global when included hedging.
- Corporate bond market needs to open.

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'Technology & Innovation'

Panel Discussion

4th October 2023 | 3.55 pm
Wednesday

Synopsis

- For manufacturing for offshore wind, feasibility of working near the port, difficulty in sea logistics, process development to reduce costs are to be seen.
- Importance of the right kind of innovation is needed.
- Paying more attention to smaller parts such as filters and elastomers, the difficulty in collaborating because of the unique design philosophy of each manufacturer, etc. are to be looked in to.
- Technology and the cost of the energy will be the criteria. Final costs of the components should come down. AI and cameras are to be added.
- Cost of replacement of the parts and the cost of shutdown to be taken in to consideration.
- There is difficulty in collaborating because of the unique design philosophy of each manufacturer.
- Standardisations of the parts by all the OEMs are needed to reduce the cost.
- Making the alternative components is needed. Component comes to India, we assemble it and send back to UK.
- Developing supply chain and export hub is needed.

Moderator	**Dr. Chakradhar Byreddy** Director, UL India
Panelists	• **Mr. R P V Prasad** CEO - India Region Envision Wind Power Technologies India Private Limited • **Mr. Mahesh Mony** Head Electricals, Nordex Group • **Mr. Siva Kasturi** Asia Pacific Regional OEM Manager, Shell Global Commercial Technology • **Mr. Alfons Boing** Head, Department of New Technologies Flender GmbH

Fireside Chat

4th October 2023 | 5.05 pm
Wednesday

'Net Zero & Financial Enablers including Inflation Reduction Act (IRA)'

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Moderator	**Mr Hemkant Limaye** Senior Director - Global Marketing LM Wind Power
Speaker	**Dr. Ajay Mathur** Director General International Solar Alliance

Synopsis

- There is phenomenal growth in Renewable energy. 300 GW RE capacity has been added.
- For 24/7 power supply, renewable energy is posing the challenge. There is the need to add storage.
- The demand is driven by the electrification.
- Need for Tera watt capacities while working on the hard-to-abate sectors.
- Supply logistics costs have dramatically increased.
- There is constant revolution in technology by the OEMs and the component manufacturers.
- New materials like silicon have come.
- Huge amount of investments is needed in R&D. Fund supply should be ensured for industry relevant R&D.
- Secured payment mechanisms are needed.
- New supply chain systems are evolving from Just-in-Time to Just-in-Case.
- There is very large capital in the industry. 70% goes to China.
- The Inflation Reduction Act (IRA) enacted in 2022.
- Minimum efficiency of the product should be there.
- Investment incentives (PLI) for manufacturers in India are needed.
- India is becoming new R & D hub for technology.

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Panel Discussion

5th October 2023 | 10.30 am
Thursday

'Manufacturing and Supply Chain/Exports'

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Moderator	**Mr. Shantanu Jaiswal** Bloomberg New Energy Finance
Panelists	• **Mr. Madhav Krishna Pokala** Vice President and Head – Manufacturing Asia Pacific, Vestas Wind Systems • **Ms. Dorte Kamper** Vice President – Sales & Marketing LM Wind Power • **Mr. S P Murali** General Manager – Sales & Marketing ZF Wind Power • **Mr. Harisudan M** Partner Price Waterhouse Coopers LLP

Synopsis

- Wind Industry has to go a long way to reach additional 100 GW of wind by 2030 as we are only at 44 GW now. Quality, cost competitiveness and product portfolio mix are important.
- Indian manufacturing base is competitive even in the global market but it is not competitive in commodity and raw material. Importing material and to export value added components increases the supply chain lead time. Securing the wind supply chain is important. Raw material supply chain needs to be improved.
- Government policies like AD GBI, excise duty benefits, incentives on imports (some are withdrawn), and the "Make in India" gives a complete duty exemption on every imported item. Other industries have adapted such schemes but the wind sector has been slow to adopt.
- Many companies have been working hard to localise the supply chain but still depend on some exports. More support is needed.
- PLI is designed from a government perspective like quality, safety and green production in automotive sector. 14 sectors are covered under PLI with various conditional aspects. PLI for Component manufacturing & Offshore is needed
- India has the capability to install over 10 GW of wind per year but land allocation; right of way, etc. are problems. The demand fluctuates and manufacturing cannot cope up with such fluctuation. The demand cycle has to be smoothened.
- There's a myth that the manufacturers are focussed on the export market and not on the domestic market. It's not a case of prioritising but one of business case and stability. It can become a good hub for manufacturing components and turbines.
- About 60% of the turbine comes from castings-generators and gear boxes. Domestic volume to ensure that we have a competitive base for entire value chain.
- China caters to 65% of global demand; India only 12%. Due to pandemic, war and related challenges, OEMs do not want to congregate in one geography.
- India now has a great opportunity, with present government policies. With our present capacity, 10 GW can cater to the domestic market and 5 GW can be exported. Nearly 60% of the turbine is made of steel. In offshore wind more steel is needed. So government should consider giving subsidy for steel.
- The panel agreed that it would be good to tap into the IRA and the FTA advantages of getting market access and investment in technology.
- Cost can be reduced through increasing production, automation and localisation and increasing quality.
- Feasibility study is needed for smaller, lesser budget turbines in non-windy states.

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'Grid Planning Integration with Regulatory'

Panel Discussion

5th October 2023 | 11.55 am
Thursday

Synopsis

- Grid planning needs- how much of RE can be integrated in the grid, its cost effectiveness, the difference between policy and regulation, operating within the existing framework and what more can be integrated (such as AI) to the framework.
- Rationality from discoms' perspective should be recognised while ensuring the energy trilemma of security, affordability and sustainability.
- Wind appears costly on LCOE basis, compared to solar, and it is an incomplete measure. "LCOE assumes certain aspects. But wind has higher value because it is available for more hours of the day. In India, in a few years, there will be surplus energy during parts of the day and shortfalls during the rest of the day."
- The tariff-based competitive bidding mechanism is followed in transmission systems projects. Another route is the regulated tariff mechanism (RTM). Specific strategic projects such as the Leh Ladakh one are given to Power Grid under RTM. Presently Power Grid runs about 50% of the projects.
- RE is generated at remote places. To integrate 500 GW of RE by 2030, CTU is to plan and implement it in a phased manner. Planning has been completed as gestation period of RE is less. Of the 536 GW of transmission planned, except 120 GW, the rest is in the approval stage, under bidding or implementation. Commissioning will begin in January 2024 and majority of the projects will be commissioned by December 2025.
- The 430 GW of installed capacity today meets only 230 GW of demand and is making transmission planning a challenge. In the last few years, the transmission price has increased by more than 120%.
- An AI-based asset management platform optimises performance and cost, using SCADA and meteorological data. The cost can be reduced by up to 50% by leveraging data, and reduce downtime up to 80% - which works well for integration into the grid.
- About regulations, policies and grid integration challenges, it is important to spell out what to achieve and not how to achieve.
- Fault ride through, injection of reactive power, grid code compliance should be system-specific. Regulations with respect to grid compliance, different modalities should be defined and carry out system studies. There needs to be a national power systems data repository accessible to everyone.
- Bidding is done after taking a lot of aspects into consideration. So the goal posts cannot be changed after bidding has been completed.
- In 2023, penalties have increased. The leeway has been reduced. Bidder cannot foresee these things when he bids. Adding a cushion to take care of unexpected changes will make the bid uncompetitive. This creates insecurity among investors. When a project is executed there is always apprehension about the lack of or inadequacy in transmission system. So it is heartening that CTU has already started planning the transmission infrastructure.

Moderator	**Dr. Rahul Tongia** Senior Fellow Centre for Social and Economic Progress
Panelists	• **Mr. Prakash Chand Garg** COO, Central Transmission Utility of India Limited • **Dr. Maik Reder** Founder and CEO of Annea • **Dr. R Nagaraja** Managing Director Power Research and Development Consultants Private Limited • **Dr. K Balaraman** Executive Director Idam Infrastructure • **Mr. Mahesh Vipradas** Vice President, Sembcorp

Panel Discussion

5th October 2023 | 2.00 pm
Thursday

'Southern India Region Centric'

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Moderator	**Mr. Hans Raj Verma**, IAS CMD, Tamil Nadu Industrial Investment Corporation (TIIC) and CMD, Tamil Nadu Energy Development Agency (TEDA)
Panelists	• **Mr. M Venkateshan** Deputy General Manager, SRLDC • **Mr. P R Muralidharan** Technical Advisor Leap Green Energy • **Mr. U B Reddy,** MD, Enerfra Projects India Pvt Ltd. • **Mr. S S Murali,** COO, Axis Energy Group • **Mr. S. Ramana Reddy** IRPS, Vice Chairman and Managing Director, New and Renewable Energy Development Corporation of Andhra Pradesh

Synopsis

- The session was dedicated to the wind rich southern states, namely, Tamil Nadu, Karnataka, Andhra Pradesh and Telangana.
- In Andhra Pradesh, pumped storage project (PSP) locations that have been identified and the booklet giving the details of land availability, CTU connectivity and other such relevant details is published to help the developers identify the project site. Many developers are coming to Andhra Pradesh, given the PSP potential. The state is also planning India's largest green hydrogen project in Visakhapatnam.
- PSPs have huge potential, the long gestation being the only deterrent, but could be done with people's participation.
- Southern region contribution to 31% of GDP and is driving towards Net Zero.
- Best wind sites were used in the early 90s, where the machines have reached their end of life and a policy for replacing or repowering is needed.
- MNRE repowering policy does not cover ground reality. A wind farm may have hundreds of owners. So land ownership is fragmented. Unless land pooling happens, repowering will not take off.
- The role and importance of nodal agencies, reactive power management, etc. were discussed.
- Grid management is very important and understanding its technical aspects would help in taking business decisions.
- Be it in RE or industrialisation, south will lead the way, and help India reach the 2030 and Net Zero targets.
- There should be a separate policy for MSMEs.
- Creation of a new platform was suggested that could help south India showcase its renewable energy and thought leadership.

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Special Address by
Dr. Beela Rajesh, IAS
Principal Secretary - Energy, Government of Tamil Nadu

Special Session

5th October 2023 | 3.00 pm
Thursday

Synopsis

- Dr. Beela Rajesh congratulated IWTMA on the success of the 5th edition of Windergy conference and trade exhibition and deliberated on the following points.
- We have come a long way from using wind energy to grind grains to what appears to be the ultimate solution to our energy needs and in combatting climate change and global warming, not only in Tamil Nadu, but also in India and across the globe.
- Wind energy movement in Tamil Nadu started way back in the 1980s with present installed capacity of 10,225 MW. This year Tamil Nadu plans to add 5,000 MW of wind energy, of which almost 4400 is to the new additions and 600 to be added to the existing producers. The industry in Tamil Nadu is doing well because of people's participation.
- Only 35% of the wind energy is sold to TANGEDCO, the rest is used for captive consumption or sale to commercial and industrial third parties. This is one of the reasons that Tamil Nadu is at the forefront in renewable energy and it will continue to be with contributing to India's total wind capacity.
- There are challenges in storage, enhancing production and in enhancing transmission and distribution. Forums such as this are sure to bring forth solutions to these challenges. I hope IWTMA and Windergy will come out with a booklet with suggestions as an outcome of the conference, so that it could be a supportive document for policy making.
- Tamil Nadu Chief Minister has announced a repowering policy and it is in the process of putting together for private sector and TANGEDCO. With that Tamil Nadu will regain its first position, which it held till May 2023.
- From Kanniyakumari to Nagapattinam, Tamil Nadu has huge offshore potential of 35 GW. Udangudi plant – though not wind - is coming to final stage, which would help with the offshore production.
- Our aim is to provide green and clean energy at affordable rates and need to take this forward as a people's movement. Everyone – right from a child in school to a student in college, every person should know what green energy is. When each household understands the importance and relevance of this form of energy, we can contribute towards the greater cause.

- To Mr Giri's request for providing a separate FiT mechanism for the MSME sector, since they contributed to the initial growth of the sector, and an enabling policy (PLI) for manufacture of critical components being imported, Dr. Beela Rajesh said the requests had been noted and the industry might hear positive announcements during the Global Investors Meet in January 2024.

Panel Discussion

5th October 2023 | 3.45 pm
Thursday

'Offshore Development in India and specific to Tamil Nadu'

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Moderator	**Dr. Rajesh Katyal** Director General National Institute of Wind Energy (NIWE) Chennai
Panelists	• **Mr. Suraj Kumar Patnaik** Senior Business Development Manager FUGRO • **Mr. David Wotherspoon** Head of New Geographies OWC UK • **Mr. Ajay Jain** Senior Advisor Corio Generation • **Mr. Alp Gunsever** Head of Secretariat Centre of Excellence of Offshore Wind and RE (MNRE & Danish Energy Agency)

Synopsis

- The National Institute of Wind Energy (NIWE) has done the assessment of the Tamil Nadu's offshore potential and the government's plans to demonstrate the first project here.
- The Ministry of New and Renewable Energy has recently released a strategy paper showing the potential of offshore wind. The turbulence intensity in sea is relatively less in this area.
- The process of offshore wind, starting from carrying out geotechnical and geophysical studies was elaborated. Geotechnical studies take more time, to the concept design based on reconnaissance survey.
- For 1 GW farm covering about 200 sq km area, the cost would be about USD 2.5 billion, based on the work in the other countries.
- Survey cost is based on vessel availability, its suitability and safety. Since number of global projects is increasing, the vessel availability is decreasing, leading to an increase in cost. Booking the vessel in advance would help bring down the cost.
- As at present there is a lot of reservation about offshore wind in India.
- India is a huge market. The pace of the process is slow. As and when bid results are declared, the fourth strategy paper will be released.
- Solar alone cannot fit the bill, we need multiple resources. Offshore wind is not competing with onshore wind, but complementing it.
- One has to take risks understanding the threats during the development, execution and commissioning stages.
- Wind has to coexist with fisheries and perhaps oil and gas rigs. Port infrastructure in Gujarat and Tamil Nadu, cost and timeline to get the coast ready, the evacuation infrastructure, etc. is to be seen properly.
- Offshore survey cost could be reduced through collaboration as is being done by UK companies that jointly take up environmental surveys.

windergy INDIA 2023
WIND POWER FOREVER

Valedictory Session

5th October 2023 | 4.45 pm
Thursday

Synopsis

- Mr. D. V. Giri, Secretary General, Indian Wind Turbine Manufacturers Association summarised the proceedings of the conference and proposed the vote of thanks.
- In last two days of the conference the global warming, decarbonisation, and sustainability for the coming generation, issues of wind industry like - supply chain, localisation, grid management, etc. were discussed.
- IWTMA has signed MoU with Tamil Nadu Industrial Investment Corporation Limited on 21st August 2023 for cleaner, greener and brighter future of Tamil Nadu. We will work with them for a greener future.
- We are looking forward for the conclave in Coimbatore in December. We are requesting our members to take up the lead at the conclave in Coimbatore.
- Capital is not a problem. Wind is to a national movement. We have to involve other industries, which do not have the opportunity.
- We have to look at repowering as the best wind sites are occupied by sub-megawatt turbines. 25 years old turbines which have finished their life and are still working. They need to be replaced with new high capacity turbines.
- Then there were discussions on offshore wind, green hydrogen, and supply of the wind turbines to the whole world. We are selling the turbines at the lowest cost in the world. There are our neighbours, who have to compete with us not on the cost basis but on delivery basis. We have to deal with this situation. We are looking for the wind-solar hybrid with or without storage.
- We need to sit and see how all the stakeholders can come under one platform for renewable power.
- Students have been invited tomorrow to interact with RE experts to know- what the wind is, what it requires and how they make a career in wind.

Vote of Thanks

Mr. Giri thanked the Ministry of New and Renewable Energy, Ministry of Power, Government of Tamil Nadu, Tamil Nadu Guidance Bureau, all the supporters, sponsors, speakers, exhibitors, dignitaries, delegates, media, IWTMA members, visitors, Wind Independent Power Producers Association (WIPPA), Indian Wind Power Association (IWPA), PDA Ventures Private Limited, Chennai Trade Centre Authorities, Chennai Trade Centre staff and all the workers engaged in assisting various logistics and other works, the IWTMA staff and all others who have joined to make the Windergy India 2023 a resounding success.

We will see you next year in 2024 in Chennai or in Delhi. Thank you to all and Best wishes.

Programmes at the Side-lines of the Trade Fair and Conference

Windergy India 2023 International Trade Fair and Conference was organized by Indian Wind Turbine Manufacturers Association (IWTMA) and PDA Ventures Private Limited from 4th to 6th October 2023 at Chennai Trade Centre, Chennai, India. This is the most prestigious venue for the national and international events in India. The following programmes were also organised at the side-lines of the Trade Fair and Conference by various institutions.

TECHNOLOGY PRESENTATIONS

The following technology presentations were done by various companies at the conference hall during the Windergy India 2023 conference.

1. Minimising Project Execution Delays using Portadeck Road Mats by Mtandt Ltd

4th October 2023, 1545-1555 hours by Mr. Siddharth Modi, Director, Mtandt Limited

2. Data to Decisions: A Journey through 14,000 Turbines and India's O&M Evolution by ONYX Insight

4th October 2023, 1655-1705 hours by Mr. Bruce Hall, CEO, Onyx Insight

3. Grid Integration of Renewable Resources and Importance of Grid Code Compliance Certification by UL Solutions

5th October 2023, 1145-1155 hours by Mr. Nivedh B.S., Business Manager, APAC, Wind Testing Inspection and Certification (TIC), Renewables, UL Solutions

4. Technology Presentation on "Contribution to India's NetZero with Domestic Manufacturing by Envision Wind Power Technologies India Private Limited

5th October 2023, 1255-1310 hours by Mr. P.R. Gopan, Country Head- Product and International Solutions, Envision Wind Power Technologies India Private Limited, Mumbai

5. Technology Presentation by Everrenew Energy Private Limited

5th October 2023, 1500-1515 hrs by Mr. Rajenthiran P, Head – Solar, Hybrid & BESS, Everrenew Energy Private Limited, Chennai

ROUNDTABLES AND PRESENTATIONS AT PAVILIONS

The following countries/institutions had their Roundtable/ presentations at the Windergy India 2023 venue.

Roundtable Sponsored by the Government of Spain and ICEX

Embassy of Spain had a Roundtable session on "Technology and Competitiveness: International Experiences" on 5th October 2023 at 11am-12pm at Board Room. H.E. José María Ridao, Ambassador, Embassy of Spain in India delivered the welcome address. Mr. Francis Jayasurya, Director, GWEC India was the session Chair and Mr. Balram Mehta, COO & Group President, ReNew Power, gave the closing remarks.

Denmark Country Pavilion Roundtable

Denmark Country Pavilion had a Roundtable on "Addressing global wind supply chain issues from India" on 5th October 2023 at 1230-1330 hours. Consul General of Denmark, Mr. Eske Bo Rosenberg, Mr. Gautam Mohan, Investment Manager, Mr. Suresh Subramaniam – Head of Energy, Trade Council of Denmark in India and Ms. Maja Schrøder Kristensen – Senior Project Manager, RE Sources spoke on the subject.

United Kingdom Country Session

United Kingdom had organised the UK Country Session at the Windergy India 2023.

Guidance Tamil Nadu Presentation

There was a presentation on "Empowering Wind Energy Growth and Offshore Development in India Specific to Tamil Nadu" at Tamil Nadu Industrial Guidance & Export Promotion Bureau (Guidance), Department of Industries, Government of Tamil Nadu pavilion at Windergy India 2023 by Mr. R. Pradeep, Associate Vice President.

Indo-German Energy Forum Roundtable

Indo-German Energy Forum (IGEF-SO) had conducted Green Hydrogen Business Roundtable at the Windergy India 2023 on 4th October 2023. Ms. Michaela Küchler, Consul General of the Federal Republic of Germany, Chennai welcomed the roundtable participants.

Exhibitors Directory & Conference Souvenir

An Exhibitors Directory and Conference Souvenir was also brought out during the event giving details of all the companies who have exhibited their products and services at the exhibition. This also contains the bio-data of all the speakers and the profile of the exhibitors besides messages from the sector stalwarts.

The Exhibition and Visitors

The Trade Fair was set up in 3 big halls- Hall no. 3, part of the Convention Hall and a German Hanger outside the halls at Chennai Trade Centre, Chennai, India in over 10000 square meter of the stall area. Over 300 exhibitors from 14 countries exhibited their products and services at the exhibition. Over six thousands visitors from 24 countries thronged the exhibition on all the three days.

The visitors profiles includes Academia, Associations, Industry Leaders, International Organisations, Clean-Tech Specialists, Consultants, Corporates, DISCOMS, Environmental Groups, Governments, Green Power Providers, Independent Power Producers, Investors, Landscape Architects, Energy Consultants, Lawyers, Surveyors & Appraisers, Media, and Trade Press, Municipalities, Non-Governmental Organisations, Non-profit Organisations, Think Tanks, PSUs, Power Consultants, R&D Institutions, Technology Developers, Trading companies, Distributing Agents, Utility Providers, Venture Capitalists, etc.

Delegates

The conference was attended by over 400 delegates from various fields like OEMs, Component Manufacturers, Government Authorities, IPPs, Regulators, Consultancy Firms, Electricity Transmission Companies, Auditors, Investment Companies, Energy Institute, etc.

Conference, Sessions and Speakers

Besides the Inaugural and Valedictory sessions, the Windergy India 2023 arranged 10 sessions with over 50 eminent speakers from all over the world in the field of Wind Energy, OEMs, Component Manufacturers, Government Authorities, IPPs, Regulators, Consultancy Firms, Electric Transmission Companies, Auditors and Investment Institutions, etc. The detail of the sessions, speakers and the summary of the proceedings are given in preceding pages of this magazine.

VIP Networking Dinner

A VIP Networking Dinner was organized in evening at The Hilton, Chennai on 4th October 2023 attended by major IPP's, OEM's, Speakers and Government Officials, IWTMA members and VIP invitees hosted by LM Wind Power and Ministry of Foreign Affairs of Denmark.

Exhibitors Networking Evening

An Exhibitor's Networking Evening was celebrated with all the exhibitors on 5th October 2023. All the 300 plus exhibitors and their staff joined the Networking Evening.

Indian Wind Turbine Manufacturers Association

SILVER JUBILEE CELEBRATIONS AND HONORING THE WIND VETERANS

Indian Wind Turbine Manufacturers Association (IWTMA) was established in 1998 and this year in 2023 it is celebrating its silver jubilee year. Over the past 25 years, IWTMA has played a pivotal role in the development of the wind power industry in India thereby contributing to the nation's transition to an eco-friendly and sustainable energy mix.

There are many wind veterans who have contributed to the wind power development in India. IWTMA felicitated and honoured 25 wind veterans at the Silver Jubilee Function organised on 3rd Oct 2023 at The Hilton, Chennai. The Plaques of Honour were presented by HE Mr. Freddy Svane, Danish Ambassador to India, Mr. Hans Raj Verma, IAS, CMD, TIIC, and CMD, TEDA, Dr. Ajay Mathur, Director General, ISA and Mr. Dinesh Jagdale, Joint Secretary, MNRE.

A Coffee Table Book "Wind Beneath Our Wings" was also released during the function to commemorate the event.

Some of the photographs of the event are presented here.

Guests at the IWTMA Silver Jubilee Celebration

Welcoming the guests: Sri D. V. Giri, Secretary General, IWTMA at the podium; Sitting from left to right: Mr. Dinesh Jagdale, Joint Secretary, MNRE; Dr. Ajay Mathur, Director General, ISA; Mr. Freddy Svane, Danish Ambassador to India; Mr. Hans Raj Verma, IAS, CMD, TIIC, and CMD, TEDA; Mr. Hemkant Limaye and Mr. Anant Naik, EC Members, IWTMA

Inscription on the plaque

Group Photo of all the Wind Veterans honored

Three Ex IWTMA Chairmen at the Function – Sri Ramesh Kymal, Sri D. V. Giri and Sri Madhusudan Khemka

Release of the Coffee Table Book 'Wind Beneath Our Wings'

Honouring the Wind Veterans with the Plaque

Late Sri Tulsi Tanti – Received by Shri Girish Tanti

Dr. Pramod Deo

Shri Madhusudan Khemka

Shri Ramesh Kymal

Shri Sumant Sinha

Shri V. Subramanian

LM Wind Power- Received by Ms. Dorte Kamper, Mr. Hemkant Limaye, Mr. Arun Sasidharan

Late Mr. Rakesh Bakshi – Received by RPV Prasad

NGC

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NGC is a global leader in wind gearbox development and production with high performance product which provides complete main gearboxes, yaw and pitch drive product for wind turbine. NGC high reliability products are adapted to various working conditions, low/high temperature, low wind speed, high altitude, offshore and others. By far, over 100,000 NGC main gearboxes have been operating globally with excellence performance, contributing to the continuous power supply for green energy.

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Dr. Baktavathsalam

Mr. S. R. Mohanty

Shri M. R. Sreenivasa Murthy

Tata Power - Received by Shri Paresh Sahassrabudhe

Mr. V. K. Krishnan

Mr. S. Annamalai

Mr. Yogesh Mehra - Received by Shri Chandrasekharan

Premier Mills Limited - Received by Mr. C. Venkatesan and Mr. Vijaysekhar

Ms. Anna Mari - received by Dr. Thomas Chandy (Nephew) and family

Shri K.R. Nair

Dr. K. Kasthurirangaian - Received by. Mr. Kannan

Shri M.P. Ramesh

Mr. R. K. Ayyadurai

Aprava Energy - received by Mr. Haziq Beg

Mr. Ajit Gupta - Received by Mr. Anant Naik

The Ramco Cement Limited - Received by Dr. Saravanan Manickam

Shri D. V. Giri

IWTMA Executive Committee Members with Dignitaries

Interview with

Thiru. V. Vishnu, IAS, Managing Director & CEO

Tamil Nadu Industrial Guidance & Export Promotion Bureau, Government of Tamil Nadu

Interviewed by

Shri D. V. Giri
Secretary General
Indian Wind Turbine Manufacturers Association

Thiru. V. Vishnu, IAS
Managing Director & CEO
Tamil Nadu Industrial Guidance &
Export Promotion Bureau (Guidance),
Government of Tamil Nadu

Question 1:

What is the history, structure and functioning of Tamil Nadu Industrial Guidance & Export Promotion Bureau?

Established in 1992, 'Guidance' is the Government of Tamil Nadu's nodal agency for investment promotion and single window facilitation.

We are mandated under the Tamil Nadu Business Facilitation Rules to promote Tamil Nadu as the preferred investment destination by reaching out, helping, and improving the ease and cost of doing business.

Guidance Tamil Nadu comprises of sector specific teams for Investment promotion & facilitation, policy and external engagement. We bring together industry, community partners, and various government departments under one roof for business facilitation.

Question 2:

What are the Major investment fields in the last 5 years?

Renewable Energy Equipments, Automotive & Electric vehicle, Non-leather Footwear, Heavy Engineering, Green Hydrogen are the major sectors which has attracted Investments.

Question 3:

How are Investments in power sector and particularly wind power sector?

Investments in Wind Sector have been growing steadily in the last 3 years. We have seen 15,000+ crores worth investments across Tamil Nadu. Companies like Vestas, Siemens-Gamesa, Baettr, WEG Industries, TPI Composites, Eickhoff Wind Asia Private Limited, Nordex group, Flender Drives, JSW Renew Energy, Senvion Wind Technology have invested in Tamil Nadu.

Question 4:

How do you see wind sector growth with offshore wind and green hydrogen?

Offshore and green hydrogen sectors are evolving and we see a lot of growth potential.

From the state perspective we have had several task force meetings with representatives from MNRE on preparing the TN ecosystem for offshore wind. Some of these being: Studies to understand impact on socio-environmental aspects in the southern districts, preparedness of the minor ports, power infrastructure to be setup for evacuation from land-side, etc. In terms of regulatory support, the state will integrate the necessary clearances onto the single window system when such things come online at Government of India. In terms of investment facilitation, our team at Guidance has had clarification, Q&A sessions for developers with NIWE.

On Green Hydrogen front, we have received multiple proposals from players from around the world, and the State government has sanctioned for 3 Giga watt scale proposals around amounting to investments of 1.5 Lakh Crores. These projects will be located in the port city of Tuticorin.

Question 5:

How is Tamil Nadu Industrial Guidance & Export Promotion Bureau involving in Windergy India 2023 Trade Fair and Conference?

We are setting up an exclusive stall to showcase the strengths of the state with respect to wind sector. Investors can walk in to our stall and discuss areas of investments in the state.

We also have panel discussions on Empowering Wind Energy Growth and Offshore Development in India specific to Tamil Nadu.

Question 6:

How Windergy and other plans are on the anvil with the Global Investor meet scheduled in January 2023?

Renewables Energy sector is a priority sector for the state of Tamil Nadu. We intend to have a pavilion exclusively for Renewables and other green technologies during our Global Investor Meet scheduled in Jan 2024. With respect to furthering the adoption of wind energy in the state and therein increase the production capacity of existing and new players in onshore, repowering and hybrid policies are being worked out.

Question 7:

Has any wind turbine or its component manufacturer sought guidance from the Bureau?

Yes, we have facilitated companies like WEG, Gurit and Eickhoff Wind Power for their approvals and regulatory clearance through single window portal.

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Suzlon Group, the world's leading renewable energy solutions provider that is revolutionising and redefining the way sustainable energy sources are harnessed across the world. With a presence in 17 countries, Suzlon is powering a greener tomorrow with its strong competencies in renewable energy systems. Suzlon's extensive experience, global expertise with diverse nationalities, and world-class manufacturing facilities are unmatched. The range of robust, time-tested reliable products backed by cutting-edge R&D is proof that our partner in the journey trusts us.

This is the journey that began over two and half decades ago with a dream to create a nation of opportunities and prosperity for our future generations, so that they can live in a clean and green world. Suzlon is powering the world with Renewable Energy solutions for a greener tomorrow, progress with sustainability, and growth with responsibility.

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*Data till 31st December 2021

Coal ministry to convert de-coaled mines into hydro power storage in RE push

In a strategic shift towards sustainable energy, the ministry of coal is set to transform defunct coal mines into Pump Storage Projects for hydroelectric power generation. Capitalizing on a land bank of over 200 de-coaled mines, the ministry will utilize solar energy to power the PSPs, aiming to produce hydro-electricity at night. With 20 mines already earmarked for potential conversion, Coal India Limited is conducting feasibility studies. Further, the ministry is engaging stakeholders to pinpoint additional suitable sites and to deliberate on the business models, including EPC and PPP frameworks.

Source: ET Energy World, 10 November 2023

Climate action imposes heavy cost on developing nations: CEA

Mr. V Anantha Nageswaran, Chief Economic Advisor to the Government of India has said that climate action, including energy transition, impose a heavy cost on developing nations. Observing that emerging countries are already grappling with twin challenges of poverty alleviation and economic growth, he said climate change and energy transition are an added burden. Energy transition must bear three costs, including rise in costs of production from rising fuel cost and higher costs of new energy sources as they replace traditional sources, he said at an event organised by Centre for Social and Economic Progress.

Source: PTI, 10 November 2023

RBI allows NRIs to buy Sovereign Green Bonds

Reserve Bank of India has issued a notification allowing NRIs to invest, without any restriction in the Government's Sovereign Green Bonds issued for 2023-24. The circular states that It has now been decided to designate all Sovereign Green Bonds issued by the government in the fiscal year 2023-24 as 'specified securities' under the FAR (fully accessible route). The government plans to borrow Rs 20,000 crore through green bonds in the current financial year.

Source: IANS, 10 November 2023

COP28 President Urges Enhanced Adaptation Finance for Vulnerable Countries

COP28 president Sultan al-Jaber has underscored the importance of intensifying efforts to address adaptation finance gaps and making climate finance more accessible to vulnerable countries. He said, "People and the planet lie at the heart of the climate process, which is focused on protecting lives, livelihoods and nature." He added, "To guarantee an inclusive and equitable transition to low-carbon and resilient growth, the voices of emerging and developing countries must not go unheard. COP28 must leverage an adequate response to the Global Stocktake and set out a pathway to fill the financing gaps and address shortcomings in the global climate finance architecture.

Source: ET Energy World, 30 October 2023

COP28 Outlines 2030 Target: 11,000 GW Renewables, Double Efficiency

The COP28 Presidency, the International Renewable Energy Agency (IRENA), and the Global Renewables Alliance (GRA) released a joint report at the Pre-COP event in Abu Dhabi, aiming to triple global renewable energy capacity to at least 11,000 GW and double annual energy efficiency improvements by 2030. Titled "Tripling Renewable Power and Doubling Energy Efficiency by 2030: Crucial Steps towards 1.5 °C," the report offers concrete policy recommendations to both governments and the private sector. This initiative aligns with the COP28 Presidency's Action Agenda objective of accelerating a just and orderly energy transition, keeping the 1.5 °C target within reach.

Source: ET Energy World, 31 October 2023

NTPC Set to Make a Shift to Nuclear Power

Driven by the government's plan to phase out all fossil fuel-based energy generaion by 2070, the National Thermal Power Corporation (NTPC) is set to make a shift to nuclear power, said Dr. C. K. Asnani, Chairman and Managing Director of the Uranium Corporation of India Limited. Dr. Asnani underscored the vital role of nuclear energy in environmental sustainability, highlighting its dual significance in revenue generation and environmental preservation.

Source: TNN, 31 October 2023

Wind Power is caught in a Perfect Storm

Wind energy is meant to thrive in turbulent conditions. In 2023, the companies that seek to harness it are battening down the hatches. The storm is caused by the wrenching recovery of renewable from the Covid-19 pandemic and years of supply chain disruptions making raw materials expensive. It is not the only one caught in squalls, many companies are facing problems. Problems have been building for the best part of two years. The pace of wind installation growth fell last year for the first time since 2018.

Source: Bloomberg, 31 October 2023

G-7 Nations Back Strong Supply Chains for Energy and Food Despite Global Tension

Trade and economy officials from the Group of Seven wealthy democracies strengthened their pledge to work together to ensure smooth supply chains for essentials like energy and food despite global uncertainties. Worries are growing among developed nations about maintaining a stable supply of computer chips as well as essential minerals, like lithium, which are critical these days amid the demand for electric vehicles and other green energy.

Source: API, 30 October 2023

Recent Progress in the Development of Wind Turbine Lubricants

Dr. Raj Shah
Director, Koehler Instrument Company, New York and Adjunct Full Professor, Dept. of Material Science and Chemical Engineering, State University of New York, Stony Brook, New York

Ms. Angelina Precilla

Nicholas Douglas

Intern at Koehler Instrument Company, Holtsville and Students of Chemical Engineering at Stony Brook University, Long Island

Introduction

The global shift towards sustainable energy sources has positioned wind turbines to a prominent position within renewable energy infrastructure. With over 600 GW of installed wind turbine power capacity worldwide, wind energy has experienced substantial growth, contributing significantly to the global electricity generation landscape. By the year 2020, wind energy accounted for 19% of the energy share, a figure expected to increase to 23% by 2040[1]. Wind turbines, by harnessing wind to produce electricity, play a crucial role in the fight against climate change. However, ensuring the reliability and efficiency of these turbines is challenging, with the lubrication of their gearboxes being a critical factor affecting their performance. Gearboxes are complex systems of gears and rods responsible for converting the torque generated by the wind pushing on the wind turbine blades into electrical power. In this context, the gearboxes and bearings of wind turbines, which operate in diverse environmental conditions—from turbulent winds to extreme temperatures—require high-performance lubrication to extend their lifespan and optimize their functionality[2]. Researchers are continuously working on innovative, environmentally-friendly lubricants to reduce the environmental impact of energy production and consumption.

...Gearboxes...responsible for converting the torque ...by the wind ... into electrical power. ...the gearboxes and bearings ...which operate in diverse environmental conditions... require high-performance lubrication to extend their lifespan and optimize their functionality

Each lubricant is tailored to meet the specific operational demands of wind turbines, which vary depending on location and the type of power output needed. These turbines have multiple lubrication points, including open gears and hydraulic systems, each requiring specialized lubricants like gear oils, hydraulic fluids, and greases[3]. Improper or inadequate lubrication can lead to significant maintenance costs, operational issues, or equipment downtime, reinforcing the need for customized lubrication solutions. For instance, insufficient lubrication can cause a wind turbine to overheat, ultimately leading to its breakdown and, in the worst cases, necessitating the replacement of the entire turbine at considerable cost.

This review explores recent developments in lubricant formulations, including the incorporation of innovative additives and the use of novel materials known for their enhanced thermal stability, reduced friction, and improved wear resistance. These advancements have the potential to enhance the reliability, efficiency, and overall sustainability of wind energy.

Advancements in Wind Turbine Lubricants

A novel category of lubricants known as ionic liquids (ILs) has gained attention for use in wind turbines due to their favorable attributes, including thermal stability, low vapor pressure, load-carrying capacity, and physicochemical properties[4]. These properties make ILs ideal for wind turbine lubrication, enabling maximum power output with exceptional efficiency. In a study on ILs, Delcheva *et al.* investigated the dynamic wetting behavior of a series of imidazolium-based ILs with varying cation alkyl side chain lengths. These ILs featured the same [NTf_2] anion and were tested on two substrates relevant to micro- and nanomechanical

applications: gold and glass[5]. Figure 1 below displays the molecular structure of this anion, along with its related cations[5]. By using the Wilhelmy plate technique to measure dynamic contact angles through slow submerging and reemerging of a liquid, the study recorded contact angle values across a range of contact line velocities. On silica, these values ranged from 29° to 32°, and for gold applications, all angles were under 10°. The results revealed a complex relationship between IL properties, wetting behavior, and the impact of water at the three-phase contact line. These findings have significant implications for advanced technologies reliant on ILs, emphasizing the need for a deeper understanding of their interactions with substrates to improve device performance and identify ILs with superior lubricating properties.

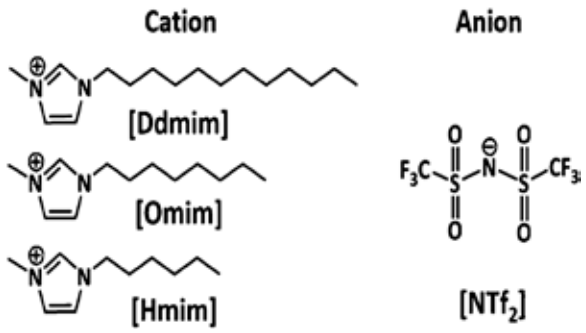

Figure 1: Chemical Structures of the ILs Used in this study[5]

In another study on lubricants, Liu *et al.* explored the synergy of 2-alkylfurans derived from nonfood biomass and aldehyde sources from natural oils or biomass. They aimed to produce three distinct classes of biolubricant base oils: furan-containing lubricant (FL), saturated FL (SFL), and bio-poly-α-olefin lubricant (BPAOL)[6]. These base oils can be precisely customized in terms of carbon number, branching length, distance between branches, and functional groups, making them suitable for various wind turbine applications. The production process involves conjugate addition-hydroxyalkylation/alkylation (CA-HAA) reactions, followed by hydrodeoxygenation (HDO) reactions, yielding in up to 90% of the desired product. Figure 2 illustrates these reactions (a,b) and presents the product yields for each component achieved through different reaction methods (c-e)[6]. By using sustainable nonfood biomass feedstock and employing energy-efficient C-C bond synthesis, this approach provides an environmentally friendly alternative to the current petroleum-based base oil production methods. The resulting lubricant base oils from the experiment were compared to their petroleum-based counterparts, as shown in Table 1. These structurally tailored base oils, particularly the C_{30} products, exhibited properties comparable to or surpassing conventional mineral and synthetic base oils. They demonstrated improved volatility, lower oxidation stability, and superior viscosity index (VI). This study demonstrates the remarkable capabilities of molecular simulation in predicting base oil properties and guiding molecular design.

Building on the previous research, Liu *et al.* continued their investigation into bio-based base oils using the same processes outlined in Figure 2[7]. Aquivion PW79S, a perfluorinated sulfonic acid resin, emerged as the preferred catalyst during the CA-HAA condensation, achieving impressive yields exceeding 80%. The key breakthrough of this study lies in the capacity to fine-tune the molecular size and branching of these base oils by varying the sizes of the substrates in the CA-HAA step. Consequently, this approach yields branched alkanes with superior properties compared to conventional petroleum-derived base oils[7]. The research findings indicate that these bio-based base oils, known for their versatile properties, can be applied across diverse applications, particularly in cold environments where mineral base oils have a tendency to solidify.

In a separate study, Paredes *et al.* explored the feasibility of two pioneering biodegradable oils—BIO-G00 and BIO-G02—derived from high oleic sunflower oil (HOSO) for crucial use in wind turbine gearboxes and mechanical transmissions of agricultural tractors[8]. They focused on evaluating the thermophysical and tribological properties of these biolubricants, particularly their viscosity behavior under varying load and speed conditions. High-pressure viscosity measurements conducted with a falling-body viscometer revealed significantly high viscosity values for both biodegradable oils, measuring at 14,720 and 7,072 mPa·s, respectively. Additionally, these lubricants proved to be effective in safeguarding moving mechanical surfaces while keeping friction coefficients low. Figure 3 illustrated the complete Stribeck curve, displaying the friction coefficient against specific film thickness (Λ). The study also emphasized accounting for thermal effects due to inlet shear heating, particularly in predicting film thickness for these highly viscous lubricants[8]. These results imply that BIO-GOO could be used in tough wind turbine conditions, especially in high-temperature and high-pressure environments, to reduce wear and extend lifespan.

Mutyala *et al.* focused on solid lubricants' potential to enhance the performance of critical mechanical components,

Table 1: Properties of C_{30}-FL1, SFL1, and BPAOL1 Base Oils Compared with Those of Select Commercial Lubricants[6]

Lubricant base oils	kV_{100}* (cSt)	kV_{40}* (cSt)	VI†	PP‡(°C)	Noack volatility§ (wt%)	DSC Oxidation onset Temperature‖ (°C)
C_{30}-FL1	3.14	12.91	105	<-63	10	170
C_{30}-SFL1	3.91	17.72	113	<-60	11.5	154
C_{30}-BPAOL1	3.19	11.84	140	-21	13.8	201
ExxonMobil PA04	4.1	19.0	126	-66	18.8	221
Group II (150 N)¶	5.3	30.6	106	-13	14.5	N/A

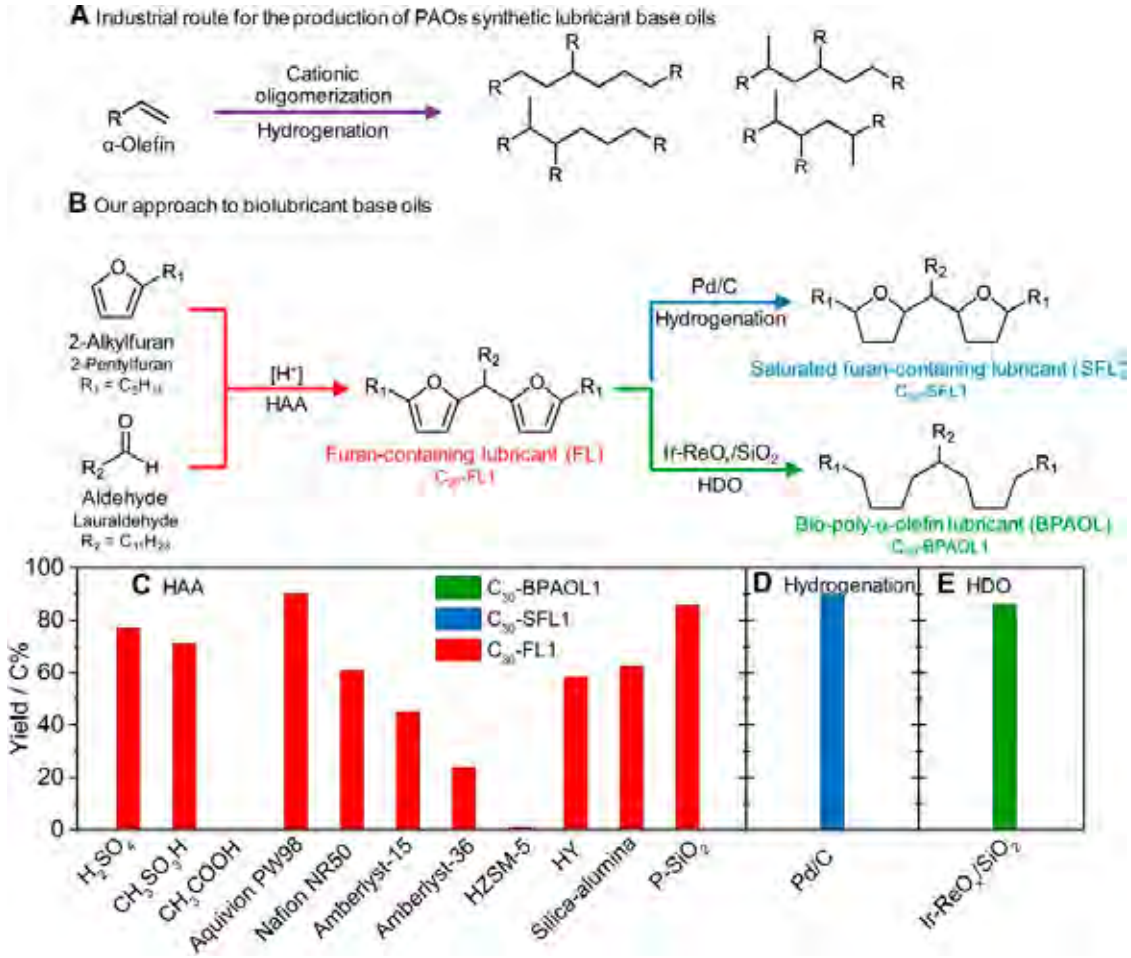

Figure 2: Commercial and Proposed Routes to Produce Lubricant Base Oils[6]

such as bearings and gears in wind turbines and automotive engines[9]. Their research introduced an innovative approach that incorporated nanomaterials such as diamond-like carbon (DLC) films and two-dimensional MoS_2, utilizing nanodiamonds (MoSND) as solid lubricants. Figure 4 illustrates traction results over time, both with and without MoSND, and showcases the micro pitting setup used in the experiments. These experiments, conducted under dry nitrogen conditions in a micro pitting rig, demonstrated superlubricity characterized by an exceptionally low traction coefficient of friction (0.003). This breakthrough was attributed to the formation of a carbon-rich, superlubricious tribo-layer at the contact interface, significantly reducing friction by over 20 times more than traditional steel-steel contacts lubricated with oil with friction coefficient values ranging from 0.06 to 0.07[9]. Furthermore, no surface damage was observed, affirming the viability of solid lubricants in demanding rolling and sliding contacts.

Conclusion

The reviewed advancements in wind turbine lubricants, from the exploration of ionic liquids to the innovative synthesis of bio-based lubricants and the integration of nanomaterials, highlight the dynamic nature of this field. ILs have demonstrated their remarkable qualities against wear and friction. Bio-based lubricants synthesized from nonfood biomass show the potential of sustainable feedstocks and energy-efficient reactions in creating structurally tailored base oils that rival or surpass conventional mineral and synthetic counterparts. The incorporation of nanomaterials gives birth to solid lubricants with superior anti-friction and anti-wear properties. Such advancements set the stage for improved efficiency, extended equipment life cycles, and reduced environmental impact in wind energy applications.

Future integration of these lubricants into a rapidly advancing world of wind turbine technology remains a challenge. As turbines grow in complexity, lubricants must adapt to meet new demands, from higher loads to extreme environmental conditions like desert dust and offshore moisture[10]. Adaptability will be crucial in maintaining equipment longevity and reliability. The symbiotic relationship between lubrication and renewable energy emphasizes the need for a sustainable future. As wind turbines continue to play a pivotal role in mitigating climate change, the development of lubrication solutions that align with sustainability goals becomes increasingly important.

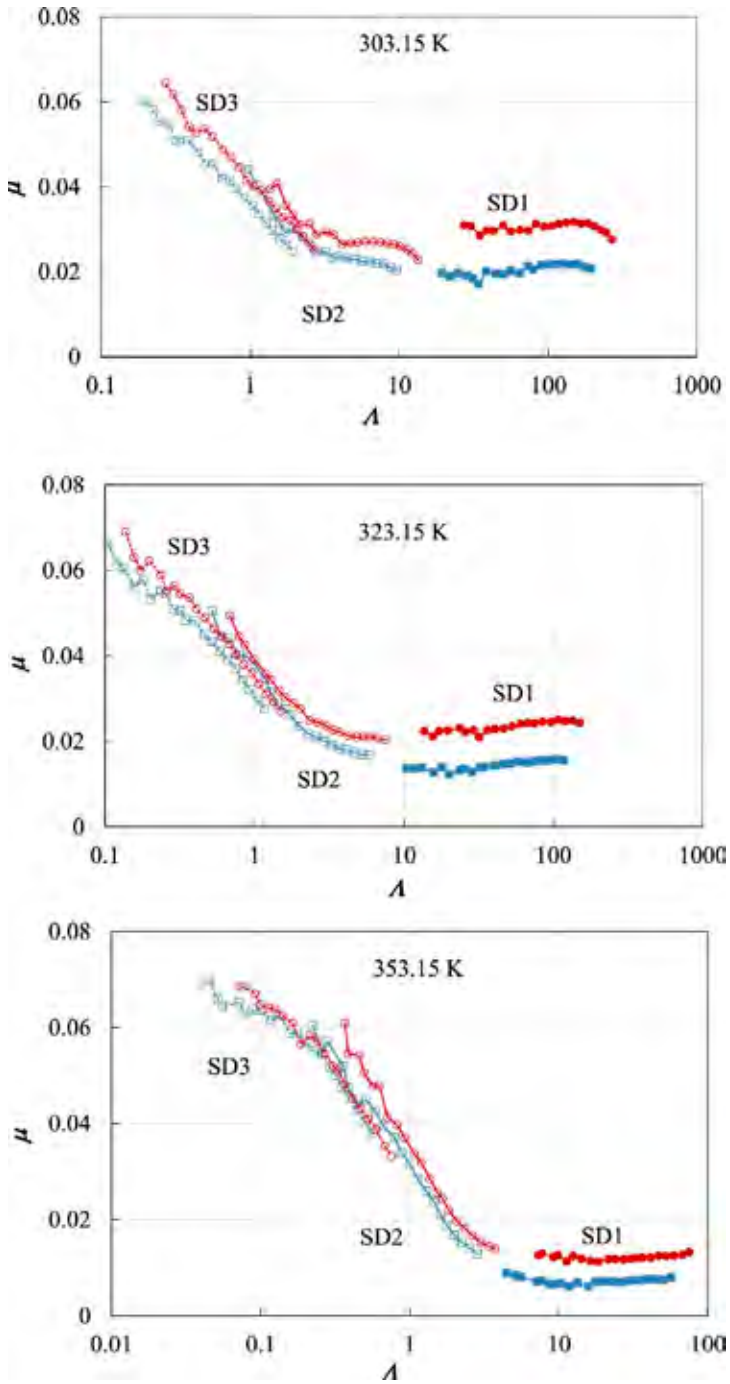

Figure 3: Stribeck curves at 5% SRR for Rough and Polished Disks (SD3-SD1) for BIO-G00 (Red Color) and BIO-G02 (Blue Color) Lubricants[8]

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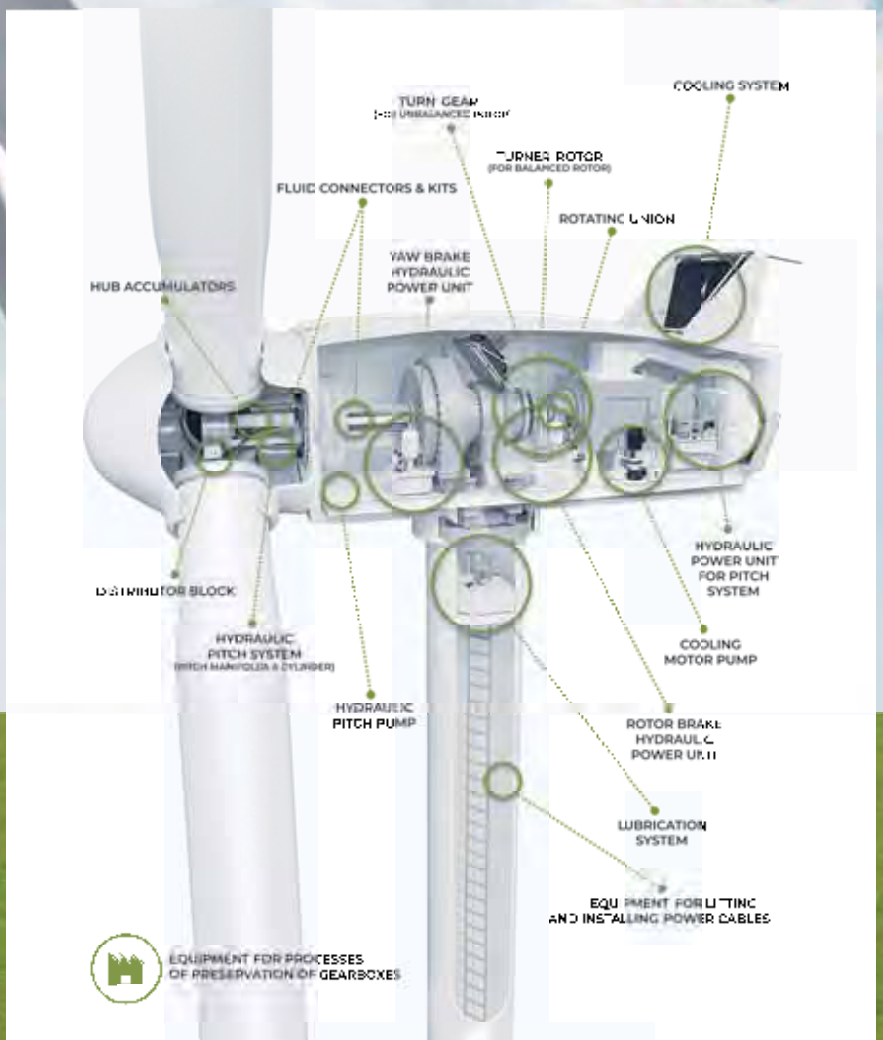

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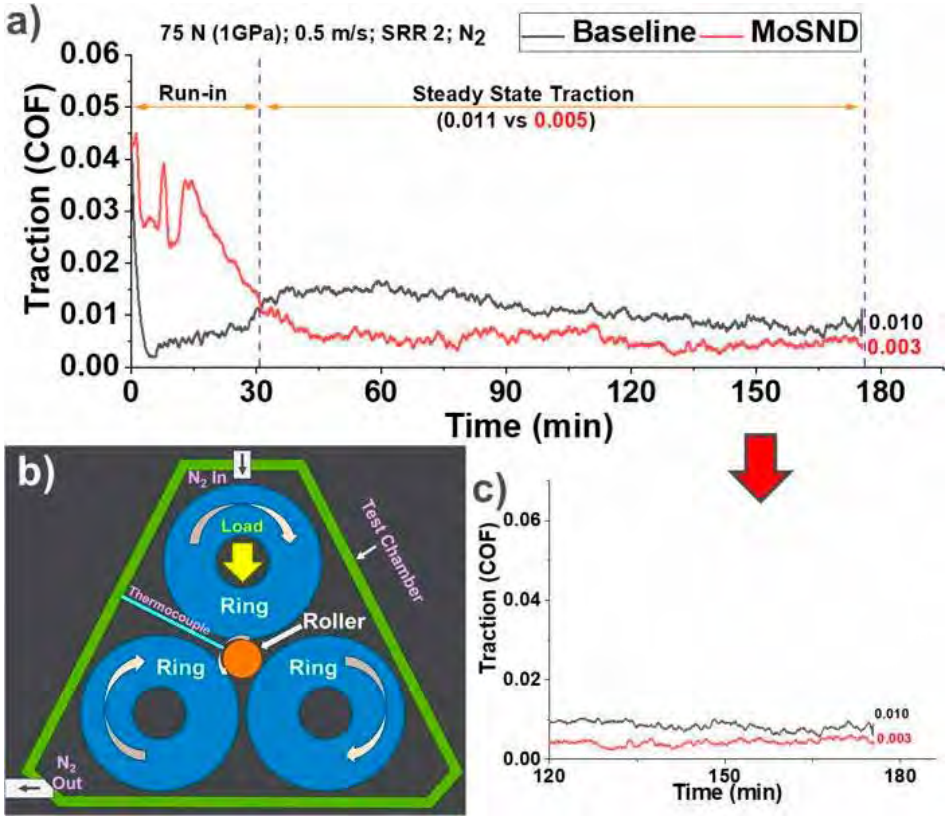

Figure 4: DLC-DLC Test Setup and Traction Coefficient Results.
(A) Traction (COF) For DLC-DLC Tests Without (Baseline) and With the Mos2+Nanodiamond (MoSND) Test with Run-in (0–30 Min) and Steady State (30–180 Min) Periods.

(B) Micro Pitting Rig (MPR) Setup in the Dry Nitrogen Environment at A Load Of 75 N, A Speed Of 0.5 M/S, and A Slide-To-Roll Ratio (SRR) Of 2%. (C) Traction (COF) for a Period of 120 Min–180 Min Showing End Traction Superlubric Values Achieved Using MoSND Solid Lubricant[9]

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BIS Plan to Bring out Standards for Power Producing Wind Turbines

Bureau of Indian Standards (BIS) is planning to bring out Standards for the Power Producing Wind Turbines and have asked for review of the papers and submit comments on or before 21.11.2023. In this regard it has issued a letter dated 21 September 2023 for New Indian Standard for Wind energy generation systems (Part 12): Power performance measurements of electricity producing wind turbine for comments. The document has been prepared by the Wind Turbines Sectional Committee, ETD. This standard defines procedures for assessing the power performance characteristics of wind turbines. The document provides a general introduction to the available options for power performance measurement and the contributing evaluations which are further detailed in the other parts of the IS/IEC 61400-12 series.

Renewable energy to fuel cost competitiveness for industries

Renewable energy is set to enhance cost competitiveness for industrial consumers, as discussed at interaction organised by FICCI and Hero Future Energies. The event aimed to propel the adoption of renewable energy by Indian industrial consumers, aligning with the country's decarbonization and net-zero aspirations.

Source: ET Energy World, 7 November 2023

CCEA Released Draft Procedure for Verifying Captive Status of Generating Plants

Central Electricity Authority (CEA) has released a draft procedure for verifying the captive status of generating plants that have their captive generating plant (CGP) and captive user(s) located in multiple states. The CEA has invited comments and suggestions on the draft procedure until 1st December 2023.

EU Considers Investigation into Chinese State Aid to Wind Industry

The EU is considering opening an investigation into China's possible use of state aid to the wind industry. According to the acting Competition Commissioner, Didier Reynders, there are concerns that state-subsidized Chinese goods could threaten European companies. An EU official source informs that there are sufficient grounds to justify an investigation into wind turbine parts, but also acknowledges that there are fears of retaliation. "Chinese wind equipment manufacturers have been implementing an aggressive strategy to enter European markets," he wrote, adding that Chinese manufacturers were offering European project developers large discounts and the possibility to defer payments for up to three years.

Source: Marketwire, 10 September 2023

BEE Publishes Procedure for Compliance under Carbon Credit Trading Scheme

India has been at the forefront of climate action to meet the global climate goals through its ambitious Nationally Determined Contributions (NDC). To facilitate the achievement of India's enhanced NDC targets, the Government has initiated the development of the unified carbon market mechanism 'Indian Carbon Market' (ICM) which will mobilize new mitigation opportunities through demand for emission reduction credits by private and public entities. The Bureau of Energy Efficiency has published the draft Detailed Procedure for Compliance under the Carbon Credit Trading Scheme (CCTS) and has invited comments from the public in this regard.

India Set to Add 5.8 Million Tonne Green Ammonia Manufacturing Capacity

India is gearing up to establish about 5.8 million tonnes of green ammonia manufacturing capacity across various regions, Union Power and New and Renewable Energy Minister Mr. R K Singh announced during a session of the ISA conference. He added that the push is not solely focused on renewables. We are on our way to becoming one of the major global manufacturers of green hydrogen and green ammonia.

Source: ET Energy World, 2 November 2023

RE Sources Can Meet 65% of World's Power Supply, 90% by 2050: Mr. R. K. Singh

Minister of Power and New and Renewable Energy Mr. RK Singh stated that renewable energy sources have the potential to supply 65 percent of the world's total electricity by 2030 and decarbonise 90 percent of the power sector by 2050. He was speaking at the Sixth Assembly of the International Solar Alliance (ISA) held in New Delhi. ISA's mission is to unlock one trillion dollars of investments in solar by 2030 while reducing technology and its financing costs.

Source: AIR, 31 October 2023

TIIC and IWTMA First Kick Off Meeting

To operationalize the MOU between IWTMA and Tamil Nadu Industrial and Industrial Corporation Limited (TIIC) for cleaner, greener and bright future of Tamil Nadu, the first kick off meeting was conducted at TIIC on 30th October 2023 at 4.00 pm in hybrid mode chaired by Sri Hans Raj Verma, IAS, CMD, TIIC and CMD, TEDA. The meeting was attended by various industries departments and many industrial institutions of Tamil Nadu.

Regulatory Update on Wind Power

Ministry of Power RPO Notification, 20th October, 2023

Central Government in consultation with the Bureau of Energy Efficiency, specifies the minimum share of consumption of non-fossil sources (renewable energy) by designated consumers as energy or feedstock and different share of consumption for different types of non-fossil sources for different designated consumers in respect of electricity distribution licensee and other designated consumers who are open access consumers or captive users to the extent of consumption of electricity from sources other than distribution licensee as a percentage of their total share of energy consumption indicated in the Table below:

S.No.	Year	Wind Renewable Energy	Hydro Renewable Energy	Distributed Renewable Energy	Other Renewable Energy	Total Renewable Energy
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1.	2024-25	0.67%	0.38%	1.50%	27.35%	29.91%
2.	2025-26	1.45%	1.22%	2.10%	28.24%	33.01%
3.	2026-27	1.97%	1.34%	2.70%	29.94%	35.95%
4.	2027-28	2.45%	1.42%	3.30%	31.64%	38.81%
5.	2028-29	2.95%	1.42%	3.90%	33.10%	41.36%
6.	2029-30	3.48%	1.33%	4.50%	34.02%	43.33%

The wind renewable energy component shall be met by energy produced from Wind Power Projects (WPPs) commissioned after the 31st March, 2024.

Any shortfall in achievement of stipulated wind renewable energy consumption in a particular year may be met with hydro renewable energy which is in excess of that energy component for that year and vice versa.

The balance excess energy consumption under wind renewable energy or hydro renewable energy component in that year, may be considered as part of other renewable energy component.

This notification shall come into force on the 1st day of April, 2024 and till such time, the RPO trajectory specified in paragraphs 5 to 14 vide the Ministry of Power Order No. 9/13/2021-RCM, dated 22nd July, 2022 read with Corrigendum, dated the 19th September, 2022, shall remain in force.

MOP Approves Procedure for Implementation of Uniform RE Tariff

Ministry of Power has approved the detailed Procedure for Implementation of Uniform Renewable Energy Tariff on 25th October 2023.

Other Regulations Issued

The following Regulations have been issued by various ministries/ authorities in the past months.

Policy Name	Issuing Agency	Date of Issue
MNRE proposes to hold bids for the development of offshore wind energy sites in Tamil Nadu	MNRE	28.09.2023
CERC approves High Price bilateral market segment in PXIL	CERC	21.09.2023
MNRE updated the ALMM list with a total enlisted capacity of 19,405 MW till Sep 2023	MNRE	20.09.2023
CERC issued the order stating the adoption of tariffs assigned in the PPA	CERC	13.09.2023
MOP issues an order to implement the pooling of CGSs with expired PPA	MNRE	11.09.2023
Gujarat Government allows all ISTS /In-STS connected RE projects to be set up in the State	Government of Gujarat	21.09.2023
TNERC proposes a draft for forecasting, scheduling, and deviation settlement related to wind and solar generation	TNERC	11.09.2023
TSERC issued draft monthly banking of open access at 8% of energy banked	TSERC	01.09.2023

*Compiled by **Om Taneja**, Renewable Energy Consultant*

Power ministry nudges state governments, gencos to take up insolvent assets

The power ministry is looking at a quicker turnaround of these stressed power plants and enhancing power supply. To tackle increasing demand, the Union Ministry of Power has urged central and state public-sector power-generating companies (gencos) and state power and energy departments to pick projects that are undergoing insolvency proceedings.

Source: Business Standard 4 November 2023

World's Top Renewable Firms Reel Even as Installations Surge

The biggest manufacturers of wind turbines and solar panels are facing their most serious financial challenges in years even as deployments of clean energy head for an annual record. About 500 GW of renewable generation capacity will be added this year, according to IEA and at least $1 billion a day is being spent on new solar additions alone. Yet companies in the sector are being squeezed by volatile costs, snarled projects, high interest rates and in the solar sector — a rush to add new capacity that's overwhelmed demand. Even as installations rise, "wind and solar equipment companies are not a good exposure to this trend," said Vicki Chi, a Hong Kong-based portfolio manager at Robeco. The wind and solar sectors are both highly competitive and there are "more attractive exposures" in electricity grid equipment and software, where demand should exceed expectations and entry barriers are much higher, she said.

Source: Bloomberg, 3 November 2023

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DENMARK – *A Pioneer in Offshore Wind Energy*

Like many countries, Denmark was once entirely dependent on imported fossil fuels. Today, many consider Denmark a global green frontrunner, pioneering the expansion of wind energy for decades. In 1991, the world's first offshore wind farm was installed in Vindeby with a capacity of 4.95 MW. Since then, several offshore wind farms have been constructed in Danish waters, totalling a capacity of 2.3 GW. Looking back, Danish offshore wind has made remarkable strides to fast-track Denmark's path to a zero-carbon future.

Almost 20 years ago, Denmark launched its first public tender for offshore wind and thereby began a new phase of using tenders as an effective tool for offshore wind development, setting up conditions for large-scale projects. Regulation, planning and tender models have since then been evolved and adapted to secure transparency, flexibility, efficiency, de-risking measures, and healthy competition.

Today, Denmark is preparing the construction of its largest offshore wind farm to date, Thor Offshore Wind Farm, which will be in operations before 2027. With 72 wind turbines, each boasting a nameplate capacity of 15 MW and a total capacity of more than 1,000 MW, Thor will produce enough green electricity to power more than a third of all Danish households once connected to the grid. Moreover, the Thor Offshore Wind Farm project was the first tender in Denmark to yield a tender price below zero and will be the first to generate an anticipated revenue to the Danish state of around 376 mio. EUR. within its first few years of operating.

Energy Islands – A New Era for Offshore Wind

In May 2020, the Danish government unveiled its plan to establish the world's first energy islands by 2030 as an extension of the country's landmark target to reduce greenhouse gas emissions by 70 pct by 2030 compared to 1990-levels.

Funded by the European Union

STATE OF GREEN

The energy islands will be the largest infrastructure project to take place in Danish history and will usher in a new era for green electricity production at sea. Historically, offshore wind farms have operated as isolated entities, distributing electricity to specific regions. Energy islands are set to revolutionise this by becoming central hubs for electricity generation, where power from multiple offshore wind farms is collected and seamlessly distributed to countries interconnected through a shared electricity grid. The concept of energy islands enables Denmark to ramp-up its offshore wind capacity by up to 14 GW before 2040, produce green electricity to supply more than 13 million households, and to utilise part of the generated green electricity to produce green hydrogen and e-fuels for both domestic use and export purposes.

Sharing Lessons Learned

Denmark is not only focused on reaching its own climate targets, but also committed to helping other countries build a solid offshore wind sector and develop a regulatory framework that supports and accelerates the utilisation of the wind resource globally. Cross-border collaborations and government-to-government partnerships like the Indo-Danish Energy Partnership is a vivid example of how Denmark shares lessons learned from decades of working with offshore wind to assist India in reaching its ambitious offshore wind targets.

Together, India and Denmark have launched a knowledge hub, Centre of Excellence for Offshore Wind and Renewable Energy (CoE). By bringing together industry, public authorities, and civil society, the CoE will play a crucial role in facilitating and accelerating the implementation of the Indian offshore wind strategy.

Anholt Onshore Wind Farm Full View (Credit Ørsted)

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CENTER OF EXCELLENCE:
Advancing India's Renewable Energy Future

The Centre of Excellence for Offshore Wind and Renewable Energy (CoE) is a knowledge hub, and a joint initiative between the Indian Ministry of New and Renewable Energy (MNRE) and the Danish Energy Agency (DEA). The initiative is a government-to-government initiative under the Indo-Danish Energy Partnership, bringing together industry, public authorities, and civil society to facilitate and accelerate the implementation of the Indian offshore wind strategy.

CoE's primary goal is to use Danish experiences with offshore wind to support the creation of an offshore wind framework in India, while transferring knowledge, building up capacity, give policy support and reduce technical and financial risks. This is achieved through the development of amongst others a series of activities such as workshops and studies on a range of topics relevant for offshore wind development in India.

The CoE actively supports the development of offshore wind in India, leveraging knowledge and risk mitigation strategies from successful Danish models. Key studies carried out by the CoE have significantly advanced offshore wind initiatives in India, and CoE continues to work closely with MNRE and government entities to further develop renewable energy solutions in the Indian market.

Studies Uncover the Offshore Wind Business Case In India

Key studies include a financial modelling framework to analyze the offshore wind business cases in Tamil Nadu and Gujarat, particularly focusing on providing reliable cost data for assessing the need for subsidies and to understand the feasibility of offshore wind projects in India. Another key study is the marine spatial planning covering areas in Tamil Nadu and Gujarat, which analyzes offshore wind resources, technical barriers as well as environmental and social parameters, ultimately identifying the most suitable areas for offshore wind development. The CoE is further assisting the creation of an offshore wind strategy by National Institute of Wind Energy, helping MNRE to identify wind zones and estimate capacities for future projects.

Centre of Excellence
for Offshore Wind and Renewable Energy

Assessing Port Infrastructure Needs

An essential study is the CoE's Port Evaluation study, which identifies key ports near the wind zones of Tamil Nadu and Gujarat. The Port study provides a detailed assessment of key ports to serve offshore wind projects located off the coasts of Gujarat and Tamil Nadu, assessing among other port-readiness, necessary infrastructure upgrades, investment costs and planning timeline for port authorities. This study has facilitated the MNRE in raising awareness regarding the essential upgrades required in specific ports and has initiated discussions with the Ministry of Ports, Shipping, and Waterways regarding the planning and financing of these necessary improvements.

Read more at **coe-osw.org**

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