Indian Wind Power

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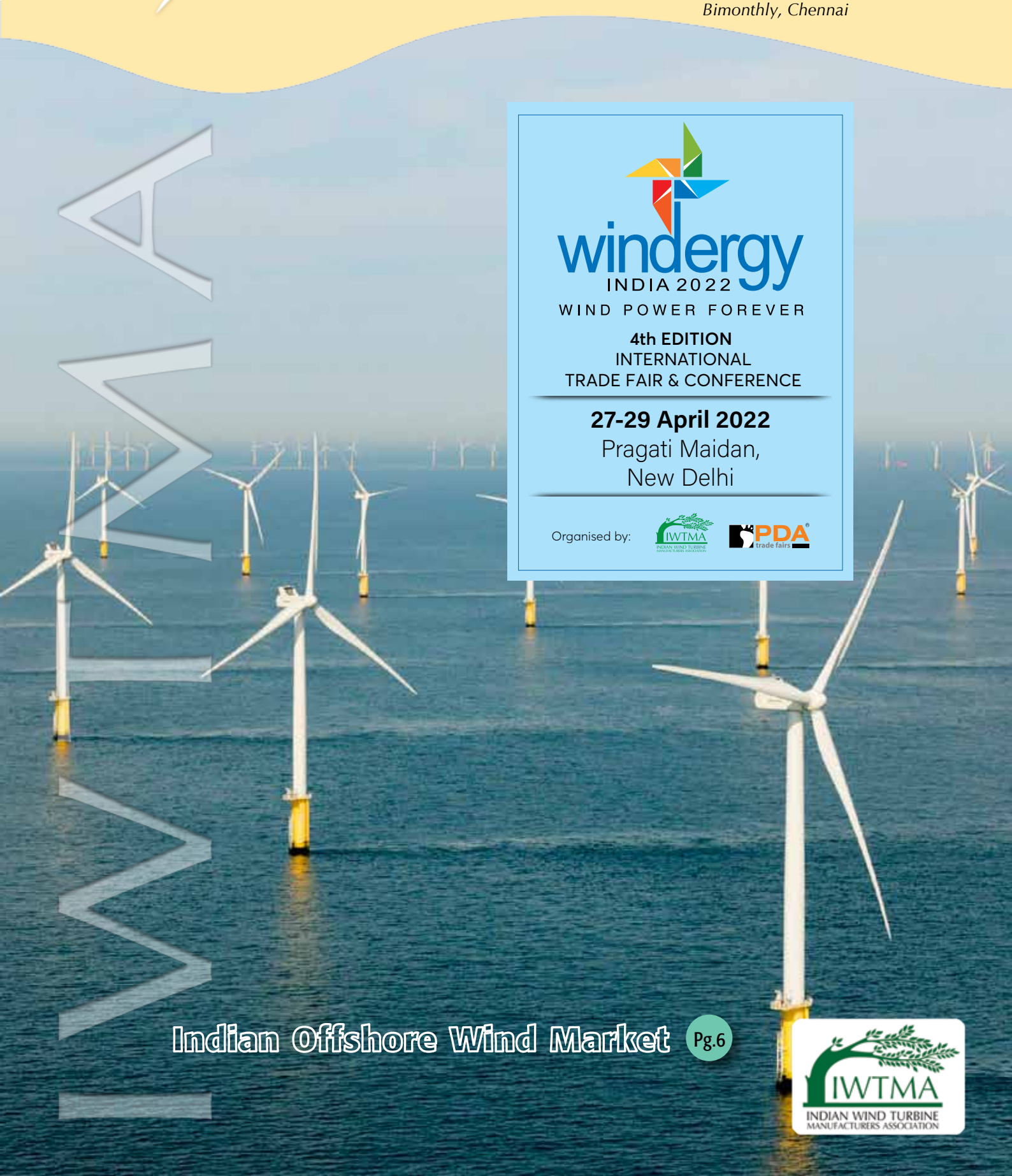

Indian Offshore Wind Market Pg.6

IWTMA
INDIAN WIND TURBINE MANUFACTURERS ASSOCIATION

Expertise and Research & Development for Wind and Solar Energy Stakeholders

Resource Assessment

Wind Energy

- Carry out Nationwide Wind Resource Assessment
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- Design and implement the comprehensive Resource Assessment Programme
- Analysis of wind data to identify Wind Farmable locations
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Offshore Wind Energy

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

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- Duration Test

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

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- Preparation of Indian standards on wind turbines
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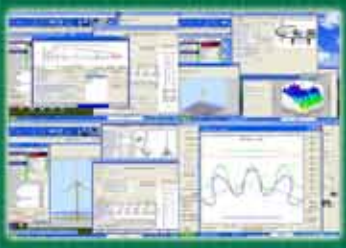
- Installation, Commissioning and Operation & Maintenance of Wind Turbines
- Grid Integration of Renewable Energy System
- Forecasting of Wind and Solar Energy Production
- Seminar / Workshops on Wind and Solar Energy



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IWTMA
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Indian Wind Power

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Indian Wind Turbine Manufacturers Association

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From the Desk of the Chairman – IWTMA

Dear Readers,

Greetings from IWTMA!

Life is slowly returning to normal and the momentum in business activity, the state of the economy, collection of GST and even travel is picking up. The Government is undertaking the vaccination drive on a war-footing and we hope that finally the Covid-19 curve is finally flattening for good. However, safety protocols and social distancing will continue to be the new normal. With Diwali -the festival of lights around the corner, the country is poised to celebrate this recovery with renewed vigor.

There is not much to cheer for the wind energy sector though as we closed the half yearly mark with an addition of only 623 MW in 2021-22 with many awarded SECI projects getting delayed. This is a continuing factor which is adversely impacting the industry. It is concerning that clean wind energy in India is not progressing fast enough even as the entire global power situation is affected by coal shortage. This situation is also ill-timed since India will be participating in COP 26 at Glasgow from 31st of October, 2021.

To add to the woes of the industry, the Government has notified enhancement of GST on renewable devices from 5% to 12%. This enhanced slab will result in increased cost. Though, it is understood, that this qualifies for a change in law and a cost pass through, the tariff sensitivity of DISCOMs cannot be discounted. The industry has made several representations in the past to bring power under GST which will enable pass through of GST by completing the loop. This could well remain a distant possibility as the contemplated policy of bringing petrol and diesel under GST has been set aside for now.

A compelling message has been conveyed through CII (ASCON) to the Hon'ble Minister for Commerce and Industry on the dire need to put an end to reverse bidding and promote a generic tariff which is sustainable and bankable. Other reforms like issues of ISTS waiver for interstate electricity, mandating RPO, uniform Wheeling and Banking for Captive use and Production Linked Incentive Scheme (PLI) for Renewable Energy value chain are all extremely important to achieve the government's renewable energy targets.

The high power and financial cost especially for MSMEs are a big hurdle in the way of our country's aspirational goals regarding ease of doing business and cost of doing business.

The Government has been promoting 'Aatmanirbhar Bharat' or 'Make in India' for India to become a Global Manufacturing Hub to meet our domestic need as well as to create a robust export economy for India. Lowest costs of turbines manufactured in India are creating opportunities for us to cater to international markets through exports. However, the export incentive under the Merchant Export Incentive Scheme (MEIS) which was at a meager 2% has been further reduced to 0.8% under the Remission of Duties and Taxes on Exported Products (RODTEP) scheme. Several other policy changes are to the disadvantage of our potential exports. The industry is working on taking up these issues by a proper representation to the Government.

I am confident that with the post COVID-19 recovery expected to kick-in soon, our sector, business and the economy will get back on the growth trajectory soon. Our association will take all steps required to stimulate the process and drive reforms with the government.

Now, it is time to look at new beginnings and celebrations that renew our spirits. I take this opportunity to wish all our readers, a very happy and prosperous Diwali and an auspicious New Year ahead.

With regards,

Tulsi Tanti

Chairman

Deepening Green Market Towards Achieving National Green Aspirations

Rohit Bajaj
Head and Senior Vice President - Business Development
Indian Energy Exchange Limited

Trading in delivery-based renewable energy started at the Indian Energy Exchange with the commencement of Green Term Ahead Market (GTAM) on its platform in August 2020. Prior to this, the Exchange facilitated trade in renewable energy through renewable energy certificates (solar and non-solar) since 2010.

The commencement marks a significant milestone aligned to the strategic vision of Government of India to set up 450 GW of installed renewable energy capacity by 2030. The present installed renewable energy capacity of 100 gigawatt (GW) with generation at 147 billion units (BU) during FY21 represents 25% in terms of capacity and 12% in terms of total generation. The country has witnessed 20% CAGR growth in renewable generation since FY'16 while total electricity generation saw 4.3% growth in the same period, indicating that the increase in generation from the renewable energy sources has been much higher than the increase from other sources. India is today the fourth largest market for renewable energy in the world and its success story has been possible through its compelling business case of fast-paced reduction in renewable technology costs.

Green Term-Ahead Market (GTAM): First Year Performance

On 21 August 2021, the GTAM marked completion of the first year on the Exchange. The market accomplished a total trade of 2744 MU - comprising 1267 MU in the solar segment and 1477 MU in the non-solar segment. The market discovered an average price of Rs 3.75 per unit with average solar price at Rs 3.48 per unit and average non-solar price at Rs 4.06 per unit along with a solid participant base of around 100 participants. With benefits such as transparency, competitive prices, payment security and flexibility in procurement that exchange market offers, a pan India wide green market is greatly facilitating obligated entities such as distribution utilities, open access consumers, and captive power plants to fulfil their Renewable Purchase Obligations (RPOs) and meet their energy needs at the most competitive prices in a collective manner.

The market features a new auction session every 30 minutes with delivery of power scheduled in an hour's time. The green market coupled with RTM together are helping the utilities and system operators to maintain demand-supply balance...

To help the states integrate renewable energy at grid level and manage the imbalances, the real time market (RTM) on the Exchange platform has been helping the utilities. The market features a new auction session every 30 minutes with delivery of power scheduled in an hour's time. The green market coupled with RTM together are helping the utilities and system operators to maintain demand-supply balance and enhance the grid safety and security.

Building Green Market Towards Accomplishing Green Aspiration

Currently the two key issues being faced by the renewable energy developers are; curtailment of renewable energy by the system operators and also non-payment of dues. The green market successfully addresses both these challenges. It provides pan India market to ensure despatch and also provides payment security to the developers. The market also encourages renewable energy rich states to develop capacity beyond their own obligation and offers opportunity to trade between RE-rich and RE-deficit states.

The commencement of forthcoming segments be it: green-day ahead as a part of the integrated day-ahead market or the longer duration contracts for green merchant capacity, that will help to deepen the green market and increase offerings for the market participants.

- **Integrated Day-Ahead Market**

Moving a step further towards energy transition, an integrated day-ahead market is expected to commence shortly for trade in conventional and green power on the Exchange with separate price discovery for each. Under the integrated day ahead market,

the bids for conventional and renewable will be received together through separate bidding windows. The clearing of electricity volumes will take place in a sequential manner – first in the renewable segment having the must-run status, considering the availability of the transmission corridor, followed by conventional segment. The participants bidding in green segment will have the option to transfer the unselected bid to conventional segment and will also be able to price it differently.

- **Long Duration Green Contracts**

The introduction of longer duration delivery contracts (LDCs) up to 365 days in conventional electricity and renewables on the power exchanges will usher in the era of Power Market 2.0 which will facilitate the further growth of power markets in India. So far, the power exchanges are confined to trade contracts only up to 11 days. The market segment is likely to commence in this fiscal year itself and it awaits final resolution of the matter in Supreme Court as well as approval of the contracts by the CERC.

- **Merchant Green Capacity**

The green term-ahead market has already started providing price signals and new avenues to renewable generators to install merchant power capacity or part market-part PPA capacity for selling power on the lines of conventional power. A decade back there was no merchant conventional capacity in the country while presently we have almost 20 GW merchant power capacity. On the same lines, there is an immense opportunity for developing the merchant green capacity.

Learning from the Global Best Practices

Globally we have seen those countries with a higher share of renewable in their total energy mix have deeper market penetration. European countries like Sweden (54.6%), Finland (41.2%) and Denmark (36.1%) have higher shares of renewable energy as a part of their total energy mix and the green energy in these countries is routed through Exchanges. Countries like UK and Germany have auctioned large capacities through contract for difference (CfD) route. The model is now a successful and proven model in UK with 3 auctions already been done and fourth one expected by the end of 2021. There has been almost 60% decline in discovered tariffs under CfD since 2015. Similarly in Germany over the next 10 years, 30 GW of onshore wind and 12 GW of solar would be auctioned through a CfD-based model. Going forward India too, must introduce new market products such as the CfD, long duration green contracts, voluntary renewable energy certificates (VRECs), etc. which will play a crucial role in furthering sustainability goals and ensuring that all the renewable energy generated within the country is dispatched in the most efficient manner.

Additional Borrowing Space Only if States Agree to Take Over Discoms' Future Losses

States will have to agree to take over the future losses of state power distribution companies in a graded manner to be eligible for additional borrowing space of 0.50% of GSDP for four years. In case the states commit but fail, the losses not taken over will be treated as state' fiscal deficit and their borrowing limit will reduce proportionately. As per the guidelines issued by the Finance Ministry, states cannot renege on power purchase contracts, cannot have unpaid subsidies to discoms, will have to reduce operational and financial losses, and will have to reduce industrial tariffs. The finance ministry has issued conditions and performance criteria for the special dispensation allowing additional borrowing space in addition the borrowing limit of 4% of gross state domestic product (GSDP) from FY21 to FY25 to improve power distribution sector.

Source: Economic Times, 14 June 2021

Repowering India's Top Wind Sites Could Add 30 GW of Capacity

Roughly a quarter (10.5 GW) of India's 39.2 GW of installed wind capacity was commissioned with wind turbine sizes of under 1 MW. Most of these older and smaller turbines occupy the top wind sites, underleveraging the country's top renewable energy resource. But repowering the older wind turbines of less than 1 MW capacity with modern turbines of 2-3 MW capacity could massively boost India's wind power generation, converting into installation of 30 GW of new capacity in India's top wind resource sites. Wind turbine technology has advanced in the last decade with improved rotor diameters, turbine sizes and pole length (hub heights).

Source: ET Energy World, June 21, 2021

Asia Pacific RE investments could hit US$1.3 trillion by 2030 and Carbon Emissions from Power Sector to Peak at 7.3 Bt by 2025

Asia Pacific renewables (wind and solar) generation investments could double to US$1.3 trillion over the current decade to 2030 compared to the previous decade (2011-2020), says Wood Mackenzie, a Verisk business. In contrast, fossil fuel power investments are expected to decline by around 25% to US$54 billion a year. We expect coal to make up 55% of fossil fuel investments until 2030 but shrink to 30% in the 2030s as gas dominates. Although we expect a 47% drop in carbon emissions from the power sector from its peak of 7.3 Bt in 2025, inertia in the coal power fleet will prevent Asia Pacific from reaching carbon-free power by 2050.

Source: Wood Mackenzie, 22 June 2021

Hydrogen, Ammonia Can Help Ensure Power Security in Energy Transition: IEA

The use of low-carbon hydrogen and ammonia in fossil fuel power plants can play a key role in maintaining energy security during the transition to greener power, the head of the International Energy Agency (IEA) told a virtual conference held by Japan's industry ministry. IEA chief Mr. Fatih Birol told that co-firing hydrogen and ammonia from low-carbon sources would cut emissions from existing fossil fuel plants, giving more flexibility in the energy transition. Ammonia is used for fertiliser and industrial materials, but is also seen as an effective future energy source, along with hydrogen. It does not emit carbon dioxide when burned, though its production releases emissions if it is made with fossil fuel.

Source: Reuters, October 07, 2021

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Global Offshore Wind Report 2021 and Indian Offshore Wind Market

Global Wind Energy Council (GWEC), Brussels has brought out a 136 pages Global Offshore Wind Report 2021. The highlights of the report are given below along with the detailed report on Indian market for offshore wind.

Global Offshore Wind Highlights

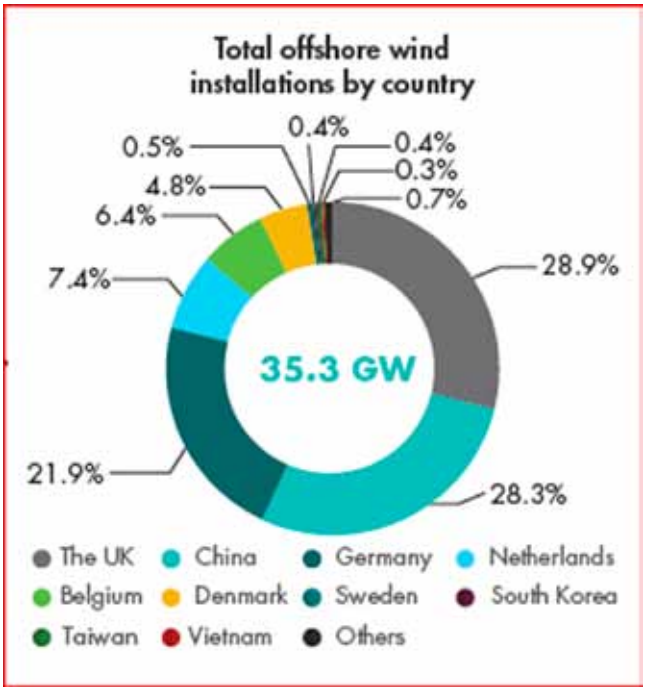
- At the end of 2020, there is a total of 35 GW of offshore wind across the world that is 14 times higher than 10 years ago.
- New capacity addition in 2020 was 6.1 GW.
- Europe remains the largest offshore market as of the end of 2020, making up 70% of total global offshore wind installations.
- Cumulative installations in Asia passed the milestone of 10 GW by the end of 2020, making it the second largest regional offshore market. China currently has a strong lead in offshore wind activities, followed by South Korea, Taiwan, Vietnam and Japan.
- It is good to note that the COVID-19 pandemic did not heavily impact the sector, though there were delays in permitting and some projects have taken longer to install.
- Offshore wind is a healthy sector with a very promising future.
- Future is alive and well as Europe expands; the US takes flight and particularly in Asia.
- Notably, China is a substantial part of the market throughout this decade and beyond. This year China will overtake the UK as having the largest installed capacity.
- However, other markets within the region are moving from early stages to concerted deployment. How countries in the region work together will be interesting to watch and whether the economies of scale and regional cooperation that happened in Europe will play out in Asia.
- One dynamics we continue to see around the world is the dramatic fall in the Levelised Cost of Energy (LCOE) from offshore wind. Prices are becoming more and more attractive for countries that have the fundamentals for offshore wind and are looking for a high-capacity renewable energy to bridge fossil fuels, solar PV and onshore wind. When talking with governments around the world, low-cost, high quality, renewable energy is very desirable, but it is the associated benefits which make it even more attractive.
- The benefits are most about are reducing imports whilst tackling climate change; the huge economic growth in terms of investment; and the creation of jobs that makes it compelling for politicians.
- This is the decade when offshore wind truly comes of age and to meet the IEA and IRENA's 1.5°C scenario, we need to ramp up significantly over the next two decades.

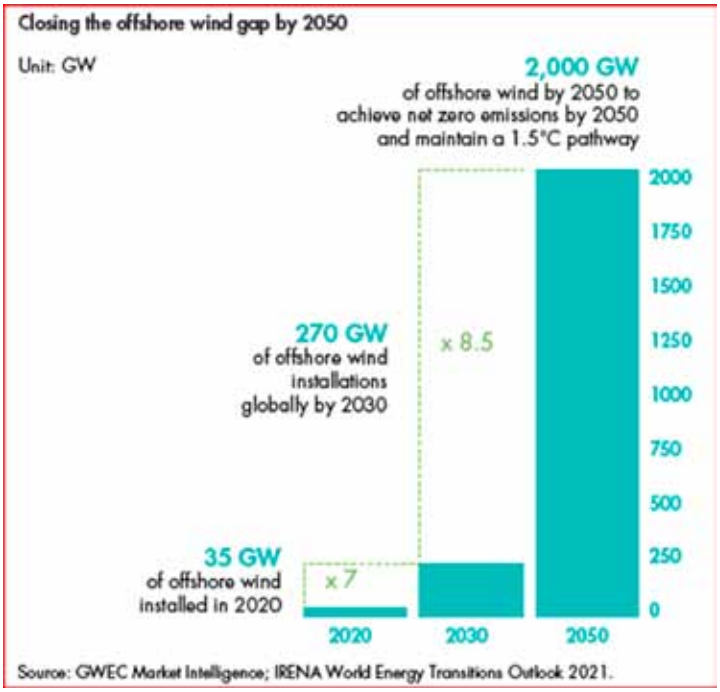
Prices are becoming more and more attractive for countries that have the fundamentals for offshore wind and are looking for a high-capacity renewable energy to bridge fossil fuels, solar PV and onshore wind.

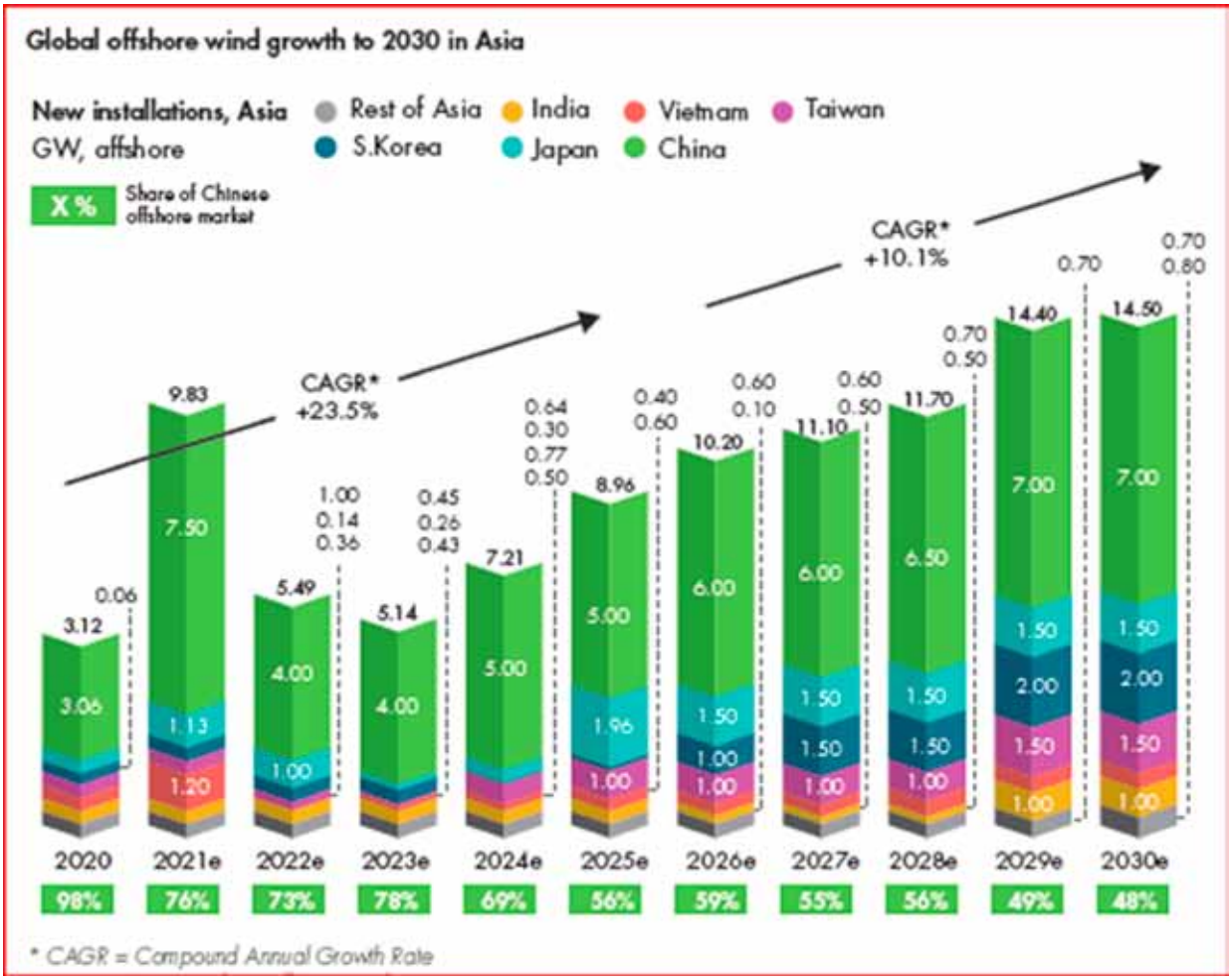
- In 2021 GWEC expects that newly installed capacity will be more than double 2020's figure, driven mostly by a boost in China where projects seek to secure the feed-in-tariff that expires at the end of the year. GWEC's outlook is that offshore wind will continue to grow as a proportion of global wind new installations, reaching 20% by 2025 in capacity terms.
- People working in the wind energy industry are passionate about addressing the threat of climate change and we know that wind energy has a crucial role to play in providing clean, affordable sources of energy that can decarbonise energy supply.

Where will offshore wind be built by 2050?

We have only begun to scratch the surface of offshore wind potential. With 35 GW installed today, primarily in Europe and China, offshore wind comprises less than 0.5% of global installed electricity capacity. Nonetheless, the offshore wind resource available worldwide is formidable. The World Bank has identified more than 71,000 GW of technical resource potential


Total offshore wind installations by country
35.3 GW
28.9%
28.3%
21.9%
7.4%
6.4%
4.8%
0.5%
0.4%
0.4%
0.3%
0.7%
The UK
China
Germany
Netherlands
Belgium
Denmark
Sweden
South Korea
Taiwan
Vietnam
Others


Closing the offshore wind gap by 2050
Unit: GW
2,000 GW
of offshore wind by 2050 to achieve net zero emissions by 2050 and maintain a 1.5°C pathway
270 GW
of offshore wind installations globally by 2030
x 8.5
35 GW
of offshore wind installed in 2020
x 7
2000
1750
1500
1250
1000
750
500
250
0
2020
2030
2050
Source: GWEC Market Intelligence; IRENA World Energy Transitions Outlook 2021.


Global offshore wind growth to 2030 in Asia
New installations, Asia
GW, affshore
Rest of Asia
India
Vietnam
Taiwan
S.Korea
Japan
China
X %
Share of Chinese offshore market
CAGR* +23.5%
CAGR* +10.1%
3.12
0.06
3.06
9.83
7.50
1.13
1.20
5.49
1.00
0.14
0.36
4.00
1.00
5.14
0.45
0.26
0.43
4.00
7.21
0.64
0.30
0.77
0.50
5.00
8.96
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2020
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2022e
2023e
2024e
2025e
2026e
2027e
2028e
2029e
2030e
98%
76%
73%
78%
69%
56%
59%
55%
56%
49%
48%
* CAGR = Compound Annual Growth Rate

available worldwide – nearly 10 times the world's current installed electricity capacity.

The Offshore Wind Resource Hub, launched by GWEC on World Ocean Day in 2021, consolidates territorial maps of fixed and floating offshore wind potential in nearly 100 countries. These illustrate the potential for offshore wind, as an indigenous and sustainable resource, to be distributed in every region of the world, from the Caribbean to East Asia to sub-Saharan Africa. Based on IRENA's target of 2,000 GW, which would be required to achieve carbon neutrality and sustain a Paris-compliant pathway, GWEC Market Intelligence foresees Asia emerging as the world's most prominent offshore wind region, home to nearly 40% of installations by 2050, followed by Europe (32%), North America (18%), Latin America (6%), the Pacific region (4%) and Africa and the Middle East (2%).

India Offshore Wind Market

The offshore wind market in India has been under exploration since 2010. Nodal agency National Institute of Wind Energy (NIWE) initiated a call in 2010 to aggregate technical inputs for offshore wind technology. The Facilitating Offshore Wind in India (FOWIND) 2014-2018 project, led by GWEC and funded by the EU Delegation to India, focused on pre-feasibility studies off the coasts of Gujarat and Tamil Nadu.

With growing interest, the Government of India announced the National Offshore Wind Energy Policy in 2015 and another EU-funded project, First Offshore Wind Project of India (FOWPI) 2016-2019, was initiated for capacity-building. These projects paved the way to launch a 1 GW Expression of Interest (EOI) for Gujarat in 2018, which received interest from nearly 35 key players.

However, the EOI has not progressed any further due to high CAPEX and lack of government support schemes. Taking note of this, the Ministry of New and Renewable Energy (MNRE) applied for €800 million viability gap funding (VGF) to the Ministry of Finance in 2019 to support the construction of India's first 1 GW offshore wind project in Gujarat. Also in 2019, the draft Offshore Wind Energy Lease Rules were made available for comment.

Offshore wind's role in India's long-term energy transition goals

Building on a number of factors, including its Nationally Determined Contributions (NDCs), surging energy demand increasing at 6-7% year-on-year over the next decade, 24x7 Power for All and power sector decarbonisation, the government has set one of the world's largest renewable energy targets of 450 GW by 2030. This includes targets of 5 GW of offshore wind by 2022, which was later scaled up to 30 GW by 2030.

Deployment of large-scale offshore wind is envisaged to fulfil a power supply gap over the next decade.

Using mesoscale satellite data, NIWE estimates 36 GW of offshore potential off the Gujarat coast and 35 GW off the Tamil Nadu coast. An estimation done by World Bank-ESMAP suggests offshore wind technical potential of 195 GW (112 GW fixed and 83 GW floating) within India's EEZ. Offshore wind is seen as a response to growing power demand, competition over land availability on land and a system balancing technology. However, no offshore wind project has commenced in India to date.

Demonstration projects of indicative capacity of 150-504 MW in Gujarat and Tamil Nadu

Category	Gujarat	Tamil Nadu
LiDAR (Light Detection and Ranging)	One LiDAR commissioned at Zone B in Nov 2017; Two are Proposed for Zone A & B.	No LiDAR installed; Three LiDAR proposed for Zone A1, B and C1.
Avg. Wind Speed	~7.63 m/a @ 100 m HH as per 6-month LiDAR Data Zone B.	NIWE's 100 m guyed mast installed at Rameshwaram shows 8.62 m/s average wind speed @ 100 m HH and WPD of 603 W/m^2 @ 50 m a.g.l.
Geotechnical Condition	Extensive weak day or soft soil layers (~9m) found in Zone A & B; challenging and costly for foundation design and need customization.	Better than Gujarat site – soil profiles for Zone A indicate significant spatial variations in the southern Tamil Nadu offshore region; ranging from weak/loose sands/clays to strong cemented sand to depth.
Infrastructure and Logistics	Pipavav port is larger and lively with high vessel availability and storage facility in the region but need to be optimised for offshore wind.	Ports are relatively smaller in size; need significant modification efforts for readiness for offshore wind farm installation.
Coastal Area	Rich in biodiversity and has fishing communities up to 10 km off the coast; Rapid EIA study is complete; however, detailed EIA study is required.	Strong tradition of fishing communities at the coastal area; precise geopolitical; EIA and social acceptance studies are required.
Tender or other acitivity	EoI invited for Zone B nearest to Pipavav port in Gulf of Khambhat - Rapid EIA study, Geotechnical and geophysical analysis are done. Tender for a LiDAR in Zone A1 has been conducted.	Tender for three LiDARs in Zone A1, B and C1 has been conducted; no project tender yet, but plan is to award first project of 300-500 MW capacity in Zone B; 75 acres of land in Dhanuskodi site is allocated to NWE for establishing first National Offshore Research & Testing Facility 2019-29.

Plans to Push for Project Development

The FOWIND studies facilitated the identification of 16 potential zones with a concept design for demonstration projects of indicative capacity 150-504 MW in Tamil Nadu and Gujarat. They found net capacity factors ranging from 26.9-32% in Gujarat and 30-38.1% in Tamil Nadu for 4-10 MW turbine ratings. While the final tender for 1 GW project at Pipavav, Gulf of Khambhat, Gujarat is in the pipeline, industry interest has shifted to the stronger wind resource and geotechnical conditions in Tamil Nadu.

The MNRE is pursuing an offshore wind measurement campaign for at least 10 GW of valid and accurate on-site data for feasible offshore wind siting. NIWE's plan to have five LiDARs (Light Detection and Ranging) installed by the end of 2021 would gather precise bankable data critical to developing offshore wind projects of up to 7.4 GW indicative installable capacity. NIWE has already floated tenders for design, fabrication, delivery and installation of the support structures for four offshore LiDARs. These interventions are likely to enhance the robustness of estimates for commercially viable offshore wind in India.

Since India already has comparatively cheaper onshore wind and solar energy, the MNRE is seeking feasible cost interventions from stakeholders for offshore wind. The structures for offshore wind PPAs and auction designs are being examined by government authorities, and the MNRE, NIWE and the Danish Energy Agency have entered into a partnership for financial modelling of offshore wind farms in India (FIMOI) 2019-2021. A World Bank Group roadmap study on offshore wind in India is also forthcoming.

Opportunities Ahead

The offshore wind sites identified off Gujarat and Tamil Nadu will require technology and business model customisation alongside institutional resource. In April 2021, GWEC India published a statement of recommendations for offshore wind development in India, including the need for the government to frame a visionary policy towards long-term cost reduction and energy security, implement seabed leasing legislation and provide clarity on the bidding process and timelines for tenders. In addition, expanding the offshore wind measurement campaign will yield LiDAR data to identify the potential zones for bankable offshore wind projects.

A first step may be targeting a feasible scale of demonstration project, along with a support scheme framework, which can demonstrate offshore wind capacity factors, technology optimisation and initial costs. Additionally, state-level roadmaps in Tamil Nadu and Gujarat with offshore wind targets can foster development progress.

These challenges will require regular engagement between GWEC India, decision-makers at federal, state and local levels of government, civil society institutions and local stakeholder communities, in order to align the offshore wind development strategy and strengthen collective understanding of the socioeconomic benefits associated with offshore wind. The true potential for the offshore wind market in India is recognised as enormous, but urgently requires increased government industry coordination and techno economic studies to be realised in this decade.

Courtesy: **Global Wind Energy Council (GWEC),** Brussels

Adani Enterprises Incorporates Manufacturing Firm for Wind Turbine Generators

Adani Enterprises Ltd (AEL) has said that it has incorporated a wholly-owned subsidiary company namely Mundra Windtech Limited (MWL) on June 7, 2021 for manufacturing wind turbine generators. On the objects and effects of acquisition/ incorporation for the acquisition of MWL, it said the company has been incorporated "to carry on business as manufacturers of wind turbine generators and other auxiliaries." MWL is incorporated in India and registered with the Registrar of Companies, at Ahmedabad, Gujarat, AEL said.

Source: PTI, June 09, 2021

SBI torn between BlackRock and Funding Coal

State Bank of India needs to finance coal projects to meet the Indian leader's push to electrify more homes, yet it wants to back renewable projects to appease investors like BlackRock Inc. For now it is doing a bit of both. BlackRock and Norway's Storebrand ASA, both of which hold less than 1% in the bank according to Bloomberg data, raised their objections over the past year. "Investors' concerns are very important to us, we take them into consideration," the lender's head of corporate banking and global markets, Ashwani Bhatia, said in an interview. "But we also have commitments to the country. There are so many coal mines being developed in India because we need them to produce steel, aluminium, electricity."

Source: Bloomberg, June 03, 2021

India to Host Clean Energy Ministerial in 2023

Power Secretary Mr. Alok Kumar said India will host the Clean Energy Ministerial in 2023. The 12th Clean Energy Ministerial (CEM) is being organised by Chile in virtual mode from May 31-June 6, 2021. India and the UK have launched a new workstream to promote industrial energy efficiency under Clean Energy Ministerial's (CEM) Industrial Deep Decarbonization Initiative (IDDI) coordinated by the United Nations Industrial Development Organization (UNIDO) supported by Germany and Canada, with more countries expected to join soon. The objective is to infuse green technologies and stimulate demand for low-carbon industrial material.

Source: PTI, June 04, 2021

India's 600 Shovel-Ready Clean Energy Projects can accelerate Rs 6 Lakh Crore of Equity, Debt: Report

Over 600 'shovel-ready' low carbon investment opportunities in India's renewable energy project pipeline have the potential to accelerate about Rs 2 lakh crore of equity and Rs 4 lakh crore of project finance debt, according to a recent report. These projects would support close to 15 lakh fresh jobs in the immediate future. These investment opportunities in the pipeline with the potential for post-pandemic economic recovery have been identified in the report released by consultancy firm, Ernst and Young (EY), and the Federation of Indian Chambers of Commerce and Industry (FICCI).

Source: ET Energy World, June 11, 2021

Snippets

India Plans to Emerge as a Global Leader in Green Hydrogen: Power Minister

India plans to emerge as a global leader in green hydrogen and the country is proposing to mandate using green hydrogen in fertilizer and in refining. India will invite bids for green hydrogen in the next 3-4 months to encourage viable usage of hydrogen as a fuel, according to a Power Ministry statement. India is looking at bids for 4,000 MW of electrolysers capacity. The other countries need to come up with more electrolyser plants to bring down the costs.

Source: PTI, August 28, 2021

Vestas Introduces a New Digital Platform for RE

Vestas introduces a digital platform providing a marketplace to efficiently connect buyers and sellers of parts and services from across various renewable energy technologies. With this platform, company aims to transform a fragmented renewable aftermarket into a simplified and connected digital journey.

Reliance Industries to Invest Rs. 75,000 Cr. for Green Energy Complex

Reliance Industries has started developing the Dhirubhai Ambani Green Energy Giga Complex on 5,000 acres in Jamnagar, Gujarat, the largest such integrated renewable energy manufacturing facilities in the world with an investment of Rs. 75,000 crore. Four factories would make and fully integrate all 'critical components of the new energy ecosystem' with an advanced energy storage battery factory, an electrolyser factory, and for converting hydrogen into motive and stationary power, a fuel cell factory will be built.

Source: Live Mint, 3 September 2021

Battery Storage 'Gigafactory' Planned in India

Lucas TVS is leading the development of a lithium-ion battery gigafactory near Chennai in India with commercial production expected to start in the second half of 2023. The initiative in partnership with Massachusetts based 24M Technologies will use the latter's SemiSolid™ platform technology, which enables a thicker electrode than some other processes. In turn, this provides a higher energy density at a lower overall cost. It plans to grow the capacity of the plant to 10GWh in two stages.

Source: Smart Energy International, 6 September 2021


Innovations for
a better tomorrow
Manufacturing wind turbines and
its components in India since 1996
With 14 manufacturing units and wind farms across 8 states, Suzlon creates local jobs at the grass-root level, energizes micro-economies, supports a local supply chain and reduces imports by making India more 'Aatmanirbhar' in the manufacturing of Wind Turbine Generators and its components. Suzlon is also a flag bearer of the ambitious 'Make in India' program for Wind Energy and a key partner in the nation's Renewable Energy mission. We are committed to energy security and low-carbon economy for the country by providing sustainable and affordable energy to power a greener tomorrow, today.
SUZLON
POWERING A GREENER TOMORROW
More than 18.8 GW of installations I Footprint across 18 countries I Largest product portfolio I R&D across The Netherlands, India, Germany and Denmark
Leading global renewable energy player offering end-to-end solutions. To know more visit us at: www.suzlon.com I Join us on

Use of Triboelectric Nanogenerators (TENG) to Harvest Wind Energy

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Introduction

The world has been experiencing an increasing amount of carbon emission since 1900. Due to the industrial revolution, fossil fuel combustion has reached an all-time high in recent years, and a recent study reports the carbon emission has increased by 90% since 1970[1]. The adverse effect of carbon emission alerted the climate scientists and there was an uproar to invest and control the emission. In 2014-2016, the world started to see efforts to decrease emissions by significant numbers and increased utilization of green energy. In the 2000s, the carbon dioxide emission increased by an average of 3.5%, which decreased in 2005-2015 to 1.8%, and in 2016, the world saw a small 0.2% increase. Meanwhile, the sustainable energy source saw a growth of 15.2%[2]. More than 90% of the renewable source of energy is forms of solar and wind energy and by 2050, wind energy is going to supply at least 20% of global electricity demand[3]. China emits the most amount of carbon dioxide. They have been heavily investing in wind energy to reduce their dependence on fossil fuel-based energy in recent years. In 2021, China announced building a 264 feet tall offshore wind turbine, which will be able to generate 80,000 megawatts of electricity every year and meet the demand of over 20,000 households[4]. Hence, it can be said that wind energy has a bright future. This paper will investigate the latest technological advancement in the field of wind energy and how it will affect the future of the world.

Triboelectric Nanogenerators (TENG)

One of the most important parts of wind turbines is the electro-magnetic generators that convert wind energy to electrical energy. However, the downsides of these generators are high cost, low voltage values, and inefficiency to operate in low frequency.[5, 6] Therefore, researchers have been looking for better alternatives, and many of them believe triboelectric nanogenerators (TENG) to be the ultimate solution. Researchers believe that the utilization of flexible flag-type generators will make micro harvesting of wind energy more efficient because miniaturization of the large-scale wind turbines will be a technologically challenging and not an economically viable decision[7]. A study conducted by Sun *et al.* proposes fluttering double flag type triboelectric nanogenerator (FD-TENG) as a solution. The design consists of two thin fluorinated ethylene-propylene films, which are connected to evaporated Ag (silver) electrodes on the surfaces and are positioned back to back with some gaps[8].

During this experiment, the researchers tried out different gaps between two flags and energy output in different wind speeds. They found that when wind speed reached 4.5 m/s, the circuit voltage (V_o) and circuit current (I_s) saw a significant increase and became 70 V and 6μA. This trend continues, when the wind speed reaches 10.6 m/s, the voltage exceeds 140 V and the circuit current reaches up to 12 μA. They tested out different materials for the flag, and FEP materials showcased a superior performance by producing 40μW when wind speed was 10.6 m/s compared to KAPTON, polyethylene (PE), and

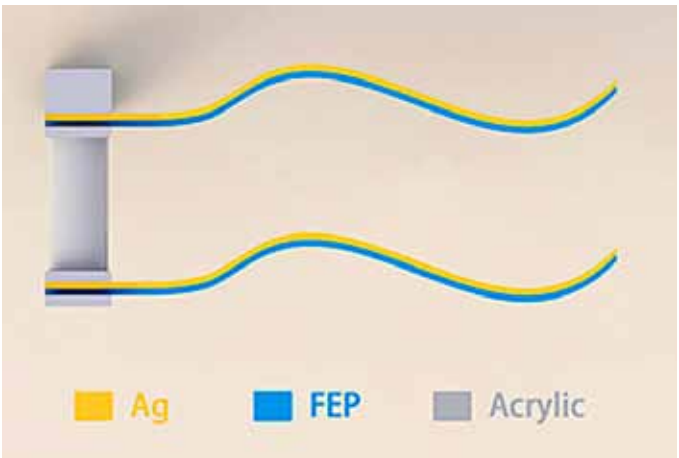

Figure 1: *Design of FD-TENG*[8]

polyethylene terephthalate (PET). The reduction of gap area between flags increases surface contact area; however, an optimal gap for short wide flags (80mm x 80mm, 110mm x 60 mm) is 20 mm, and 35 for long-narrow flags (140 nm x 50 nm). The short wide flags (110 nm x 60 nm) performed the best in lower wind speed (≤4.5 m/s) and the power density reached from 200 mW/m² to 600 mW/m². These results show a promising future for flag-based triboelectric nanogenerators[8].

The use of TENG will make wind harvesting more efficient... Leaf-based TENG takes one step forward to harvest sustainable energy in a more "green" way. Also, GW-TENG showcases ways to harvest wind energy at a low speed.

Harvesting Wind Energy at a Lower Wind Speed

Another study addresses the issue of harvesting wind energy at a lower wind speed. This study proposes the use of ultra-stretchable triboelectric nanogenerators to harvest wind energy at speeds below 3 m/s. The design of the GW-TENG is divided into three parts: 3D printed arched components, fluorinated ethylene propylene (FEP) treated by plasma etching and unidirectional thermoplastic polyurethanes (TPU) spinning nanofibers (NFs) modified by ultra-long silver nanowires (AgNWs) as positive electrode tribo-layer[9].

The proposed gentle wind-driven nanogenerators (GW-TENG) can achieve a power density of 20 mW x m³ when wind speed is only 0.7 m/s and reaches conversion efficiency reaches up to 7.8% when wind speed is 2.5 m/s[9].

Also, to ensure the efficiency of the proposed GW-TENG, the researchers developed a self-charging power package that uses a polyester film capacitor instead of previous Al electrolyte capacitors to improve the energy storage's performance.

Biodegradable Plant Leaf-Based Triboelectric Nanogenerator

Traditional friction layers of TENG are made of polymers, e.g., PET, FEP, nylon, etc. which are not biodegradable and cost-effective. Hence, researchers have been looking for environment-

Figure 2: *Schematic Representation of the Applicability of GW-TENG in Various Ambient Situations. Energy Harvesting from Different Sources*[9]

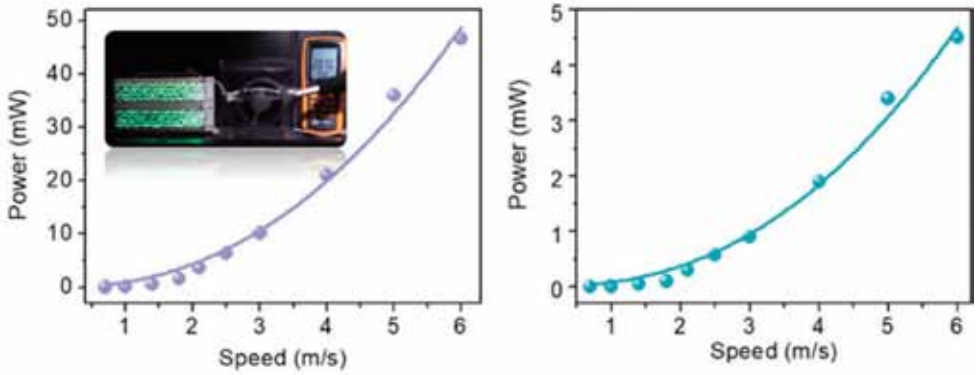

Figure 3: *The Instantaneous Output Power and Average Power of GW-TENG in the Airflow*[9]

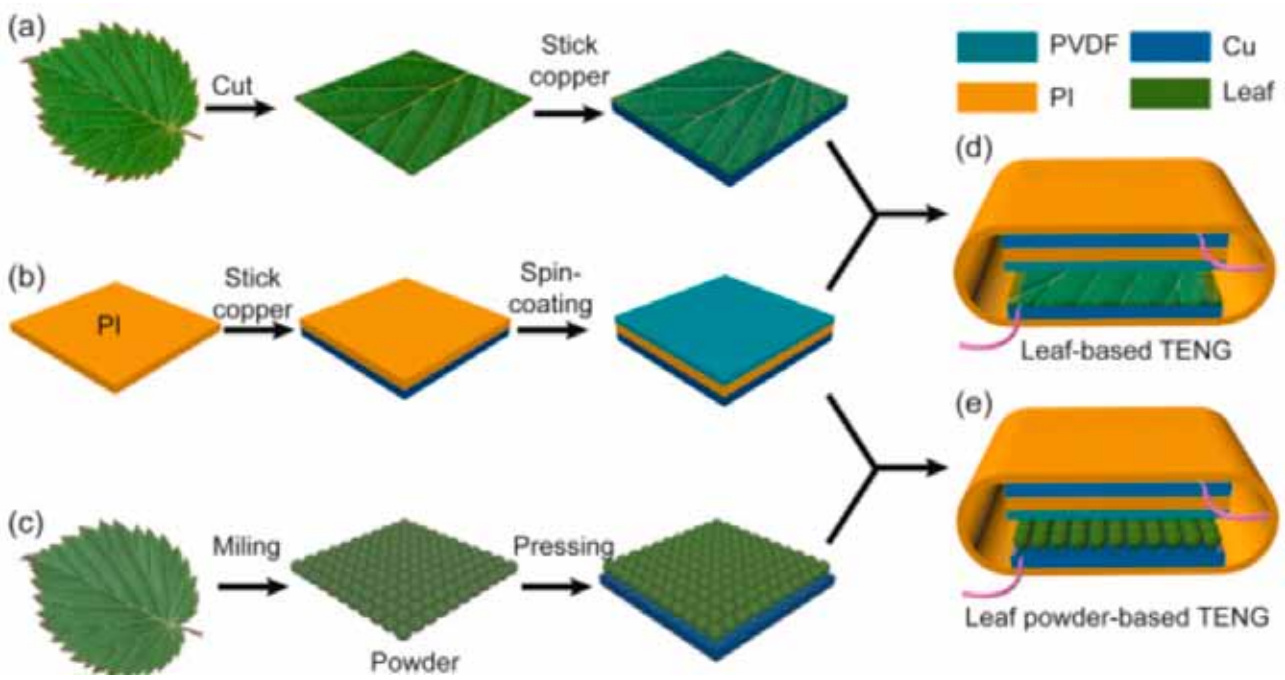

Figure 4: *Design Process of Leaf-based TENG*[10]

Table 1: The Power, Annual Energy and Economic Performance of Proposed Turbine[15]

Wind speed (m/s)	No. of hours/ Year (h)	Rayleigh wind probability	Wind power (W)	Electrical power (W)	Annual energy (kWh)	Revenue generation ($0.108/kWh)
1	131	0.015	1.17	0.81	0	0
2	184	0.021	9.37	8.41	0	0
3	272	0.031	31.61	29.39	7.98	0.86
4	531	0.06063	74.92	70.04	37.20	4.01
5	729	0.0832	146.34	136.33	99.36	10.73
6	869	0.0992	252.87	233.92	203.27	21.95
7	940	0.1073	401.55	368.19	346.08	37.37
8	946	0.108	599.40	544.22	514.87	55.60
9	917	0.1047	753.44	766.76	703.25	75.95
10	806	0.092	753.44	1040.29	838.39	90.54
11	689	0.0787	753.44	1368.98	943.79	101.92
12	562	0.0641	753.44	1756.68	986.41	106.53
13	418	0.0477	753.44	2206.98	922.19	99.59
14	335	0.0382	753.44	2723.12	911.24	98.41
15	199	0.0227	753.44	3308.08	657.82	71.04
16	168	0.0192	753.44	3964.51	666.78	72.01
≥17	65	0.00737			0	0

friendly solutions. A biodegradable plant leaf-based triboelectric nanogenerator has been designed by Feng *et al.* where they use fresh Syringa vulgaris leaf, mulberry leaf, salix leaf as TENG, and dry leaves as frictional materials[10].

The fresh leaves can maintain their original surface structure, which helps to maintain a stable performance. The fresh leaves' I_s and V_o can reach up to 15 μA, and 430 V, whereas the dry leaves' output can go up to 25 μA to 560 V. When they used PLL (phase-locked loops), a closed-loop feedback system consisting voltage controlled oscillator[11], as a modifier the I_s value reached 60 μA, and V_o value became 1000V which was a significant jump from unmodified leaf-based TENG. This design is capable of powering 868 LEDs (Feng). This nanogenerator design opens a new door to biodegradable, cost-effective alternatives.

Hybrid Darrieus Modifed-Savonius (HDMS) VAWT

Horizontal axis wind turbines (HAWT) are the most commonly used; however, the vertical axis wind turbines (VAWT) are

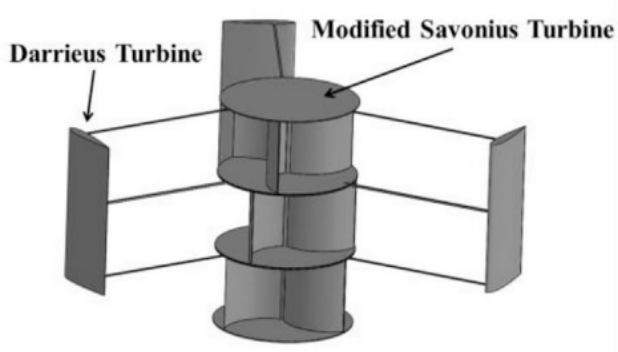

Figure 5: *3D Model of the HDMS-type VAWT*[13]

gradually gaining popularity among researchers because of their ability to operate under different wind directions without using any complex mechanism and minimal sensitivity wake effects[12]. However, one of the shortcomings of VAWT is the unsatisfactory self-starting capability. To address this issue, Liu *et al.* proposed a new hybrid Darrieus Modifed-Savonius (HDMS) VAWT, which showed a superior self-starting capability at a lower speed and enhanced harvesting performance. The original Darrieus VAWTs are lift-driven wind turbines that work best when the tip speed ratio is relatively higher. The Savonius VAWTs are drag-driven turbines that have a better self-starting capability and work best when the tip speed ratio is low. The improvement of these turbines individually is very cost ineffective and technologically challenging and results are not awe-inspiring. However, a hybrid design incorporating both types of turbines showcases exceptional results[13].

The power coefficient of HFMS-VAWT has a power coefficient of 41%, which is 13% higher than the "typical" VAWT. Acceleration torque generated by the inner motor of the VAWT improves the self-starting capability of HDMS, and also, small inertia or large initial velocity triggers the self-starting ability of the proposed system[13].

In recent years, small-scale wind turbines have been gaining popularity because of their convenience and efficiency. A study conducted by Shah *et al.* proposes a simple design of VAWT which can be installed in buildings in the urban area to supply electricity for low-demand appliances. Their intended design consists of movable, lightweight drag-based turbines which can harvest energy from non-directional wind at a relatively low speed. While testing the efficiency of the model, the output came out to be 367.2 W when wind speed was 7 m/s. The economic viability of the proposed design is very impressive, its annual energy output of 7838 kWh, and in 20 years, it will cost only $0.108/kWh-generating a net income of $13,967 in 20 years[14].

These improved designs will make the VAWT a more efficient and feasible vision. Also, the use of simplistic design will reduce maintenance costs and encourage an energy "independent" society.

Conclusion

Considering the recent advancements in the field of wind energy, it can be said that, in the near future, it's going to be a big part of the country's energy sources. Although inefficiency at low frequency, absence of cost-effective design and complex build of the technology remain to be hindrances towards achieving the goal, recent efforts made by researchers to address these issues and finding solutions promise a bright future. The use of TENG will make wind harvesting more efficient and also sophisticated designs look promising. Leaf-based TENG takes one step forward to harvest sustainable energy in a more "green" way. Also, GW-TENG showcases ways to harvest wind energy at a low speed. The continuous research to develop a feasible VAWT design makes the process more economically friendly and mechanically efficient. Therefore, it can be said that as the research continues, the solutions to the problem will come out, and there will be more technological advancement in this field.

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OPINION

Cobra Effect in Indian Power Sector: Unregulated Growth of Regulatory Assets

In an attempt to address the increasing population of venomous Cobra snakes in Delhi, the then colonial government formulated a scheme that offered a bounty to be paid for every dead cobra brought to the officials. The success of this scheme was short lived as enterprising people ingeniously started breeding and killing cobras to be presented before the administration in lieu of bounties. The scheme had to be scrapped, but it entered the lexicon of economic governance as the Cobra effect, a term coined by the economist Horst Siebert. Such counter-intuitive outcomes are more often than not a result of linear thinking for addressing complex problems.

The Cobra effect phenomenon has resulted in the Indian power sector compounding the problem of poor financial health of the sector.

Power regulators have invented an accounting device, Regulatory Assets, a concept that goes against all accounting norms. In essence regulators accept that the power tariff does not adequately covers the costs of procurement, but the lacking courage to pass on the costs to the consumers and the inability to enforce higher efficiency norms in the industry results in the difference between the costs and sales revenue being classified as regulatory assets. In other words, they recognize the expenditure but do not take such into account while fixing tariffs. The magnitude of this problem has gone beyond control, estimated to be Rs 76,963 crores as per a report by India Ratings.

...the lacking courage to pass on the costs to the consumers and the inability to enforce higher efficiency norms in the industry results in the difference between the costs and sales revenue being classified as regulatory assets.

Unable to actually deal with the problem head on, regulators often allow a surcharge to be charged from the consumers so that the uncharged amount can be recovered incrementally. However, the surcharge is often less than even the carrying costs of this revenue gap, leading to a cascading effect.

The concept is not just a perversion of accounting norms but is also flawed financially and ethically. It is not an asset since it represents electricity consumed that cannot be monetised. Two, by not allowing capital costs to be recovered; it constrains the health of the sector, and would ultimately impact on the quality of service. In any case, it is hard to segregate such investments from the larger distribution and subject them to seizure by lending entities. These factors inhibit banks from extending credit to distribution companies against these fictional 'assets.' There is a strong ethical argument in that it is passing on current consumption charges to tomorrow's customers, including to the unborn, looking at the level and rate at which regulatory assets are growing.

The regulators and policy makers seem to ignore that complexity of the problem. A linear thinking approach for addressing this problem would suggest either cutting expenditures of the distribution utility or increasing their revenues. However, the problem has complicated linkages, causes and consequences. For instance, in additional to sub-optimal tariffs, the revenue collections are inadequate for multiple and varied reasons across the country. Technical and commercial losses could be disproportionately higher leading to less revenue recovery with respect to cost of supply. In some cases, the expenditures might be disproportionately high owing to inefficient power purchase agreements, higher financial costs, poor infrastructure, low levels of technology adoption, poor capacity of state agencies to recover power bills from consumers, wilfully defaulting consumers, higher levels of pilferage and theft, amongst a host of other factors.

In addition to these factors, there are intertwined social, political, environmental and behavioral externalities acting as catalysts in this process. Cross-subsidising the power tariffs by collecting higher revenues from well-off consumers (industrial, commercial and domestic) to provide subsidised tariff to low-income households and agricultural consumers has its social as well as political significance. It is no wonder that subsidised tariffs have found a concrete place over the years in election manifestos of political parties across the spectrum. Similarly, the race to adopt renewable energy sources because of their environmental benefits is another externality affecting the fiscal prudence of the power sector.

The result of these failures has adversely affected the health of the power sector, which has larger social and economic implications for the countries. While the total installed capacity has risen to 382 GW, while peak load is just 182 GW. The net result is that on the one hand, many generation plants are either non-operational or operate at low levels of capacity, thus affecting the health of the industry and of the lending banks. On the other hand, our per capita consumption is just 1181 kWh, against the world average of 3260 kWh, depriving much of our population of minimum energy needs.

To top it off, there are deeply rooted motives in the regulatory processes and decisions. With a questioned independence, Independent Regulatory Agencies are likely to serve interests of political masters rather than the public. Their appointments are seen as rewards for past actions that favoured the government of the day; domain expertise and capability are clearly at a

discount. What we desperately need is to create conditions where regulators work in the public interest instead of being a safety-valve for the government of the day for blame shifting and politics of optics.

Each of the factors mentioned above operate in a system. There are intrinsic structural and systemic factors leading to such operational and behavioural outcomes. These require holistic diagnosis which is decentralised and sensitive to regional realities.

Unfortunately, regulatory assets are seen as a solution instead of adopting an approach that takes into account the complexities of the problem it aims to solve. In absence of a concrete, realistic and carefully-drawn liquidation strategy, which addresses the complicated factors causing the financial stress in the power sector in the first place, these assets would remain liabilities, and grow exponentially.

The recently announced draft National Electricity Policy calls for cost-reflective tariffs without taking the route of regulatory assets. The question is why were no questions raised when commissions were approving such assets? What was the economic logic of allowing them in the first place? Were the policymakers unaware of this unsustainable nature of regulatory assets? What is the roadmap for implementing this now?

It is high time the public called out this game that has greatly harmed society and continues to grow.

Authored by Mr. Shakti Sinha, Director, Atal Bihari Vajpayee Institute of Policy Research and International Studies, MS University, Vadodara; and Sarthak Shukla, Assistant Policy Analyst, CUTS International, Jaipur

Courtesy: ET Energy World, May 31, 2021

Snippets

NTPC Plans Rs 2.5 Lakh Crore Investment on Renewable Energy

NTPC will be investing close to Rs 2.5 lakh crore over the next decade on expanding renewable capacity also aimed at boosting equity support, a big chunk of which would also come from the market through public offer. NTPC recently doubled its renewable power capacity addition target from 30,000 to 60,000 MW by 2032. It aims to have a thermal-renewable mix of 50:50 over next decade. Current try the company has about 1500 MW of renewable capacity with another about 3,500 MW under construction. NTPC will also cut net energy intensity by 10 per cent. In this regard plan is to add 7,000-8,000 MW of renewable capacity every year.

Source: IANS, July 03, 2021

Norway to Spend $1.2 Bln on Renewable Projects in Developing Nations

Norway will allocate 10 billion crowns ($1.16 billion) over five years towards renewable energy investments in developing countries to cut greenhouse gas emissions. The climate fund, administered by the Norwegian Investment Fund for developing countries, Norfund, will from next year support projects to reduce dependence on fossil-fuels, especially coal. Eventually, it could mobilise around 100 billion crowns in investments via partnerships with private capital and is an essential part of Norway's contribution to achieving the United Nations' climate change agreement and sustainable development goals, the government said. The support will be in addition to the 6.3 billion crowns Norway spends per year in climate financing as part of its development aid budget, a foreign ministry spokesperson said.

Source: Reuters, July 08, 2021

Spain Aims to Install 1-3 GW of Floating Wind Turbines by 2030

Spain plans to install floating wind turbines on the deep waters off its coasts with capacity to generate between 1 and 3GW of power by 2030. Spain has one of the world's largest onshore wind fleets, but its coastal waters are too deep to allow the installation of turbines that have allowed greater wind speeds and extra space to be exploited offshore in Britain and some other countries.

Source: Reuters, July 08, 2021

India to add 68 GW Renewable Capacity in five years: Bridge to India

India is expected to add 68GW of renewable capacity in five years, up marginally from previous year's estimate of 60 GW, with solar occupying 65% of the share, according to a recent survey. Gujarat, Maharashtra, and Karnataka emerged as the top three states for overall growth prospects of renewable power projects in the survey. The India Renewable Power CEO survey was conducted by renewable energy consultancy Bridge to India in which 44 Indian and international companies participated.

Source: ET Energy World, July 21, 2021

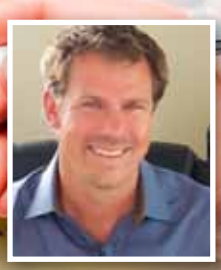
Overseas Green Capital Chasing Renewable Energy Firms Across India

According to experts, India offers the right kind of risk-return profile which is why his company likes to invest here. Last week, Thailand-listed Global Power Synergy Public Company announced the acquisition of a 41.6% stake in Avaada Energy through its subsidiary Global Renewable Synergy Company with approximately Rs 3,374 crore deal. Avaada has 1.4 Gw of operational solar generation capacity and about 2.4 Gw of under construction projects.

Source: Business Standard, July 22, 2021

Power Performance Tests for Wind Turbines

Practical Considerations, Key Steps and Other Essential Insights



Matt Cramer
Business Development Manager
and PPT Technical Services Lead,
ArcVera Renewables

Power performance testing (PPT) is executed in order to determine the economic value of a wind project and to ensure that projects are performing as they are supposed to, in turn allowing investors to identify project underperformance and manage investment risk. Power performance testing is also conducted for regulatory compliance and warranty verification and is recommended for projects in simple terrain and other types of site conditions.

Although PPT methodologies do not vary significantly among providers due to the guidance of industry-utilized IEC standards, not all providers are equal in quality of service; differences are most apparent in a provider's troubleshooting methodologies, test execution recommendations, and instrument deployment approach. Because informed judgment in making those pivotal decisions is what sets providers apart, and because power performance testing is such a complex task, depth of experience is the most crucial consideration for owners to look for when choosing a provider. The best PPT professionals will have used the totality of their experience to thoughtfully establish best practices for accurately scoping, managing and delivering projects.

In addition to being vital for informed decision-making, experience also plays a key role in data collection and analysis, which is integral to a successful power performance test. Fluency in data analysis entails attaining high-quality data, understanding the data enough to enhance the understanding of the test, and being thoroughly familiar with a test's uncertainty requirements. This level of data analysis comprehension will dictate best practices in hardware deployment and, ultimately, the viability of the test's final results.

During the data-collection period, an experienced PPT provider's objective will be to attain data with two main characteristics: high availability and low scatter. Data with these qualities allow for much higher confidence levels in test results. Data availability can be dependent on capricious factors, like the weather, but it can also be partially controlled through the constant monitoring of sensors. Constant monitoring will help the PPT provider collect data with higher availability, catch problems early, promptly troubleshoot those problems, and repair or replace sensors as needed. Scatter, the second data characteristic that must be watched for by a PPT provider, is driven primarily by real-world conditions and wind turbine performance. It can be reduced through a few different measures, such as methodically placing the met tower closer to the turbine or restricting the wind-direction sector.

Even the most experienced and knowledgeable PPT providers can sometimes encounter inconsistent results, despite best efforts to reduce scatter and keep availability high. If inconsistent results do occur, the right PPT provider can effectively perform scenario testing to troubleshoot results, understand root causes, and increase confidence in the final results. In order to complete this type of complex analysis, a large, geographically diverse wind turbine operational database is necessary. Our extensive PPT database for wind farms across the United States is one of the tools that aid in our ability to proficiently perform such detailed analyses.

Equipment Selection

There are two main ways of assessing a site's wind resource: met towers and lidar. Met towers with anemometer wind-speed measurements are the most widely accepted methodology due to low uncertainty levels and a long, reliable history of use. One of the deficiencies of met towers, however, is that it is both difficult and costly to reuse or replace them, as the sensors need to be recalibrated after each use. Lidar, on the other hand, is not nearly

ZX TM Lidar installed at Galloper Wind Farm for RWE Power Performance Test of SGRE 6MW

as unwieldy; it is small, mobile and reusable. Unfortunately, lidar is not yet widely accepted as a permanent monitoring system, but with all of its benefits (including lower scatter, faster test time and reduced cost) it is quite likely that lidar will become more universally accepted down the road.

The size of a turbine may have an impact on PPT requirements. For example, because larger rotors lead to more scatter in the data, some changes have been made to Edition 2 of the IEC 61400-12 standard that allows the use of lidar to measure shear and veer. This new addition is a huge development for the future trajectory of lidar usage in the industry, especially with the growing frequency of larger rotors. And, as higher hub heights lead to more expensive PPTs, owners will likely end up testing fewer machines per megawatt of energy production, since IEC and warranty requirements do not change with increased size.

Compared to hub height met towers, the combination of a short met tower and lidar is less expensive and less logistically challenging during installation. The downside to this alternative is that it comes with higher uncertainty than when using hub height met towers. For this reason, and because hub height met towers are still feasible up to at least 120 meters, hub height met towers are likely to remain the gold standard for some time.

Additionally, nacelle anemometry can be accurate if used together with one or more met towers to create a nacelle transfer function, but it is more likely that nacelle lidar will instead be used instead for many applications. This is particularly probable in the case of offshore wind farms.

PPT services, while standardized, are complex and nuanced. Experienced providers recognize the planning value as well as the most expensive, time-delaying pitfalls. Procurement of PPT services should include careful attention to the firm's experience doing PPT tests in a variety of locations. It is also critically important to find out who will actually be engaged in the assignment, since some firms tend to field their PPT services work scope using inexperienced, lower-cost staffing, presumably to maximize their margins. Acquiring an experienced PPT provider means having effective field personnel who know how to think through issues, attain reliable data, and maintain the plan-defined PPT schedule, lowering the risk of weather-related and other cost runups.

SnipPets

Climate Group Appoints Mr. Sumant Sinha as Trustee on UK Board for 3 Years

London-based Climate Group the appointment of Mr. Sumant Sinha, Chairman and Managing Director of ReNew Power, as a trustee on its UK board for three years. On his appointment, Mr. Sinha said, "I am delighted to be part of the board of trustees of the Climate Group. I have been associated with Climate Group for the past three years and I believe their work is crucial in strengthening the collaborative efforts in meeting the Paris Agreement goals and mitigating the impact of climate change on global communities."

Source: PTI, August 18, 2021

Ministry Sets up Regulatory Compliance Wing to Monitor Discoms

The Union Power Ministry has set up a regulatory compliance division to monitor the various regulatory parameters and their compliances by power distribution companies as well as state commissions. The monitoring wing will also look at the pendency of cases and delays in judgments in each body. Power and renewable energy minister Sri R K Singh has held an interaction with electricity regulators. The forum of regulators resolved to prepare norms on various regulatory parameters and issues. These norms would be adopted by the state commissions for best practices and faster implementation of reform and regulatory policies, the statement said.

The Ministry of Power is working on resource adequacy guidelines and guidelines for procurement of power in line with load fluctuation requirement, contract-term, energy mix, and renewable obligations, etc. Both guidelines are expected in the next two to three months.

The technical as well as the commercial issues related to electrical vehicles charging would be resolved by state commissions. An emphasis was made on determination of cost reflective tariff, setting up of adequate number of the consumer grievance redressal forums with consumer representatives.

Regulatory issues like financial viability of the distribution companies, payment of dues, reduction in AT&C losses, roll out of smart metering in prepayment mode, timely issuance of tariff orders, timely disposal of the petitions, promotional tariff for the EV charging stations were discussed. The forum of Regulators had recently undertaken a study to analyse the impact of various factors on the retail tariff of electricity and to develop measures to address them. The statement said the ministry of power has acted on most of the recommendations and directed that state commissions should act upon them too so that the retail tariff for the consumers can be reduced.

Source: ET Bureau, August 26, 2021

India's Smart Meter Rollout Timeline Released

India's Ministry of Power has issued the timelines for the nationwide replacement of existing meters with smart meters by 2025. In the rollout, all electricity consumers – other than agricultural consumers – in areas with a communication network will be supplied with smart meters operating in prepayment mode. Union territories and electrical divisions having more than 50% consumers in urban areas with aggregate technical and commercial (AT&C) losses of more than 15% in the financial year 2019-20 must be metered with smart meters by December 2023.

Source: Smart Energy International, August 25, 2021

SG 3.4-145, our next -generation turbine

Delivering India's positive energy with SG 3.4-145, our next -generation turbine. India's journey to become a sustainable nation is powered by a billion aspirations. We're proud to play a part in empowering India with clean and renewable energy, at affordable costs. Standing tall on a new 3MW platform, the SG 3.4-145 is a key milestone in India's clean energy story. This turbine delivers a remarkable 48% more

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annual generation than its predecessor, in Indian low-wind conditions. Backed by smart monitoring system and optimized for all-weather conditions, the SG 3.4-145 is the right fit for the Indian market, delivering high profitability and reduced LCoE. The perfect turbine made for India, made in India. The SG 3.4-145 is indeed geared up to deliver India's positive energy.

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RENEWABLE ENERGY

Elevated Foundation for Complex Ground Conditions

Miguel Turullols Sanz
Marketing and Communication Manager, Nabrawind, Spain

1. Introduction

Our technology installed last year a new concept of wind turbine called Nabrabase. In fact, this new technology is not a wind tower, but an elevated foundation, according to the certificating process that the Spanish company is actually carrying with DNV GL, that helps to reduce the footing dimensions. For instance, concrete volume may be reduced up to 60%. This also allows an 80% reduction in the CO_2 emissions of the foundation execution phase.

The tripod transmits to the ground mostly only vertical forces. Therefore, the resulting foundation is remarkably light and efficient… allows the implementation of optimized alternatives footing such as a pile or anchor rock foundation.

Figure 1: *Nabrabase First Project in the Wind Farm Developed by Innovent in Morocco*

This elevated foundation is quite innovative. The key of the concept relies on the tripod, patented by us. The tripod transmits to the ground mostly only vertical forces (not bending moments, as in standard towers). Therefore, the resulting foundation is remarkably light and efficient and, furthermore, the three legs structure allows the implementation of optimized alternatives footing such as a pile or anchor rock foundation.

It has been certified as an elevated foundation, which means it is a standard foundation solution compatible with all kinds of wind turbines.

This new product offers several advantages for wind turbines ranging between HH80m and HH130m. These advantages, including a drastic environmental impact reduction, will be shown in the following article as well with a brief technical description, a visual explanation of its installation process and its applicability for the Indian Market.

2. Description

The wind turbine resulting from the application of this elevated foundation is a hybrid structure with the following elements:

- Foundation
- Nabrabase Tripod
- Tubular tower
- Nacelle

Whereas the tubular tower and nacelle don't involve any innovation, the foundation is the key element of this proposal.

Firstly, it is important to note the wide portfolio of foundations available for this product:

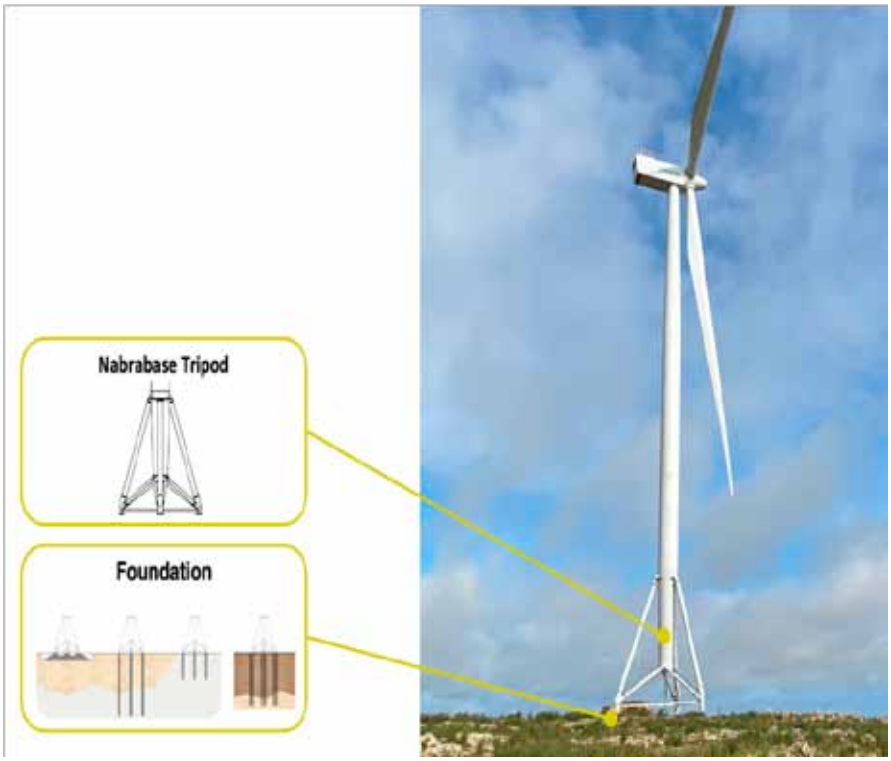

Figure 2.1: *Structure of the Elevated Foundation*

- Gravitational foundation
- Pile foundation
- Anchor Rock foundation
- Multi Pile foundation

They all share a significant reduction in the footing dimensions and costs when compared with standard tubular towers. Therefore, the choice between them depends on the specific conditions of the terrain.

The Pile Foundation is the most cost-effective solution for most of the soil conditions. It is suitable for those sites where soft rock is available no deeper than 10m.

Pile foundations are formed by three independent concrete piles of 1.5m of diameter with a length, in the range of 20-30m, that depends on the soil characteristics of the windfarm.

The estimated average time for manufacturing the full pile foundation is 4 days (1 day per pile for drilling and positioning of the pile reinforcement - that integrates the anchor cage on top to connect the tower- and 1 day for concrete pouring).

The Anchor Rock foundation is the best solution for those sites where hard rock is available no deeper than 3m. Pile foundations are formed by three independent concrete footings of 3-4 m of diameter and 1-1 heigh that is connected to the rock through 8-12 post-tensioned rock anchors, grouted in pre-drilled holes.

The gravitational foundation is the best solution for those sites where rock is not available close to the surface (deeper than 10m). The gravitational foundation design consists of three independent small footings, manufactured according to the standard process of conventional wind turbine foundations.

Finally, the Multi-pile foundation is the best solution for sites with very poor bearing capacity. Multi-pile foundations are formed by three independent footings supported by several piles of 0.8m of diameter with a length that depends on the soil characteristics of the windfarm. Emplacements such as

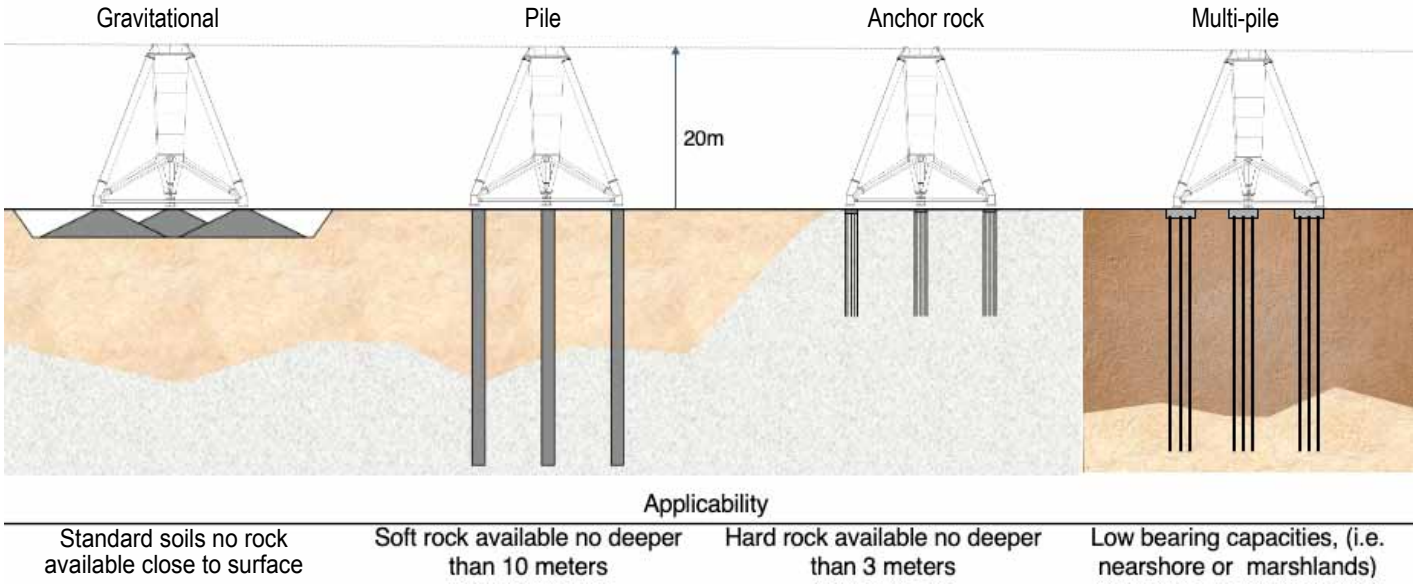

Figure 2.2: *Foundation Alternatives*

Figure 2.3: *Pile Foundation*

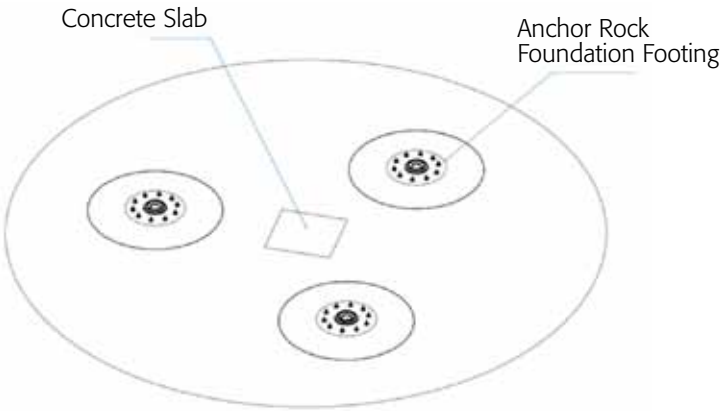

Figure 2.4: *Anchor Rock Foundation*

Figure 2.5: *Gravitational Foundation*

Figure 2.6: *Tripod picture of the project in Morocco*

marshlands or even nearshore projects may benefit from this foundation.

As for the Tripod, it is manufactured in several elements that are transported separately and assembled on site by means of preloaded tension connections. Tripod elements are manufactured in steel and cast iron.

The connection between the Tripod elements is done by means of maintenance-free in the outer part of the piece, and by means of conventional bolts in the internal part of the piece.

The installation is fast and simple, so it is completed in just four days.

3. Installation

The first such foundation is already installed in a wind farm developed by Innovent in Oualidia (Morocco). The following images come from this installation and will help to explain the installation process, which normally just takes two weeks:

- Four days for the foundation.
- Another four days for the installation of the tripod.
- One week for the tubular tower, nacelle and rotor.

Accordingly to the soil conditions identified in the Oualidia's wind farm, a pile foundation was the most suitable option.

As it can be seen in the picture, the process starts by digging three piles with a piloting machine. After that, the steel cage is introduced and, lastly, the concrete is poured to the footing.

Once the foundation is concluded, the installation of the tripod begins.

Figure 3.1: *Pile Foundation Execution*

Figure 3.2: *Assembly Platform, Corner Connector and Radials Installation*

Figure 3.3: *Tubular Segment and Elephants Installation*

Figure 3.4: *Horizontals and Tubular Tower*

Figure 3.5: *Nacelle and Rotor*

The picture shows the first steps of the tripod's installation. The corner connector, the radials and the lower part of the tripod (called lower ring) are installed.

Following this step, the tubular segment is added to the lower ring. Then, it is fixed with elements called elephants (the form of this assembly slightly reminds to the elephant's trunk).

Finally, the horizontals are installed between each corner connector as well as a ladder to access the tower. Once the tripod is completed, the installation of the tubular tower begins.

The last step goes for the installation of the nacelle and rotor, just as in any other standard tubular tower.

4. Main Advantages

This tower offers several advantages. Most of them come from its reduced environmental impact. However, there are other important benefits such as:

Footprint reduction: The remarkable light and efficient foundation allow a significant CO_2 emissions reduction during the installation of the wind turbine. In fact, both the pile and anchor rock foundation reduce the concrete requirement up to a 60% compared with standard foundations. Therefore, the CO_2 emissions are reduced an 80%.

Foundation simplification: Not only the concrete requirement is reduced, but also the manufacturing process on site is simplified. Likewise, all foundations share a minimal excavation surface.

Fast installation: The whole installation takes just two weeks divided as follows. Four days for the foundation, another four days for the tripod installation, and one week for the tubular tower, nacelle and rotor.

Applicability: This solution is competitive for hub heights between HH80 and HH120. However, this is not the only advantage regarding its applicability. Its wide foundation portfolio makes it compatible with all kind of ground conditions. Furthermore, it may even be the key to unlock some projects where the soil conditions limit the profitability of the wind farm.

Stiffness: Regarding structure dynamics, the tripod bending stiffness is equivalent to 2-3x the bending stiffness of its equivalent tubular tower segment for a given HH.

5. Applicability for the Indian Market

India is a huge market with plenty of wind resources still awaiting to be developed. However, it is also true that a significant amount of MW has already been installed all over the country, limiting, thus, the availability of emplacements. This fact is leading some companies to

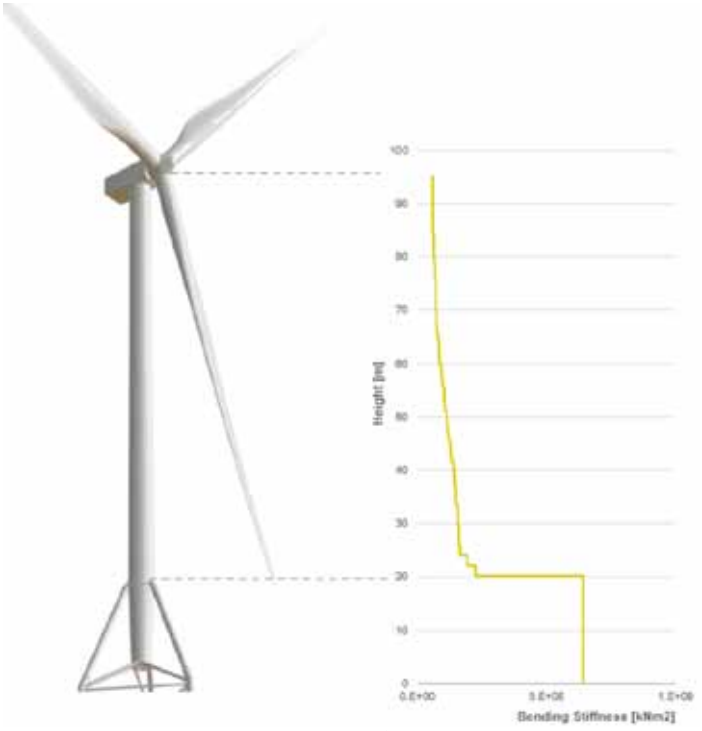

Figure 4: *Bending Stiffness*

the development of wind farms in some places where the ground conditions are not optimal, at the very least.

This is how a very complex project showed up where this elevated foundation can make the difference. The soil of this project required a deep foundation due to large thickness of soft soil close to the surface (there was sandy silt layer of low plasticity at depths at 15-20 meters).

The standard gravitation foundation it was first evaluated required 2.000 m^3 of concrete and 250 tons of steel per wind turbine. This is obviously, an enormous impediment for the development of the projects.

However, the multi-pile foundation designed for this project only requires 640 m^3 of concrete and 77 tons of steel. It is just a third of the standard foundation requirements.

The applicability of this new concept is, thus, wide and will make the difference in several projects where complex ground condition limits the viability of the wind farm.

Snippets

Cabinet Approves Rs. 3.03 Lakh-Crore Scheme for Power Distribution Sector

The Cabinet Committee on Economic Affairs has approved a reforms-based and results-linked revamped power distribution sector new scheme worth Rs 3.03 lakh crore, including Rs 97,000 crore central outlay with an aim to improve the operational efficiencies and financial sustainability of discoms. The scheme will provide conditional financial assistance to strengthen the supply infrastructure of discoms based on meeting pre-qualifying criteria and upon achievement of basic minimum benchmarks. The implementation of the scheme would be based on the action plan worked out for each state rather than a 'one-size-fits-all' approach. The scheme will be available till 2025-26. Rural Electrification Corporation and Power Finance Corporation have been nominated as nodal agencies for facilitating implementation of the scheme.

Source: ET Energy World, June 30, 2021

Discoms Permitted to Relinquish Entire Allocated Power from 25-Yr-Old Projects

In a letter to the state governments and the heads of central generating stations (CGS), the Ministry of Power has said that as per the guidelines of power purchase agreements (PPAs), discoms are eligible to terminate the entire allocated power from a power project that has completed 25 years of operations since its commissioning. They may also continue to draw power from such old power stations, exercising the first right of refusal available to them under the terms of long-term PPAs. Power generating stations losing old PPAs would be free to sell such relinquished power in the open market through exchanges, tie-ups with other buyers desiring to go for long term or medium term PPAs or get the power reallocated to the willing buyers.

Source: IANS, July 06, 2021

EU Commits to Inclusive Transition with €17 Billion Fund

The Just Transition Fund (JTF), a regulation that will next be published in the Official Journal of the European Union, is designed to facilitate a just transition by financing projects aligned with Europe's net zero goals, driving investment in territories that need to phase out the production and use of coal, lignite, peat and oil shale or transform heavily polluting industries. The total amount of €17.5 billion ($21.3 billion) is made up of €7.5 billion ($9 billion) available for budgetary commitment for the period 2021-2027 and €10 billion ($12.2 billion) from the recovery instrument (Next Generation EU) available over the years 2021-2023.

Source: Smart Energy International, June 9, 2021

Mr. R K Singh Asks PFC, REC to Explore Cheaper Fund Options

Power Minister Mr. R K Singh has asked state-owned Power Finance Corporation (PFC) and REC to explore cheaper options for raising funds, including offshore sources. Besides, he also asked both the non-banking financial companies to focus on ensuring that the power sector value chain gets access to cheaper funds, particularly renewable energy. The minister also stressed the need for a speedy resolution of stressed assets.

Source: PTI, October 06, 2021

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Wind Power Bids Completed and Commissioned

Solar Energy Corporation of India (SECI) BIDS (WIND)

S. No.	Bids Completed	Capacity	Upper Cap	SCOD	Bidder	Tariff	State	Bid Capacity	Project Commissioned			
									Capacity Breakup	2018-19	2019-20	Total
		MW	Rs./kWh			Rs./kWh		MW	MW	MW	MW	MW
1	SECI - I (24th February 2017)	1050	No Cap	5-Mar-19	MYTRAH	3.46	TAMIL NADU	250	250	624.8	425.2	1050
					INOX	3.46	GUJARAT	250	250			
					OSTRO	3.46	GUJARAT	250	250			
					GREEN INFRA/Sembcorp	3.46	TAMIL NADU	250	250			
					ADANI	3.46	GUJARAT	50	50			
2	SECI-II (4th October 2017)	1000	4	3-May-19	RENEW	2.64	GUJARAT	250	212.1	0	712.1	712.1
					ORANGE	2.64	TAMIL NADU	200	200			
					INOX	2.65	GUJARAT	250				
					GREEN INFRA/sembcorp	2.65	TAMIL NADU	250	250			
					ADANI	2.65	GUJARAT	50	50			
3	SECI - III (13th February 2018)	2000	2.93	24-Nov-19	RENEW	2.44	GUJARAT	400	242.5	0	842.9	842.9
					GREEN INFRA/Sembcorp	2.44	GUJARAT	300	300			
					INOX	2.44	GUJARAT	200				
					TORRENT	2.44	GUJARAT	499.8				
					ADANI	2.45	GUJARAT	250				
					ALFANAR	2.45	GUJARAT	300	250.2			
					BETAM/ENGIE	2.45	TAMIL NADU	50.2	50.2			
4	SECI - IV (5th April 2018)	2000	2.93	28-Feb-20	SRIJAN ENERGY/CONTINNUM	2.51	GUJARAT	250		0	94	94
					SPRNG ENERGY/ACTIS	2.51	TAMIL NADU	300				
					BLP/ENEL/AVIKARAN	2.51	GUJARAT	285				
					BETAM/ENGIE/VIVID	2.51	TAMIL NADU	200	94			
					INOX	2.51	GUJARAT	100				
					ADANI	2.51	GUJARAT	300				
					MYTRAH	2.52	KERALA	300				
					RENEW	2.52	GUJARAT	265				
5	SECI - V (25th September 2018)	1190	No Cap	22-Sep-20	TORRENT POWER	2.76	GUJARAT	115		0	0	0
					ADANI	2.76	GUJARAT	300				
					ALFANAR	2.77	GUJARAT	300				
					SITAC	2.77	GUJARAT	300				
					ECOREN	2.77	KARNATAKA	175				
6	SECI-VI (15th February 2019)	1200	2.85	Feb-21	ADANI	2.82	GUJARAT	250		0	0	0
					RENEW	2.82	MP	300				
					CONTINUUM/MORJAR	2.82	GUJARAT	150				
					POWERICA	2.82	GUJARAT	50.6				
					ECOREN/ZENATRIS	2.83	KARNATAKA	125				
					SOFTBANK	2.83	MAHARASHTRA	324.4				
7	SECI-VII (14th May 2019)	480	2.83	May-21	ENGIE	2.79	GUJARAT	200		0	0	0
					RENEW	2.81	GUJARAT	50				
					SPRNG	2.82	MP	100				
					ADANI	2.83	GUJARAT	130				
8	SECI-VIII (30th August 2019)	440.64	2.85	Aug-21	CLP	2.83	GUJARAT	250.8		0	0	0
					Avikiran Energy/Enel	2.84	GUJARAT	189.84				
9	SECI-IX (14th August 2020)	970		Feb-22	VENA ENERGY	2.99	KARNATAKA	160				
					JSW	3	TAMIL NADU	810				

10	SECI-X (15th March 2021)	1200		Sep-22	Adani Renewable Energy	2.77		300				
					Ayana	2.78		300				
					Evergreen Power Mauritius	2.78		150				
					JSW	2.78		450				
11	SECI - XI (3rd September 2021)	1200		Mar-23	Renew	2.69		300				
					Sembcorp	2.69		180				
					Evergreen Power	2.69		150				
					Adani	2.7		450				
					Azure	2.7		120				
TOTAL		12730.64								624.8	2074.2	2699

NTPC & STATES BIDS (WIND)

S.No						TARIFF	STATE		Project Commissioned			
									Capacity Breakup	2018-19	2019-20	Total
		MW	Rs./kWh			Rs./kWh		MW	MW	MW	MW	MW
9	NTPC (21st August 2018)	1200	N.A	May-20	SPRNG VAYU	2.77	MP	200		0	0	0
					MYTRAH	2.79	TAMIL NADU	300				
					SRIJAN ENERGY/CONTINNUM	2.8	GUJARAT	50				
					RENEW	2.81	KAR/GUJARAT	300				
					HERO	2.82	KAR/GUJARAT	300				
					SITAC/EDF	2.83	N.A	50				
10	TAMIL NADU (28th August 2017)	450	3.46	May-19	REGEN POWERTECH	3.42	TAMIL NADU	200	50	50	0	50
					LEAP ENERGGY	3.43		250	0			
					NLC	3.45		0	0			
11	GUJARAT (GUVNL) (21st December 2017)	500	N.A	Oct-19	SPRNG ENERGY	2.43	GUJARAT	197.5	197.5	104.9	395.1	500
					K.P. ENERGY	2.43		30	30			
					VERDANT/SITAC	2.44		100	100			
					BETAM WIND/ENGIE	2.44		29.9	29.9			
					POWERICA	2.44		50	50			
					RENEW	2.45		35.7	35.7			
					Oil India	2.43		18.9	18.9			
					SJVNL	2.43		38	38			
12	MSEDCL (6th March 2018)	500	3	Jan-20	ADANI	2.85	GUJARAT	75		0	202	202
					KCT/RENEW	2.85	MAHARASHTRA	75	75			
					INOX	2.86	GUJARAT	50				
					MYTRAH	2.86	MAHARASHTRA	100				
					HERO	2.86	MAHARASHTRA	75.6				
					TORRENT	2.87	MAHARASHTRA	124.4	124.4			
13	MSEDCL (1st June 2018)	87	2.52	Mar-19	SARLA PERFORMANCE FIBERS LTD	2.51	MAHARASHTRA	6		0	0	0
					INOX	2.52		6				
					ESSEL MINING & INDUSTRIES LTD	2.52		75				
14	GUVNL TRANCHE -II (13th May 2019)	745	N.A	May-21	AANISHA POWER	2.8	GUJARAT	40		0	0	0
					POWERICA	2.81		50.6				
					VENA ENERGY	2.81		100				
					SARJAN REALITIES	2.87		100.8				
					VIRIDI	2.95		100				
					INOX	2.95		40				
					RENEW	2.95		200				
					ADANI	2.95		113.6				
TOTAL		**3482**								**154.9**	**597.1**	**752**
GRAND TOTAL		**16212.64**								**779.7**	**2671.3**	**3451**

Note: The figures may vary as it is collected verbally from several sources.

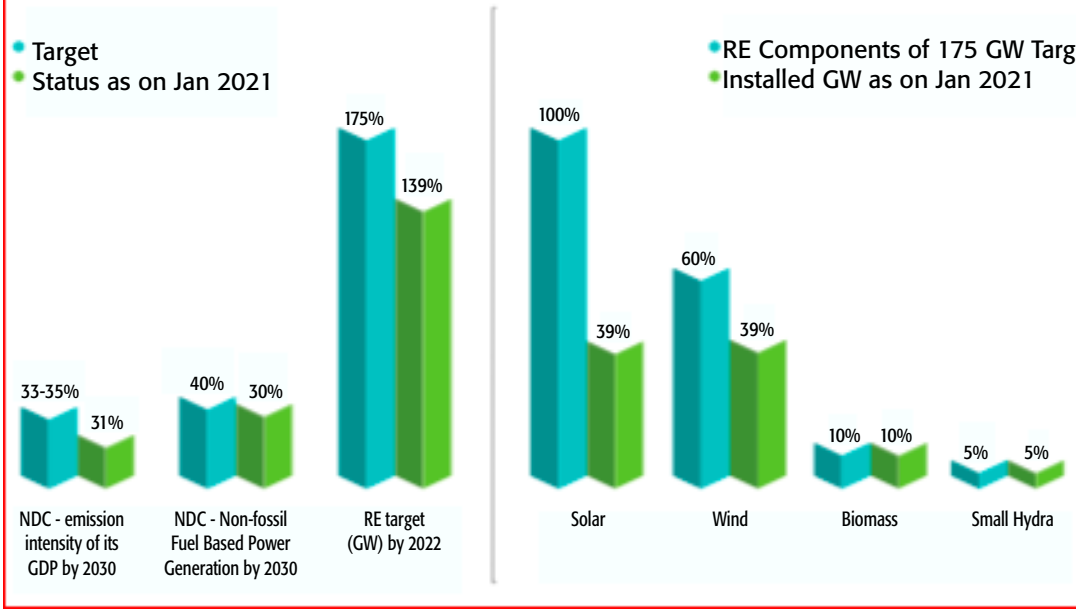
Compiled by **Rishabh Dhyani,** Wind Independent Power Producers Association (WIPPA)

India's Wind Energy Sector Set to Register 50% Growth over Next Five Years: GWEC

India is the world's fourth-largest energy consumer and an important vector in the global trajectory to limit global warming. However, with more than 1.35 billion people, its per capita carbon footprint is only around 2 tonnes CO_2e, compared to the footprint of a country like Australia at 17 tonnes CO_2e. Due in part to this issue of "climate equity" and having ambitious renewables targets already in place, India has refrained from setting a net zero target to date. India's steeply rising power demand has largely been fuelled by coal-fired generation to date. But political shifts have directed India towards a clean energy transition since 2015, when India pledged an NDC of 33-35% reduction in carbon emissions intensity of its economy by 2030 compared to 2005 levels. The country remains vulnerable to the impacts of climate change, with a series of droughts, floods, deforestation and depleting groundwater levels contributing to the shift in public opinion towards sustainability. As a developing nation, India is still on a pathway to poverty eradication and middle-income status. Nonetheless, it has pursued an ambitious palette of low-carbon programmes, including liberalisation reforms to the power sector, 24/7 green power, clean cooking and energy efficiency. India's renewable energy target of 175 GW by 2022 includes 60 GW onshore wind. As of February 2021, there was 39 GW of wind capacity installed, comprising 10.25% of the power mix. Growth of wind over the next five years will be driven by the expiry of the inter-state transmission (ISTS) charges waiver in 2023, as well as the trend of hybrid tenders combining wind, solar and storage technologies. The government has also shared its vision for longer-term renewable energy targets of 450 GW by 2030, including 140 GW of wind.

However, installations are falling short of the levels needed. Climate Action Tracker has deemed India "2°C compatible", i.e. on-track to achieve its NDC target and contributing a fair share of the global effort, but still falling short of the deeper reductions required to limit warming to 1.5°C. The government's 2022 targets may also be missed, due to constraints around land allocation, grid availability, recurring financial instability of

India's clean energy transition progress versus targets



Overview of India's Net Zero Plans	
Net zero target, if any	• N/A
Status of the legislation	• N/A
Public Investment announced alongside the net-zero target	• N/A
NDC, as of February 2021	• Reduce emissions intensity of GDP by 33-35% by 2030 from 2005 levels • Raise renewables to 40% of total power generation capacity by 2030 • Create additional carbon sink of 2.5 – 3 billion tonnes CO_2e through afforestation by 2030
Renewable energy targets	• 175 GW by 2022, including 100 GW Solar; 60 GW Onshore Wind; 5 GW Offshore Wind; 10 GW Biomass; 5 GW Small Hydro • 450 GW by 2030, including 30 GW of offshore wind
Installed wind capacity as of end of 2020	• 38.6 GW onshore wind
Key technology strategy on energy transition	• Ambitious targets for wind and solar capacity • Round the Clock tenders, including hybrid tenders combining wind and solar with energy storage • National Hydrogen Energy Mission to expand green hydrogen uptake in steel, chemicals and transport sectors
Other drivers of clean energy transition	• Green Energy Corridor, Green Term Ahead Market and 'Aatmnirbhar Bharat' • National Electric Mobility Mission Plan 2020 • National Mission for Enhanced Energy Efficiency • Smart City Mission

Source: GWEC Market Intelligence, February 2021

DISCOMs, tender design and PPA sanctity. Reviving a long-term national mission to scale up wind and renewables by resolving these challenges, such as through increased government industry coordination and knowledge-sharing, will provide a much-needed boost to the sector. With wind and solar prices beating fossil fuel-based generation across India's grid, the expansion of affordable renewables can support decarbonisation of energy intensive industries such as steel, iron, cement, transport and agriculture. Via the National Electric Mobility Mission Plan 2020, the Modi administration has already enacted an aggressive electric and hybrid vehicle scheme and aims to shift railways from coal dependency to the world's first net zero railway network by 2030. The government has also announced that green hydrogen auctions will be launched in 2021, although tender documents have not yet been issued, as of February 2021.

Meeting India's clean energy targets in the absence of a broader carbon neutrality strategy will require urgent and targeted implementation of regulatory reforms. Accelerating wind growth is also in line with the government's principles of Aatmnirbharta (self-reliance) and "Make in India" for energy security and supply chain competitiveness. The development of offshore wind and green hydrogen capacity will further support India's shift to a more flexible, resilient and clean energy system.

Courtesy: GWEC, Global Wind Energy Report 2021

India Committed to Work with US on Clean Energy: Environment Minister

India stands committed to working with the US on clean energy, Union Environment Minister Mr. Bhupender Yadav said after a telephonic conversation with US Special Presidential Envoy for Climate (SPEC) Mr. John Kerry. During the conversation with Mr. Kerry, the minister discussed the Climate Action and Finance Mobilization Dialogue (CAFMD) Track under the India-US Climate, Clean Energy Agenda 2030 Partnership, and other related issues, the environment ministry said in a statement.

Source: PTI, August 25, 2021

ONGC Eyes Offshore Wind Energy Projects

India's largest oil and gas producer Oil and Natural Gas Corporation (ONGC) is eyeing generating electricity from wind at its vast offshore acreage as it looks to augment its renewable energy portfolio, its chairman Mr. Subhash Kumar said. ONGC has oil and gas fields both in the Arabian Sea and Bay of Bengal. That experience of operating in shallow and deep-sea is now being tapped to set up wind turbines to generate electricity that could be wired to land. Last year, ONGC signed an MoU with India's largest electricity generator NTPC to explore setting up offshore wind projects along with the 7,600-km coastline.

Source: PTI, August 31, 2021

States Must Not Leave Investors in the Lurch:

Reneging on PPAs/Reauctioning will Hurt Capital Invested in Renewables

With tariffs having come down sharply to levels of around Rs 2-2.25 per unit, and in some instances, below Rs 2 per unit, a clutch of states has either refused to buy solar power or has reneged on the power purchase agreements (PPA).

First, it was the Andhra Pradesh government that demanded tariffs in the PPAs for 5.2GW of wind- and solar-power capacity be revised downwards. Subsequently, the Uttar Pradesh government stopped procuring electricity from 650 MW of wind power plants, claiming the Rs 3.46-per-unit PPA-tariff had not been approved by CERC. Last August, Gujarat had auctioned 700MW of solar capacity to be built in Dholera for which a tariff of Rs 2.78 per unit had been discovered.

But with tariffs crashing below the Rs 2 per unit mark, the state decided it would hold the auction again. Although power producers have taken the matter to court, states remain undeterred. CRISIL estimates that power-supply agreements for about 7GW of capacity, bid out at auctions prior to February 2020, are yet to be closed out since tariffs have dropped thereafter. Of this, about 3GW is vulnerable to reauctioning or even cancellation since the tariffs discovered were relatively high.

In a strange way, the basic customs duty (BCD) to be levied on import of solar modules and cells of 40% and 25%, respectively, starting April 2022 could rescue about 4.2GW of solar projects that have been bid out but are yet to find buyers. Since the imposition of the levy will result in tariffs hikes of about Rs 0.25-0.50 per unit, this will 'correct' the price. Consequently, state-run power discoms may finally agree to buy the power at the discovered price of less than Rs 2.75/unit.

Also, CRISIL believes payment risks are expected to moderate over the next two years as a bigger proportion of the operational capacity will have tariffs of less than Rs 3 per unit. The analysts point out that even now payments are relatively regular for projects with lower tariffs. Currently, around 35% of the operational solar capacity is working with a tariff of below Rs 3 per unit; by end FY23, this share is expected to increase to roughly 60% since the bulk of the fresh capacity coming up with tariffs of below Rs 3 per unit. Moreover, many more projects are being auctioned by central counter-parties like SECI and NTPC which are financially sound and, therefore, likely to make payments on time. The share of these entities is tipped to go up from 20% in March 2020 to about 30% in March 2022.

It is important that discoms close out PPAs because, thanks to the pandemic, construction of both solar and wind power capacities has been delayed. The target of 160GW by FY23 is now likely to fall short about 40%. That's a big setback, but what is more worrying is that ongoing projects could get hit due the poor financial health of discoms; at the end of March, 2021 they owed generators some Rs 68,000 crore. While the Centre threw them a life-line in Budget FY22, most discoms remain disproportionately leveraged. A combination of delayed payments—data from Praapti shows they are stretching repayment periods—and non-closure of PPAs post auctions could turn projects unviable. This is a sector that has attracted large sums of capital, and will continue to do so given it is critical for the environment. But this capital should be respected.

Source: The Financial Express, May 25, 2021

SNIPPETS

Maharashtra Can Save Rs. 75,000 Crore on Power Generation in 10 Years: Report

Maharashtra state's electricity generation sector has the potential to save up to Rs16,000 crore over five years and Rs75,000 Crore over the next decade as per the latest report 'Maharashtra's Energy Transition. A Rs. 75,000 Crore opportunity' released by research group Climate Risk Horizons. According to it, the state government can save thousands of Crores through three measures- the quick retirement of 4,020 megawatt of old coal power plants owned by Mahagenco by 2022, halting on-going construction of the new Bhusawal unit 6 that is surplus to requirements and the longer term replacement of expensive coal power contracts with cheaper renewable energy by 2030. The cost of electricity from these units is far more expensive than today's competitive tariffs for renewable energy.

Source: TNN, June 12, 2021

Bill Gates and EU Pledge $1 Billion Boost for Green Technology

The European Union and an energy investment programme founded by Bill Gates plan to raise up to $1 billion to roll out the low-carbon technologies Europe is betting on to meet its climate change goals. The partnership would see Gates-founded Breakthrough Energy use private capital and philanthropic funds to match funding provided by the EU. The aim is to together provide up to 820 million euros, or $1 billion, from 2022 to 2026. Support will target hydrogen produced from renewable energy, sustainable aviation fuels, technology to suck CO_2 out of the atmosphere, and long-duration energy storage, the Commission said. "The world cannot wait for technologies to develop on their own," the Commission said. The EU has committed to eliminate its net greenhouse gas emissions by 2050.

Source: Reuters, June 03, 2021

Boosting turbine performance and profitability

SKF is designing and developing bearings, seals, condition monitoring systems, and lubrication systems that enable more cost-effective wind energy generation. Working together with original equipment manufacturers and wind farm operators, SKF engineers provide dedicated solutions that can optimize the reliability and performance of new and existing wind turbine designs.

SKF's dedicated wind turbine solutions can help both turbine manufacturers and wind farm owners to:

- Increase energy production
- Increase turbine performance and reliability
- Reduce operating and maintenance costs
- Reduce lubricant consumption
- Minimize environmental impact
- Reduce energy losses
- Decrease warranty claims
- Reduce time to market
- Customize solutions

For these and more solutions, visit www.skf.com/wind
or contact
Mahavir Kanwade
Manager-Application Engineering SKF India Limited
mahavir.kanwade@skf.com
020-66112684

SKF®

Advanced Technologies for Cost Effective Wind Turbines

Yash Priyam
Assistant Manager
(Industrial Services)
TÜV Rheinland (India)
Private Limited, Noida,
Uttar Pradesh

Modern wind turbines are increasingly cost-effective and more reliable, and have scaled up in size to multi-megawatt power ratings.

The biggest factors in boosting wind turbine productivity are the longer blades and taller towers, which are fueling much of the next-generation research and development and push to build a more powerful, efficient, durable and cost-effective turbine.

Developer in the industry are working to develop better turbine technology, such as higher efficiency generators and more reliable blades to minimize energy and manufacturing costs. Wind blade developers are developing blade with curved tips that are designed to take maximum advantage of all wind speeds and are focusing on developing differently shaped and configured blades to improve the robustness and rotational speed for better generation.

Although turbine heights and rotor diameters are increasing, there are a few limitations. Transporting and installing large turbine blades for onshore wind turbine is not easy, since they cannot be folded or bent once constructed. This limits the routes trucks can take and the radius of their turns. Turbine tower diameters are also difficult to manage, since they may not fit under bridges or highway overpasses.

Doing risk assessment of wind turbine as per EN ISO 12100: Safety of machinery general principles for design risk assessment and risk reduction, helps in mitigating overall turbine failure risk/component failure risk and improves the safety, plant performance and profit.

Computational use of fluid dynamics simulators and sensor for wind farm aplication helps operators to minimize the impact of turbine wake effects by investigating plant performance under a full range of atmospheric conditions.

Making the Indian grid smart digitally will help communication between the utility provider and the customer. It consists of a series of computers, automated process and new technologies working together to create a responsive grid.

Utilization of controllable grid interface test system helps in reducing testing time for better understanding of how wind turbine, photovoltaic inverters and energy storage systems react to disturbances on the electric power system.

The 'Cloud' becomes a safer space to store larger amounts of data, the wind industry can take advantage of this to allow turbines to store an increased amount of analytics than before with more data comes to have further insight into the health of the turbine.

Using Drone technology photos and videos can be taken remotely and autonomously without the need for a pilot, cloud computing can then stitch these images together, before finally passing them over to an AI system that is programmed to identify any problems with the blade for example cracks, wear and tear in blades.

Wind turbines are often subject to extreme mechanical stress. Use of Condition Monitoring Systems (CMS) helps ensure the stability of WTG, long service life and optimal design of wind turbine components (rotor blades, drivetrains, inverters etc.). Thus, it prevents complete failures, which are more expensive and allows significant savings.

Transmission is a core sector of the power industry and the need to transfer power will remain for the foreseeable future, however advancements in maps and GPS technology have allowed for easier and more efficient driving on the same roads. There are similar technologies that allow for such innovation in transmission operation and also using drone technology by taking photos and videos of transmission lines, pylons and insluators lines which help in carrying out the inspection and minimizing power disruptions.

Post-commissing Owners' Engineering service (POE) after complition of wind project construction can help in maintaining and increasing of wind turbine uptime, minimize downtime, address any misalignment that hampers performance, take care of repeated errors and employ technological advancements throughout owner assets' lifetime.

The benefits of Post Commissioning Owner's Engineering is to maximizing availability and maintainability of wind turbine equipments and review of positive affect the Mean Time to Repair (MTTR) and Mean Time Between Failure (MTTF) of the wind turbines, enhancing plant performance and profit, improving safety and reducing risk, improving personnel safety and performance, reviewing and optimizing sparing.

Utility Workforce Unprepared for a Digitized Energy Future

Power and utility executives foresee seismic changes in the sector over the next few years, with many agreeing they lack the proper planning on how to proceed or prepare.

According to the new EY Power & Utilities Digital Transformation and the Workforce Survey, nearly 90% of executives report having too few workers with the right skills is challenging their ability to adopt digital technologies, with many lacking a plan on how to proceed. Furthermore, the survey shows near-universal (94%) agreement on the need for direct investment in technology and the workforce.

The EY survey of 159 power and utility executives across the globe provides insight on how executives are dealing with increased societal pressures to tackle the climate crisis, the global transition to a low-carbon energy system, and the accelerated need for large-scale transformation, especially post COVID-19. Ultimately, these challenges have created an evolution that must include cultivating a digitally savvy workforce, says EY.

"The low-carbon energy transition will create new roles that require different skills or reskilling, and a utility's agility to adapt and respond to the unknown will become even more critical," said Cyntressa Dickey, EY Global and Americas People Advisory Services — Energy & Resources Leader. "The number of disruptive threats continues to rise, the number of non-traditional competitors continues to grow, and technology is developing at the most rapid pace in history. Digital adoption and investment without an accompanying skilled workforce will not result in the desired benefits or returns."

Survey Findings

- More than 9 of 10 executives said they will be changing their mix of energy sources (91%) and adapting to changing consumer expectations for a cleaner energy economy (93%) over the next few years. These changes will require new and enhanced capabilities for utilities.
- More than half (55%) ranked the adoption of new technologies as one of the three trends that will have the most positive impact on their organization.
- Nearly 60% of the workforce requires reskilling or upskilling, however, according to current plans, only 41% will be reskilled or upskilled, with an average education time of 7.5 months and $4,650 in training costs per reskilled employee.
- 36% of the workforce will not be reskilled or upskilled, for a variety of reasons, including competing priorities, internal challenges, and market pressures.
- 5% of executives said reskilling is essential to their success in the next three years, however, only 57% said they have a robust plan to reskill over the same period.

According to the survey, executives do not necessarily know where skill gaps exist and are experiencing issues with workforce retention. One-third said they cannot measure the gap between the skills they have and what they need. Additionally, two-third report having difficulty in retaining those with in-demand skills in their workforce.

"Utilities can be the linchpin of a decarbonized economy, if they can effectively execute a plan for digital and develop the workforce to support it," said Ryan Levine, Principal, Ernst & Young LLP and EY US-East Energy People Advisory Services Leader. "However, failure could make them lose market share and become a prime target for disruption. Utilities will need to embrace a human-centered approach to develop a digital mind-set and integrate technology across the enterprise to serve customers more efficiently."

Courtesy: Smart Energy International, June 9, 2021

GE to Set up 148.5 MW Wind Capacity for Continuum Green Energy

GE Renewable Energy has said that it has been selected by Continuum Green Energy to set up 148.5 MW wind energy capacity in Morjar, Bhuj wind farm in Gujarat to supply, install and commission 55 sets of its 2.7-132 onshore wind turbines for the 148.5MW. The project was won by Continuum Green Energy during the tranche-VI auction of wind projects by SECI and will produce enough green energy to power 125,000 households in India.

Source: PTI, June 16, 2021

We will Demand Equal Distribution of Carbon Space, Fresh Finance at Glasgow COP26: Javadekar

India will demand equitable distribution of carbon space along with fresh finance in the upcoming Glasgow COP26 Summit, said environment minister Mr. Prakash Javadekar at the Economic Times Energy Leadership Summit 2021. He said that climate change was a result of 200 years of unbridled carbon emissions from industrialised countries and has not happened overnight. "Can't we demand an equitable share of energy? We require energy and carbon space. Developed world must decide on this," said Javdekar. The minister said that India's contribution to historical emissions was just 3 per cent and now much of the carbon space of the world has already been consumed.

Source: ET Energy World, June 19, 2021

Advanced Product Quality Planning (APQP) for Wind Industry

Dr. Sanjiv Kawishwar
Director
CORE
(Centre of
Renewable Energy), India

Concept of Advanced Product Quality Planning (APQP) was first developed for automotive industry by Ford, Chrysler and GM. APQP is a well-established concept in the automotive industry and it has been the backbone for maturing quality performance at automotive Manufacturers and Suppliers.

Wind turbine manufacturers and suppliers have formed a non-profit organization named APQP4Wind and developed the APQP concept for wind industry. The concept of APQP is customised for wind industry considering the special conditions differentiating wind from automotive. APQP is a common quality assurance methodology for the global wind industry that helps organisation to reduce risk and lower the costs of poor quality. It helps to mature and align the global wind industry supply chain by lowering the cost of poor quality.

This is based on the concept that the quality assurance methodology used by the wind industry supply chain from design (concept) to customer (commissioning and O&M) should be uniform. Ultimate objective of this concept is to standardize, processes, procedures, tools and methods for the global wind industry, based on commonly accepted and available APQP principles and guidelines.

Implementation of APQP enables collaboration within the wind industry that provides support to project management, training and the tools so that stakeholders can improve the quality performance on a continual basis and minimize the risk.

APQP framework includes

- A work stream through the supply chain for developing and manufacturing a product.
- A method to manage interfaces between responsible stakeholders.
- A structure to enhance the effectiveness of processes, procedures and product.
- The standards have been created to substitute company specific procedures and set aligned methods and procedures for all suppliers and sub suppliers operating in the wind industry, therefore it strengthens the cooperation.
- Standards provide tools and methods for the global wind industry, that helps stakeholders to continually improve the quality environment in which they operate and minimize risk.

Advanced Product Quality Planning

[follow Plan, Do, Check, Act (PDCA) cycle]

- Plan, Define & Scope Quality Program
- Product Design & Development
- Product Requirements compliance
- Process Design & Development
- Process Requirement compliance
- Product & Process Validation
- Product and Process Approval

APQP methodology can be used to plan, implement and verify the product conformance through quality assurance activities in order to:

- Secure on-time implementation and completion of quality assurance activities
- Enable suppliers to deliver products with required quality right first time and on time

Certification according to ISO 9001:2015 or IATF 16949 or an Integrated Management System (IMS) is very useful for effective operation of APQP in an organisation.

APQP is implemented for the following:

- To improve quality of incoming materials
- Reduce costs
- Achieve quality threshold
- Establish a supply base that reaches goal of zero defects
- Minimized quality costs
- Provide greater visibility, better accessibility and optimum efficiencies
- Have an investment in quality that will payoff to OEMs, supplier and sub supplier.
- Focus on Suppliers delivering high or medium risk components.
- Achieve continual quality improvement that helps to reduce the Levelized Cost of Energy.
- Make transparent process of product quality assurance as well as product release.

APQP standards have been designed to substitute company-specific procedures and set aligned methods and procedures for all suppliers and sub-suppliers.

The key benefits for the wind industry of using APQP are:

- Preventive approach to achieve quality standards.
- Shifting focus from quality control to quality assurance.
- It helps to enhance and mature the global Supplier base.
- Supports standardization of processes to reduce cycle time and increase efficiency.
- Facilitates profitable growth and reduce risk

The value of APQP for suppliers and manufacturers is based on their ability to translate the standards into value-creating initiatives based on knowledge and experience in the deployment of the methods. It ensures that parties communicate at the eye level when it comes to quality assurance of processes.

Reference: **https://apqp4wind.org**

National Electricity Policy (NEP) 2021

A Roadmap for Sustainable Development of Electricity in India

India's power sector is slated for a revamp with the release of the long-awaited draft National Electricity Policy, 2021 (NEP), on April 27, 2021. The Government of India (GoI) had formulated the NEP as a guidance for the augmentation of the power sector and optimal utilisation of available resources. First devised in 2005, the NEP is being revisited after 16 years to consider the paradigm change in the climate, technological enhancements, and the burgeoning electricity needs of the nation. The draft NEP 2021 identifies numerous fronts on which India needs to step up, such as increasing energy supply, ensuring wide-spread access to electricity, and enhancing energy efficiency in order to meet climate change goals and achieve sustainable development.

With India's energy demand outpacing its supply, there is undoubtedly a need to bolster energy generation, transmission, and distribution. In this regard, NEP identifies thermal power, hydropower, nuclear energy, and renewables as the potential sources of augmenting energy generation. Undoubtedly, greater access to energy will play a catalytic role in the socio-economic development of the nation. To promote universal access to energy, the NEP sets out a mechanism for distributed generation of electricity through the installation of rooftop solar photovoltaic systems, in areas where it is not feasible to provide electricity through the main grid, by integrating such systems with microgrids. Further, in a bid to advance generation of renewable electricity, the NEP also proposes that such distributed generation systems be installed in public offices. However, the NEP lacks coupling of the measures for such distributed generation with provisions for net metering, which would enable the consumers to offset their electricity bills against solar power generated by them. While the Electricity (Rights of Consumers) Rules, 2020 permits net metering for loads up to 500kW and gross metering for loads above 500 kW, specifically permitting increased distributed generation, and net metering irrespective of load capacity for government establishments, educational institutions and EV charging stations, would enable distribution companies (DISCOMs) to mitigate risks associated with arrears of dues and also cut down their losses.

The NEP correctly identifies the distribution leg of the power sector as the weakest link in the electricity supply chain. Although DISCOMs are being revitalised through multiple GoI schemes deployed over the last decade and a half, it is essential that DISCOMs become self-sustaining, for which wider autonomy in selecting the appropriate energy mix could be permitted to the DISCOMs. For instance, currently, the Ministry of Power prescribes that DISCOMs must fulfil specified percentages of renewable purchase obligations (RPO) from both, solar and non-solar renewable energy sources. This distinction was initially created to incentivise the solar power sector. However, with solar prices becoming competitive, the segregated RPOs could be streamlined in favour of a single RPO, which would offer greater discretion to the DISCOMs to choose an energy mix that would best suit the demands of the consumers, an element that has not been given enough consideration in the NEP. In order to augment the firmness of the power sourced from the renewable energy sector, a scheme similar to the RPO, imposing a storage purchase obligation on DISCOMs for a percentage of the load handled by them could have been considered for inclusion in the NEP as a guiding factor. The development of storage capacity would help in tackling the problem of variable or intermittent energy supply in the renewable energy sector by providing grid stability.

Energy efficiency is one of the key pillars in transition of the economy towards clean energy. India has progressed towards better energy efficiency in the past couple of years, by incorporating measures such as Energy Efficiency Building Code, National Mission for Enhanced Energy Efficiency and fuel consumption standards for the transport sector. However, the penetration of efficient appliances could be deepened by contemplating additional consumer awareness programmes for the power sector, a measure that has been overlooked in the NEP.

It would be prudent to simultaneously roll out measures in line with the NEP in the National Tariff Policy as well as the Electricity Act, 2003, so that the developments in the power sector are harmonious and unequivocal.

In a well-intentioned and holistic framework, the NEP provides a broad roadmap that will lead India towards sustainable development. It makes a strong case in favour of indigenisation of raw materials, promoting electric vehicles, addressing cyber security risks and having a proper disaster management framework. The NEP presents a picture of India's outlook towards becoming a self-sufficient energy economy. However, such changes cannot be read in isolation. It would be prudent to simultaneously roll out measures in line with the NEP in the National Tariff Policy as well as the Electricity Act, 2003, so that the developments in the power sector are harmonious and unequivocal. Since the proof is in the pudding, swift action should be taken to implement the changes proposed in the NEP.

Source: ET Energy World, August 26, 2021

Regulatory Update on Wind Power

Draft Notification for Electricity (Rights of Consumers) Amendment Rules, 2021

Ministry of Power, Government of India has issued a Draft Notification on 30th September, 2021 to amend the Electricity (Rights of Consumers) Rules, 2020. Distribution Licensee shall ensure 24x7 uninterrupted power supply to all the consumers, so that there is no requirement of running the Diesel Generating sets. Accordingly, the State Commission shall give trajectory of System Average Interruption Frequency Index (SAIFI) and System Average Interruption Duration Index (SAIDI) for the cities.

Consumers, who are using the Diesel Generating sets as essential back up power, shall endeavor to shift to cleaner technology such as RE with battery storage, etc. in five years from the date of the publication of this amendment or as per the timelines given by the State Commission for such replacement based on the reliability of supply by the distribution company in that city.

The process of giving temporary connections to the consumers for construction activities or any temporary usage, etc. shall be simplified by the distribution licensee and given on an urgent basis and not later than 48 hours.

Bringing 33kV System under Transmission for Performance Improvement

Considering the importance of sub-transmission system, Ministry of Power had constituted a Committee to suggest measures for reduction of losses in the sub-transmission system and for ensuring reliability and efficient performance and to make recommendation for promoting investment in sub-transmission system. The Committee observed that Losses at 33 kV is about 4.8%, while the loss in 66 kV-220 kV level is only 1.72-2.39%.

Committee inter alia recommended to bring 33 kV system under State Transmission Utility for improvement in performance of 33 kV system. Further, the Committee also recommended technical measures for improvement of performance of 33 kV networks including robust network planning/network re-configuration, network re-conductoring/use of higher capacity conductor, predictive maintenance, adoption of modern technology for improvement of reliability like indoor switchgear/GIS switchgear panel, auto-switched (thyristor controlled) capacitor bank, low loss power transformers, SCADA based substation automation system (SAS), etc.

Revised Guidelines and SBDs for procurement of ISTS through TBGB process

Ministry of Power, Government of India, Transmission Division has issued a notification about Revised Guidelines and Standard Bidding Documents (SBDs) for procurement of Inter-State Transmission Services (ISTS) through Tariff Based Competitive Bidding (TBGB) process.

The Guidelines (comprising of Guidelines for Tariff Based Competitive-bidding for Transmission Service and Guidelines for Encouraging Competition in Development of Transmission Projects), in this regard, are being issued separately.

It may also be noted that in view of financial crunch like situation faced by Transmission Developers due to COVID-1 9, Ministry of Power had provided relaxation to the ISTS projects in terms of Bid Bond and Contract Performance Guarantee (CPG) vide letters dated 03.12.2020 and 25.03.2021 respectively and provisions contained in these letters will have overriding effect till 31.12.2021.

GST Rate Changes for Renewable Energy Industry

Ministry of Finance (Department of Revenue), Government of India has issued a Notification No. 8/2021-Central Tax (Rate) on 30th September 2021 applicable from 1st October 2021. The summary of the changes for Renewable Energy Industry are as follows:

The rate of tax for the following goods has been increased from 5% to 12%.

Sl. No. of Notification No. 1/2017 – CT (Rate): 201A (Schedule II)
Chapter, Heading, Subheading or Tariff item: 84, 85 or 94
Description Following renewable energy devices and parts for their manufacture:- (a) Bio-gas plant; (b) Solar power based devices;(c) Solar power generator; **(d) Wind mills, Wind Operated Electricity Generator (WOEG);** (e) Waste to energy plants / devices; (f) Solar lantern / solar lamp; (g) Ocean waves/tidal waves energy devices/plants; (h) Photo voltaic cells, whether or not assembled in modules or made up into panels. *Explanation:-* If the goods specified in this entry are supplied, by a supplier, along with supplies of other goods and services, one of which being a taxable service specified in the entry at S. No. 38 of the Table mentioned in the notification No. 11/2017-Central Tax (Rate), dated 28th June, 2017 [G.S.R. 690(E)], the value of supply of goods for the purposes of this entry shall be deemed as seventy per cent. of the gross consideration charged for all such supplies, and the remaining thirty per cent. of the gross consideration charged shall be deemed as value of the said taxable service.
Rate: Revised from 5% to 12%

Draft Electricity (Promoting RE through Green Energy Open Access) Rules, 2021

Ministry of Power, Government of India has issued Draft Electricity (Promoting renewable energy through Green Energy Open Access) Rules, 2021 on 16th August, 2021 for comments within 30 days. This rule shall be applicable for purchase and consumption of green energy including the energy from Waste-to-Energy plant. Gist of the draft is given as follows:

4. **Renewable Purchase Obligation (RPO)**
   (1) There shall be uniform Renewable Purchase Obligation, on all obligated entities
   (2) Any entity-whether obligated or not - may elect to purchase and consume Renewable Energy as per their requirements by one or more of the following methods.
      (A) Own generation from renewable energy sources without any capacity limit behind the meter.
      (B) By procuring Renewable Energy through Open Access from any Developer with which the entity enters into an agreement.
      (C) By requisition from distribution licensee.
      (D) Purchase of renewable energy certificates to meet the RPO Obligation.
      (E) Purchase of green hydrogen.
      (F) Any other sources, as may be, prescribed by the Central Government.
5. **Green Energy Open Access:** The Appropriate Commission shall put in place regulations in accordance with this Rule to provide Green Energy Open Access to consumers who are willing to consume the Green energy. There shall be no limit of supply of power for the captive consumers taking power under green energy open access.
6. **Nodal Agency**
   A Central nodal agency shall be notified by the Central Government which will operate a single window green energy open access system for renewable energy. The Central nodal agency shall set up a Centralised Registry for this purpose.
7. **Procedure for Grant of Green Energy Open Access**
   The Forum of Regulators shall prepare in sixty days a common application format for online portal for the Green energy open access which shall be adopted by the Appropriate Commission.
8. **Banking**
   Banking may be permitted on monthly basis on payment of charges to compensate additional costs, if any, to the distribution licensee by the Banking. The appropriate Commission shall fix the applicable charges.
9. **Cross Subsidy Surcharge**
   Cross Subsidy Surcharge shall be levied on consumers who are permitted open access.
   Provided that the surcharge for green open access consumer purchasing green energy, from a generating plant using renewable energy sources, shall not be increased, during twelve years from the date of commissioning of the generating plant using renewable energy sources, by more than 50% of the surcharge fixed for the year in which open access is granted.
   Additional surcharge shall not be applicable for green open access consumers.
10. The distribution licensee shall give green certificate on yearly basis to the consumers for the green energy supplied by the licensee to consumer on his request beyond the Renewable Purchase Obligation of the consumers.

Electricity (Transmission System Planning, Development and Recovery of IST Charges) Rules, 2021

Ministry of Power, Government of India has issued a notification on Electricity (Transmission System Planning, Development and Recovery of Inter-State Transmission Charges) Rules, 2021 to come into force on the date of their publication in the Official Gazette.

3. **Planning and Approvals**

The Central Electricity Authority shall draw up short-term plan every year on rolling basis for upto next five years and perspective plan every alternate year on rolling basis for next ten years for development of the electricity system and coordinate the activities of the planning agencies for the optimal utilisation of resources to subserve the interests of the national economy and to provide reliable and affordable electricity.

Central Electricity Authority shall also draw up the perspective plan for development of transmission system after consultation with all the relevant stakeholders such as, Central Transmission Utility, State Transmission Utilities, System Operators, generating and distribution companies, industry associations and the State Governments, etc.

4. **Connectivity**
   (1) The Generation or Distribution Companies or Inter-State Transmission System Consumers shall be connected to the network and shall be able to sell or buy power from any Generator or Distribution Company or Inter-State Transmission System connected entity and the Appropriate Commission shall issue appropriate regulations to regulate General Network Access.
   (2) While transitioning to General Network Access, all existing Long-term Access granted or deemed granted to a Designated Inter-state Customer may be considered as sanctioned General Network Access.
5. **Recovery of inter-state transmission charges**
   (1) The entire Inter-State Transmission System shall be treated as one integrated system and any Designated Inter-state Customer seeking General Network Access shall pay the onetime General Network Access charges as prescribed by the Central Commission. Provided that existing Designated Inter-state Customers with existing Long-term Access quantum need not pay one time General Network Access charges.
   (2) All Designated Inter-state Customers shall pay per Mega Watt tariff fixed by the Central Commission as monthly transmission charges in addition to one time General Network Access charges.
   (8) The Central Transmission Utility shall be responsible for billing, collection and disbursement of the transmission charges as per the regulations made by the Central Commission.
   (9) The Central Commission shall bring out Regulation on fees and charges for Central Transmission Utility.
   (12) The Central Government may, if it is satisfied, waive Inter-State Transmission System charges and losses for notified sources of energy for a specified duration.

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

Snippets

Gautam Adani Says $50-70 Bn Investment Planned Across Energy Chain

Gautam Adani has said that his infrastructure conglomerate will invest between USD 50-70 billion in organic and inorganic growth opportunities across the entire energy value chain over the next decade. The port-to-energy group will invest over USD 20 billion in renewable energy generation alone. This will include investments with potential partners for electrolyzer manufacturing, backward integrations to secure the supply chain for our solar and wind generation businesses, and AI-based industrial cloud platforms.

Source: PTI, October 05, 2021

New Renewable Energy Policy to Implement Power Projects by 2025

The Maharashtra government has come up with a new Renewable Energy Policy aiming at implementing 17,360 MW of transmission system-connected power projects by 2025. This includes 12,930 MW of solar power projects, 2,500 MW of wind energy projects, 1,350 MW of co-generation projects, 380 MW of small hydro projects and 200 MW of urban solid waste-based projects, said Mr. Dinesh Waghmare, Principal Secretary (Energy) at the 4th Edition of 'CII Renew India 2021' organised by CII, Maharashtra.

Source: Express News Service, October 1, 2021

UK-India Joint Research Funding Led To 258 Projects: Report

The UK-India research and innovation relationship has resulted in 258 projects with a joint investment of around 330 million pounds, UK Research and Innovation (UKRI). The projects covered a wide range of subjects, from heritage to renewable energy, generating a large number of outputs in different formats and scholarly and societal impact in a multitude of forms.

Source: PTI, October 01, 2021

Senvion Bags Order to Supply Wind Turbines for JSW Energy's 591MW Project

Senvion has been awarded a 591MW project to deliver its wind turbines for JSW Energy at its ongoing pipeline of about 2.5GW of renewable projects under construction. The project will comprise 2.7 MW turbines.

Source: ET Energy World, October 04, 2021

Energy Lawsuits Pact Seen Threatening Paris Climate Agreement

Fear of multi-billion-euro lawsuits from fossil fuel investors is putting the Paris agreement on climate change at risk, one of the deal's architects has warned. Compensation claims from a pact that allows companies to sue countries over policies that affect their investments could amount to more than a trillion euros by 2050, according to one estimate. The Energy Charter Treaty (ECT) was originally drawn up to protect energy firms as the Soviet Union crumbled, but new analysis suggests it could allow coal plants in 54 signatory states to keep belching carbon dioxide for more than a decade. Globally, five energy multinationals are now suing governments for a total of $18 billion, claiming a loss of earnings due to climate action. Four of these suits are taking place in the ECT's investor-state tribunals.

Source: Reuters, October 02, 2021

Adani Green Acquires SB Energy India

Adani Green Energy (AGEL) has said that it has completed the acquisition of SB Energy India. With this deal, SB Energy India is now a 100 per cent subsidiary of AGEL. Earlier, it was a 80:20 joint venture between Japan-based SoftBank Group and Bharti Group. The transaction pegs SB Energy India at an enterprise valuation of about Rs 26,000 crore and marks the largest acquisition in the renewable energy sector in India. SB Energy India has 5 GW renewable assets across four states in India. The portfolio holds 1,700 MW of operational renewable assets, 2,554 MW of assets under construction and 700 MW of assets near construction.

Source: ET Energy World, October 04, 2021

GE to Supply 810 MW Onshore Wind Turbines to JSW Energy

GE Renewable Energy has said that it has received an order from JSW Energy to supply 810 MW of onshore wind turbines for their upcoming wind farms in Tamil Nadu.

Source: ET Energy World, October 07, 2021

Banks Need to Accelerate Green Lending to Achieve Sustainable Growth: SBI Chief

Banks have always been the backbone of India's economic growth and as the country pivots to sustainable growth, the banking sector will have to accelerate green lending, said SBI Chairman Mr. Dinesh Khara. He added that there is a growing need to sensitise India's financial sector to the importance and benefits of green finance. Talking about the ESG initiative of SBI, he said the bank aims to become carbon neutral by the year 2030 and to achieve the objective a number of measures taken to reduce its carbon impact.

Source: PTI, October 08, 2021, 08:29 IST

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Ministry of Power Framework for Implementation of Market Based Economic Despatch (MBED) – Phase1 for Lowering the Cost of Power Purchase to Consumers Released

Around 5% reduction in the cost of power to the consumers from MBED is expected.

Ministry of Power has been examining suitable mechanisms to enhance competition in the power sector with the objective of lowering the cost of electricity to consumers.

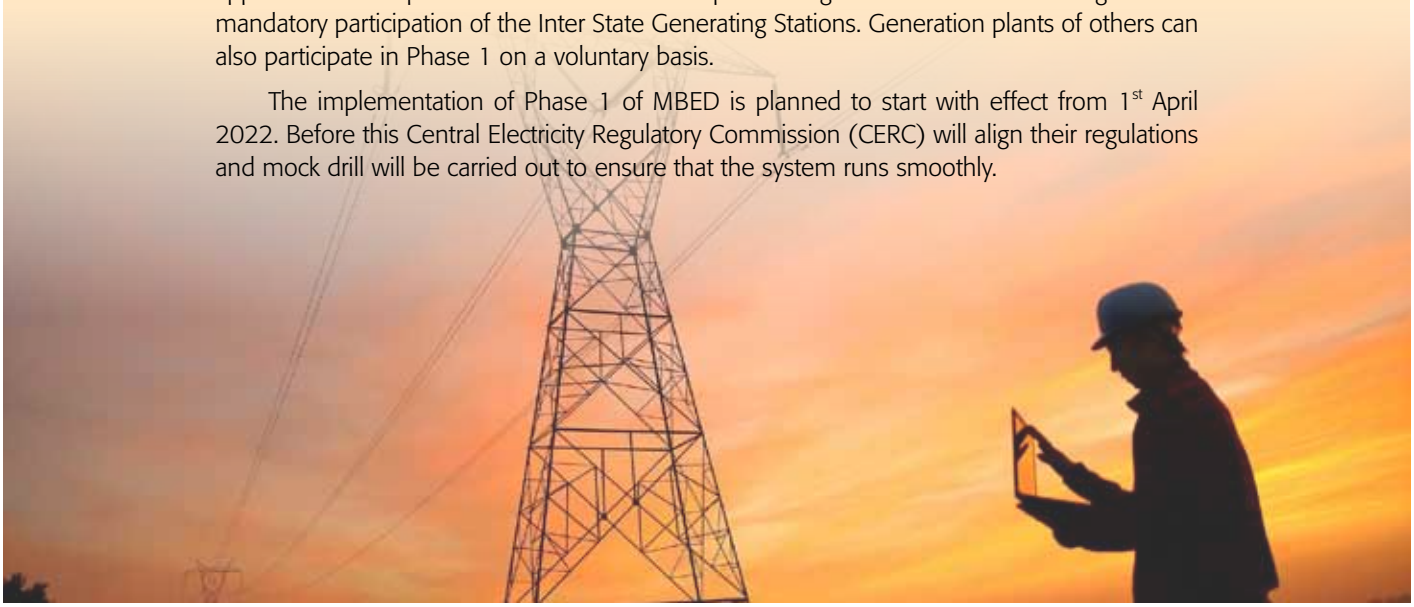
With success in generation capacity additions over the past few years and a well-integrated national electricity grid, the time is right to move towards optimising the operation of generating plants in the country to deliver benefits of reduced operating costs to the distribution utilities and end consumers. A robust day-ahead market will also form the basis for transitioning away from the country's over-dependence on longer-term PPAs to sustainable market-based operations.

It is hence widely recognized that an essential next step in reforming electricity market operations and in moving towards "One Nation, One Grid, One Frequency, One Price" framework is to implement Market Based Economic Despatch (MBED) in the day-ahead horizon, initiated by the Central Electricity Regulatory Commission. MBED will ensure that the cheapest generating resources across the country are despatched to meet the overall system demand and will thus be a win-win for both the distribution companies and the generators and ultimately result in significant annual savings for the electricity consumers.

Ministry of Power recognized the need for a consensual and phased approach in implementing Market Based Economic Despatch (MBED) that will help participants, power exchanges and load despatch centres to adapt gradually to the new regime. To this effect, a Discussion Note was circulated on 1st June 2021 by the Ministry of Power to all concerned stakeholders for obtaining their inputs and comments. A consultation workshop covering State Governments was convened by the Ministry of Power on 6th July 2021. Several comments were obtained during the workshop which was subsequently deliberated by the Ministry. Pursuant to that, a second consultative workshop was held with Discoms, Electricity Regulatory Commissions, State Gencos, etc. on 26th August 2021.

Ministry of Power noticed substantial alignment amongst all key stakeholders on a phased approach and the process to be followed for implementing Phase 1 of MBED starting with the mandatory participation of the Inter State Generating Stations. Generation plants of others can also participate in Phase 1 on a voluntary basis.

The implementation of Phase 1 of MBED is planned to start with effect from 1st April 2022. Before this Central Electricity Regulatory Commission (CERC) will align their regulations and mock drill will be carried out to ensure that the system runs smoothly.



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