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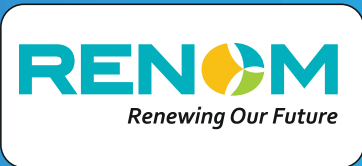
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From the chairman's desk



Dear friends,

At the outset, may I begin by wishing you and the organisations that you represent the very best in terms of business performance during FY 2024-25. Whilst external conditions certainly have an impact, improvements in internal processes that lead to better efficiencies and cost reduction also tend to make a significant difference. It is apt, therefore, to focus on internal processes as well as external conditions. We wish to draw your attention to one such external condition.

As you are aware, in terms of the “Report on Optimal Generation Capacity Mix for 2029-30 (Version 2.0)” published by the Central Electricity Authority (CEA) in April 2023, the target for wind energy installed capacity by 2030 is 99,895 MW. As against this figure, the installed wind energy capacity as on 31 March 2024 is 45,886.51 MW. The CEA Report on Under-construction Renewable Energy Projects states that as of 31 July 2023, the capacity of under-construction wind energy projects was 20,875.35 MW. Since then, 1,213.59 MW has been commissioned. Therefore, the capacity of under-construction wind energy projects can be taken to be 19,661.76 MW. Accordingly, the total for capacity installed and under-construction projects is 65,548.27 MW, leaving a balance of 34,346.73 MW to be added in the next six years. The asking rate is around 5,725 MW every year over the next six years.

Given the fact that India talks highly of its commitment to Net Zero and greening of the planet, that the nation has nearly four decades of experience with wind energy installations and a manufacturing base of 15,000 MW per annum (Source: MNRE), it would seem like a cakewalk to achieve the target set for 2030. However, this is far from the reality of the situation – the industry is beset with policy uncertainty, manifested by flipflops at the central as well as at the state levels. Even where firm policies exist, there is considerable dillydallying on the part of the bureaucracy, aided in no small measure by double speak from those they receive orders from. Add to that increased input costs, unrealistic e-reverse auction prices, limited availability of land, right of way (ROW) issues, etc. and the net result is diminished interest from serious investors.

Your Association has been representing issues such as the above on a regular and sustained basis. We welcome your ideas / suggestions on what would aid the process of development.

For the moment, we are constrained by the excitement of elections. Once the elections are over, we hope to facilitate and bring all the stakeholders together, to find ways to collaborate in finding a solution that is fair and equitable to all. As would be apparent, the longer we delay, achieving the green energy targets set would be that much more difficult.

With best regards
Prof Dr K Kasthurirangaian
Chairman



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The time is apt for dispatchable renewable energy – A D Thirumoorthy

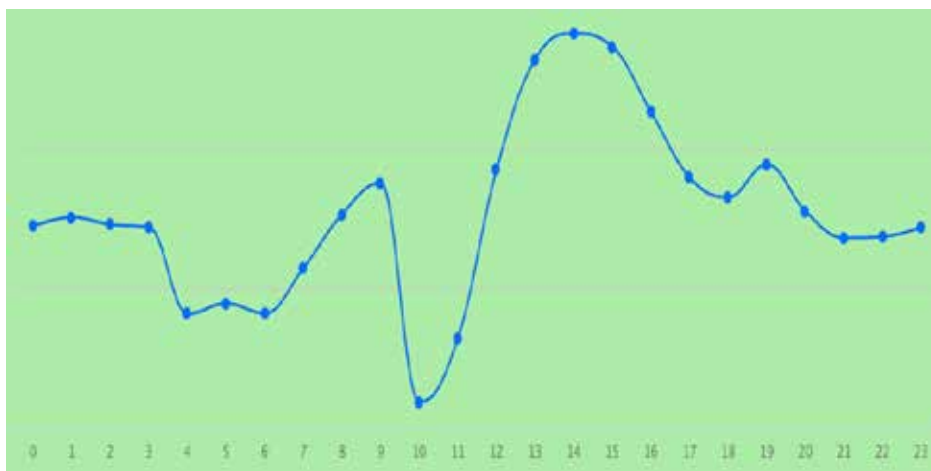
A major component of India’s power scenario continues to be fossil fuels. This can be observed from the fuel-wise installed capacity in the chart.

All India Installed Capacity (MW) Sector-wise as on 29-02-2024									
Sector	THERMAL				Nuclear	Hydro(Large)	RES*	Grand Total	
	Coal	Lignite	Gas	Diesel					Total
State	69437.50	1150.00	7012.06	280.31	77879.87	0.00	27254.45	2526.61	107660.93
Private	73512.00	1830.00	10788.24	308.89	86439.14	0.00	3931.00	132411.17	222781.31
Central	68019.96	3640.00	7237.91	0.00	78897.87	7480.00	15742.72	1632.30	103752.89
All India	210969.46	6620.00	25038.21	589.20	243216.88	7480.00	46928.17	136570.08	434195.13

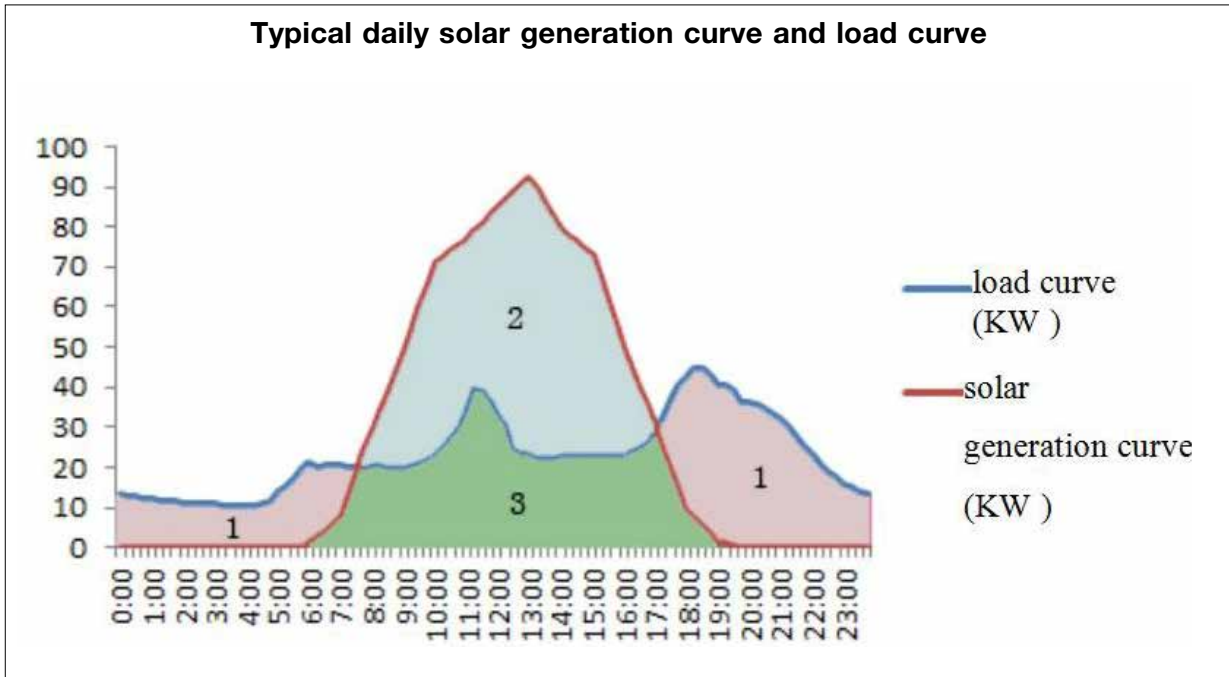
Due to international compulsions and our carbon reduction plan, the Indian government is planning to get 50% from renewable energy sources by 2030.

Sector	Achievements (1st April 2023 – 31st March 2024) FY-2023-24	Cumulative Achievements (as on 31.03.2024)
I. Installed RE Capacity (MW)		
Wind Power	3253.39	45886.51
Solar Power*	15033.26	81813.60
Small Hydro Power	58.95	5003.25
Biomass (Bagasse) Cogeneration	0.00	9433.56
Biomass(non-bagasse)Cogeneration	107.34	921.79
Waste to Power	1.60	249.74
Waste to Energy (off-grid)	30.16	336.06
Total	18484.70	143644.51

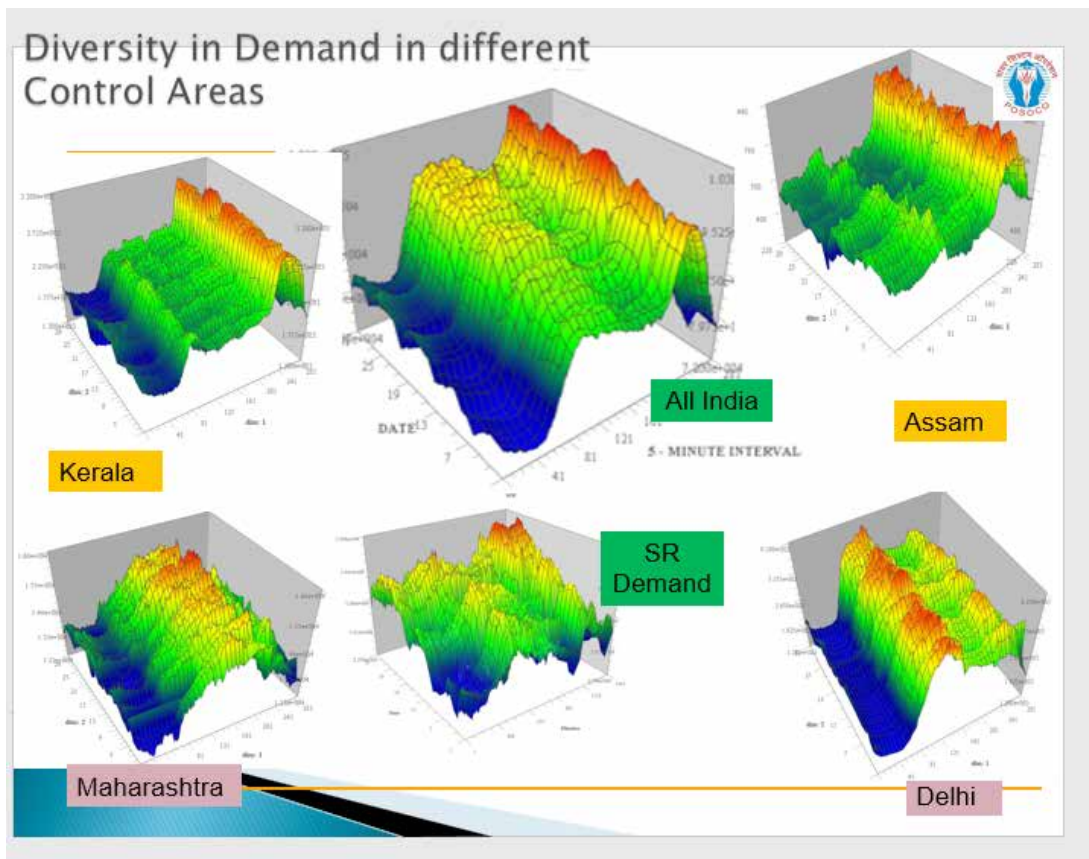
The above chart indicates the importance of wind energy in India. Wind makes up roughly 30% of all the renewable energy sources.



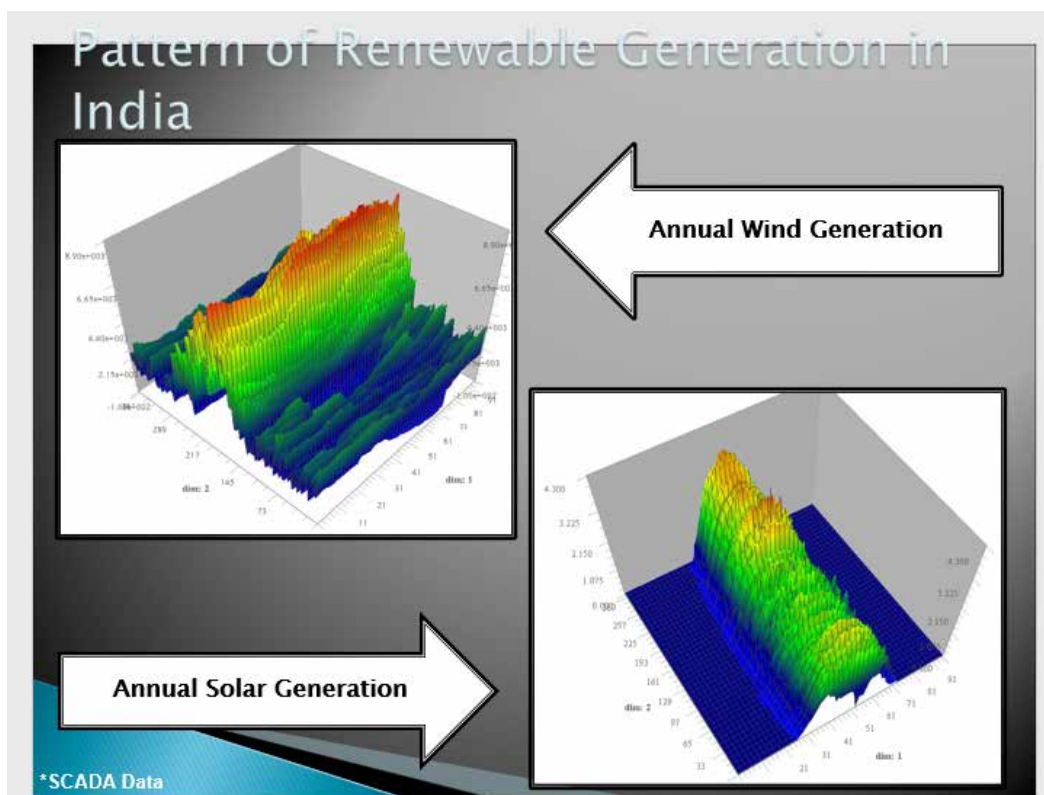
Typical wind energy generation during the day



From the above images we infer that the load curve and wind energy curve with solar power curve do not see any match of load curve with either solar or wind energy curve or the combination of both.



From the above figures we can see that the diversity of load curves are entirely different in different regions.



The above figure indicates the pattern of generation curve of wind and solar in India.

The grid operators and grid managers who are responsible to maintain the grid within the grid parameters always insist on dispatchable power to see that all the customers are serviced with reasonable power quality. When the generation exceeds load requirements frequency increases and if generation falls short of the load, frequency decreases. The grid operators are obliged to maintain the grid frequency within the band width as per CERC regulations. To maintain the frequency within the band width, grid operators insist on dispatchable power.

As the old thermal generation assets retire and the world moves towards a low or no emissions future, there is a need to solve the 'energy trilemma'. In other words, our energy future needs to be affordable, sustainable and reliable.

The role of renewable generation in achieving **affordable** and **sustainable** energy is clear. Wind and solar PV now offer the lowest cost of new energy development, have low ongoing operational costs, and near zero emissions – and therefore hold great potential for rapid decarbonisation of the energy sector.

However, replacing coal-fired power stations with wind and solar PV is not a like swap in terms of availability of power when it is needed by consumers. Coal-fired power stations produce firm baseload power, but generation from renewable resources varies due to the availability of the natural resource. Generation of wind and solar PV energy vary according to the weather and the time of day.

Achieving reliability

Reliability means having stable, high-quality power available whenever it is needed. We know that renewables can produce energy, but is the power produced **when it is needed?** The variability in power from renewables – and its dependence on natural resources such as wind and sun – makes matching supply and demand a challenge. This challenge increases as more renewables enter the market.

With moderate amounts of renewables, it is still possible to maintain system reliability through clever solutions – in particular, targeted grid support designed through careful planning and study of generation profiles, and supported by solid communications, control, power systems studies and forecasting. However, there is a limit to such approaches.

Ultimately we will need storage solutions to enable renewable generation to be available whenever consumers require it and so that the grid can be stable and secure.

What are dispatchable renewables?

For generation to be dispatchable it needs to be available at the request of power grid operators or the plant owner according to the needs of the market. Dispatchable generators can be turned on or off, or can adjust their power output according to market need. If a generator is dispatchable it can be used to match load, meet peak demands, or fill the gap if another generator suddenly goes offline. Dispatchable generation is very valuable to the market because it can be used to match the profile of energy demand.

To make wind and solar PV dispatchable, storage solutions are needed, and these may vary depending on the particular project. The main contenders are large-scale batteries, pumped hydro, and modified use of traditional hydropower. All of these can ‘store’ energy (at times when wind or solar are generating more than the market requires), and release that stored energy again when the market needs more power than the weather-dependent renewables can supply. The choice of storage solution will depend on the particular circumstances of each project.

Effectively, baseload fossil fuel generation can be replaced by the combination of variable renewables, dispatchable renewables, change in use of existing hydropower, and smart high-voltage network support and planning to ensure sufficient transmission capacity.

The time to start planning for this transition, from thermal generation to fully dispatchable combinations of renewables and storage, is now.

The time is right for dispatchable renewables

The questions of when and how much dispatchable renewables we’ll need are complex. Future needs will be driven by a combination of commercial, regulatory and technical considerations as well as changing customer behaviour (all of which are in motion). Nevertheless, the trend towards increasing needs for dispatchable renewables is clear – so this is the time to get things moving.

There are already opportunities in which dispatchable renewables offer distinct advantages, and where business cases may stack up. With increasing wind and solar PV developments in the network without dispatchable capability, such opportunities will only expand. However, the lead time required to include large-scale storage in these ‘dispatchable renewables’ projects means that planning must begin well in advance.

Mr A D Thirumoorthy, with rich experience in the renewable energy sector, is the chief technical advisor at Indian Wind Power Association.

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Panel Discussion 1	Sustainable Energy Transition Through Secured Digitalisation - Net Zero Future
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Panel Discussion 2	Energy Sector - Regulatory Framework & Digitalisation Approach
Panel Discussion 3	Cloudification & GenAI – a Modern Business Requirement for New Energy Business Model
Fireside Chat 1	Customer Story/Case Study/Best Learning - Power Sector

Motivational Speaker / Digital Leader Session

DAY 2, 20 JUNE 2024

Leadership Panel	CIO Roundtable - Digital Roadmap
Panel Discussion 4	Enhancing Customer Experience Through Digitalisation
Technical Session 2	Asset Optimization Through Digitalisation (T&D Sector)
Technical Session 3	AI & ML Opportunities & Impact in Energy Sector
Panel Discussion 5	Digital Skills Upgradation & Capability Building
Fireside Chat 2	Customer Story/Case Study/Best Learning - Oil & Gas Sector

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Towards firm and dispatchable renewable energy – N Karunamoorthy, C R Viswanathan & Maheswari Manoharan

The concept of firm and dispatchable renewable energy (FDRE) is the pivotal innovation in the power sector, particularly within wind solar hybrid projects equipped with energy storage systems (ESS), aimed at supplying power to discoms on a demand basis.

India plans to achieve 500 GW renewable energy (RE) by 2030, i.e., sourcing 50% of its electricity from non-fossil fuels, thereby reducing carbon emissions by 45% from level recorded in 2005. The Central Electricity Authority's National Electricity Plan-2023 estimates that there is a need for 486 GW of variable renewables to meet the above objective. However, the significant use of variable and intermittent RE presents issues such as grid balancing and underutilisation of the transmission system.

The above-mentioned difficulties can be addressed by converting variable renewable energy into FDRE by integration with energy storage systems. Moreover, FDRE offers reliable round-the-clock (RTC) power from green sources to consumers.

Being a flexible supplier, ESS can store excess energy generated during peak hours and release it at times of high demand or during periods in which the productivity of RE resources is less. As a result, ESS enables RE to reliably satisfy electricity demands, improving the grid's resilience and efficiency. This increased dependability without sacrificing sustainability has the potential to revolutionise both our homes and our businesses. This novel approach has sparked significant interest, leading to the issuance of tenders by key entities, such as NTPC and SECI.

General conditions for FDRE tenders

Some of the major conditions of hybrid tender of SECI which are more or less similar to that of NTPC, are given below:

- The participation in the wind-solar hybrid projects with energy storage systems from ISTS-connected RE projects in India will take place under tariff-based competitive bidding (TBCB).
- All charges including wheeling charges, scheduling charges, maintenance and reactive power charges, as per CERC / SERC guidelines where applicable, shall be included.
- Connectivity should be at 220 kV level and above.
- Power supply shall be based on the demand profile of the buying entity.
- The power supply shall be in 96-time blocks of the day applicable for each contract year. Up to 5% of power can be sourced from green sources.
- The demand fulfilment ratio (DFR) based on supply vs demand profile shall be 90% on a monthly basis.
- ESS shall be charged using RE only.



- ESS can be tied up separately with a third party.
- During the PPA period of 25 years, ESS technology can be changed at any time under intimation to SECI.
- AC capacities shall be considered for the capacity of the project.
- The configuration of the project can be changed up to 12 months before commissioning.
- Since connectivity is at ISTS, the minimum capacity of the bid shall be 50 MW and a maximum of 750 MW per entity.
- The projects can be co-located or at different locations. If ESS is at a different location, the charges for charging/discharging are to be borne by the developer.
- The developer has to get all permissions, including connectivity to SECI.
- Excess generation can be sold to a third party/power exchange or to discom at 50% of the PPA tariff.
- Part commissioning up to 50 MW and the balance capacity later is allowed.
- A 24-month timeframe is allowed for the commissioning of projects.
- There is no incentive for early commissioning.
- A trading margin of 7 paise/unit payable to SECI.
- Earnest money deposit (EMD) by bank guarantee (BG), performance bank guarantee (PBG), or payment on order instrument (POI) issued by IREDA/REC/PFC is required.
- Success charges/MW to be paid by selected bidders. PPA will be signed only after the success charges are deposited with SECI.
- Payment security mechanism at 2 paise/unit payable to SECI for FDRE project.
- For shortfall in supply of power, penalty payable by the developer is excluded in case of force majeure events.

FDRE tenders

A. NTPC tender

NTPC invited online bids for supply of 3,000 MW of firm and dispatchable power from interstate transmission system (ISTS) connected RE projects anywhere in India under FDRE Tranche II on build-own-operate basis.

Tata Power Renewable Energy Ltd (TPREL) has been awarded 200 MW (4.71/unit), the first FDRE project from SJVN Ltd; this tender includes a greenshoe option for additional capacity beyond the initial 200 MW. This project is most likely to be commissioned within 24 months from the execution date of the power purchase agreement. This project incorporates the combination of solar, wind and battery storage with appropriate capacities.

Other companies that were awarded projects in the NTPC auction are Axis Energy at a tariff of Rs 4.64/unit for 300 MW, Juniper Green Energy at a tariff Rs 4.69/unit for 200 MW, Hero Energy at a tariff of Rs 4.69/unit for 120 MW, Serentica Renewables at a tariff of Rs 4.71/unit for 200 MW, Renew Solar Power at a tariff of Rs 4.72/unit for 400 MW, Bright Night Renewables at a tariff of Rs 4.72/unit for 110 MW, and ACME at a tariff of Rs 4.73/unit for 53 MW. Here the price includes the cost of ESS and the price is valid for 25 years from the date of commissioning. Out of 3,000 GW, only 1,584 GW was auctioned, where the aggregate bids received were only for 1,980 MW.

B. SECI tenders

SECI – FDRE I: SECI has invited bids for supply of 500 MW ISTS for setting up ISTS connected renewable energy projects under SECI - FDRE I on built-own-operate basis. SECI will sign into the 25-year power purchase agreement with the winning bidders, subject to the terms and conditions indicated in the request for selection (RfS) and PPA agreements. According to the notification issued by SECI, the scope of work involves providing power to Punjab State Power Corporation Ltd on a demand-following basis.

The bidders shall submit a single bid, offering a minimum quantum of cumulative contracted capacity of 50 MW and a maximum quantity of 250 MW, in the prescribed formats. The cumulative contracted capacity must be quoted in multiples of 10 MW only.

SECI – FDRE II: SECI had invited bids for supply of 1,500 MW ISTS for setting up ISTS connected renewable energy projects under SECI – FDRE II on build-own-operate basis.

The winners of this tender are Hero Future Energy at a tariff of Rs 5.59/unit for 120 MW, JSW Neo Energy at a tariff of Rs 5.60/unit for 180 MW, Serentica Renewables at a tariff of 5.60/unit for 100 MW and Renew Solar Power at a tariff of Rs 5.60/unit for 80 MW. It was recorded that 480 MW out of 1,500 MW was auctioned.

SECI – FDRE III: SECI has invited for bids for supply of 800 MW ISTS for setting up ISTS connected renewable energy projects under SECI - FDRE III on build-own-operate basis. The bidders shall submit a single bid, offering a minimum quantum of cumulative contracted capacity of 50 MW and a maximum quantity of 400 MW in the prescribed format. The cumulative contracted capacity must be quoted in multiples of 10 MW only.

SECI – FDRE IV: SECI has invited for bids for supply of 1.26 GW ISTS for setting up ISTS connected renewable energy projects under SECI - FDRE IV on build-own-operate basis. The bidders shall submit a single bid, offering a minimum quantum of cumulative contracted capacity of 50 MW and a maximum quantity of 630 MW. SECI will sign 25-year power purchase agreement with the winning bidders.

Out of 1.26 GW, power from 1.25 GW is scheduled to be sold by SECI to Delhi utilities BSES Rajdhani Power Limited (BRPL) and BSES Yamuna Power Limited (BYPL). Electricity generated by the remaining 10 MW will be procured by Gujarat-based M/s GIFT Power Company Limited (GIFT PCL).

SECI – FDRE V: SECI has invited bids for supply of 1,000 MW ISTS for setting up ISTS connected renewable energy projects under SECI – FDRE V on build-own-operate basis. SECI will sign 25-year power purchase agreement with the winning bidders. The power purchased by SECI has been designated to be sold to the Punjab State Power Corporation (PSPCL).

Bidders who have previously commissioned renewable energy and/or storage projects, and/or are in the process of doing so, and have untied capacity are also eligible to participate. In such a case, they will be entitled to a longer period of PPA, comparable with the time between the actual start of power supply and the scheduled commencement of supply date (SCSD).

The bidders shall submit a single bid, offering a minimum quantum of cumulative contracted capacity of 50 MW and a maximum quantity of 500 MW. SECI - FDRE (solar power project): SECI has invited bids for supply of 25 GW solar power project with 20 GW/50 MWh battery energy storage system at Ladakh.

Bidders must have experience in engineering, procurement and construction (EPC) or as a developer with experience in the execution of ground-mounted solar power project on turn-key basis in one of these categories:



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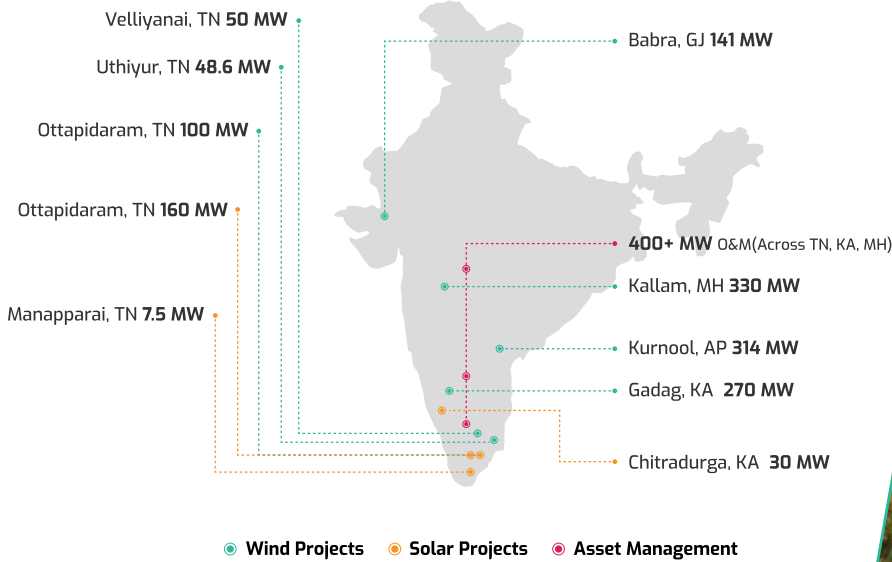
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1. Design, supply, installation and commissioning of grid-connected solar power projects with a cumulative capacity of 12.5 MW over the past seven financial years as on the bid submission timeline. Also, this project must have been in operation satisfactorily for at least six months before the bid submission date.
2. Design, supply, installation and commissioning of at least two grid-connected solar power projects, each with an individual capacity of 2.5 MW or more over the past seven financial years as on the bid submission timeline. Also, these projects must have been in operation satisfactorily for at least six months before the bid submission date.

It can be clearly understood that India is at the forefront of FDRE concept and there is a significant potential to become a global leader when tenders are followed diligently and implemented to foster the country's development further. Also, this concept aims at providing round-the-clock power. Moreover, FDRE power will help to scale up renewable capacity addition while also helping in achieving economies of scale. It will also facilitate the obligated firms meet their fulfilment of renewable purchase obligation (RPO) requirements.

Dr N Karunamoorthy is the Managing Director; C R Viswanathan is Advisor – Regulatory & Policy; Maheswari Manoharan is Executive – Business Development at Windplus Private Limited. The authors can be contacted at contact@windplus.in

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Proceedings – 14th AGM of IWPA Gujarat State Council

Overview

The 14th annual general meeting (AGM) of IWPA Gujarat State Council was held on 12 April, 2024, via video telephony, with sufficient quorum.

Introductory remarks

Secretary-general Mr Ajay Devaraj congratulated the members since Gujarat has the highest installed wind capacity in the country, with 11.7 GW as on 31 March, 2024, and generated 14,073 million units (MU) in FY 2023-24. Mr Devaraj said that in the period between 1 and 12 April, Gujarat maintained the lead with 387.70 MU generation.

He further said, “As per IWPA bylaws, an office bearer or a state council member ceases to hold office if he is no longer with the member company. For this reason, Mr Manoj Mishra ceases to be the president of GSC. The IWPA bylaws also state that the vice president shall preside over the meeting, in the absence of the president. However, GSC does not have a vice president. So the AGM will be presided over by the IWPA chairman.”

Chairman Prof Dr K Kasthurirangaian welcomed the members, and suggested proceeding with the agenda, beginning with the report from the state council.

Annual report

As Secretary of GSC Mr Dilbag Sharma could not join due to pressing official matters, Mr Devaraj presented the report.

Salient points from the report: The state council has made representations and has had meetings with the Government of Gujarat for the extension of the wind policy which was in operation from 2 August, 2016 and extended till 31 March, 2023. Representations were made with GERC – prior to and after the public hearing on 8 April, 2024 about the wind tariff discussion paper – for expediting an industry- and investor-friendly wind tariff order. GSC has been advocating for a PPA framework for MSME category projects under FiT mode.

As developers have been facing various challenges including threats and violence against site personnel, tripping of transmission lines and the like by local miscreants, GSC met with the state chief minister, seeking intervention. The suggested solutions include formation of empowered task forces in the districts that have the highest concentration of projects, for timely redressal of complaints related to law and order; formal communication from the Government of Gujarat to the district-level revenue and police authorities to conduct quarterly / half-yearly meetings with RE developers to facilitate airing of concerns and their timely resolution.

Election of council members

Sl. No.	Name	Company	Designation	Position in GSC
1	Mr Jigar Shah	Kintech Synergy Pvt Ltd	Managing Director	Treasurer
2	Mr Arshi D Kambariya	Opera Energy Pvt Ltd	Managing Director	State council member

Sl. No.	Name	Company	Designation	Position in GSC
3	Mr Divyesh M Savaliya	Onix Structure Pvt Ltd	Managing Director	State council member
4	Dr Janukkumal Modi	Viviid Renewables Pvt Ltd	Associate Vice President	State council member
5	Mr Jay Vyas	Shridhar Infratel Pvt Ltd	Chairman & Managing Director	State council member

The full complement of IWPA GSC members is as follows:

Sl. No.	Name	Company	Designation	Position in IWPA GSC
1	Mr Dilbag Sharma	ReNew Power Pvt Ltd	State Head - Gujarat	Secretary
2	Mr Jigar Shah	Kintech Synergy Pvt Ltd	Managing Director	Treasurer
3	Mr Amresh Pandey	Siemens Gamesa Renewable Power Pvt Ltd	Manager	State council member
4	Mr Arshi D Kambariya	Opera Energy Pvt Ltd	Managing Director	State council member
5	Mr Dhatchina Moorthy	SEP Energy Pvt Ltd	Director	State council member
6	Mr Divyesh M Savaliya	Onix Structure Pvt Ltd	Managing Director	State council member
7	Dr Janukkumal Modi	Viviid Renewables Pvt Ltd	Associate Vice President	State council member
8	Mr Jay Vyas	Shridhar Infratel Pvt Ltd	Chairman & Managing Director	State council member
9	Mr Jeetendra Thakkar	CLP India (P) Ltd	Head – Government Affairs	State council member
10	Mr Z N Kadri	Gujarat Industries Power Company Ltd	Dy. Manager – Business Development	State council member
11	Mr Kamlesh B Trivedi	Navneet Education Ltd	Commercial Manager	State council member
12	Mr Mohammed Irfan	Netra Energy Pvt Ltd (Alfanar Energy)	Director	State council member
13	Mr Purvish M Shah	Gopal Glass Works Pvt Ltd	Business Head	State council member
14	Mr N Saravanan	Windplus Pvt Ltd	Head – Wind & Site	State Council Member

Open forum

A member pointed out that it is difficult for small captive consumers to take up projects in Gujarat. An office bearer said that the council planned to meet the authorities in this regard. Mr Devaraj said that if any matter required to be brought to the attention of the central ministries, the national office would take it up.



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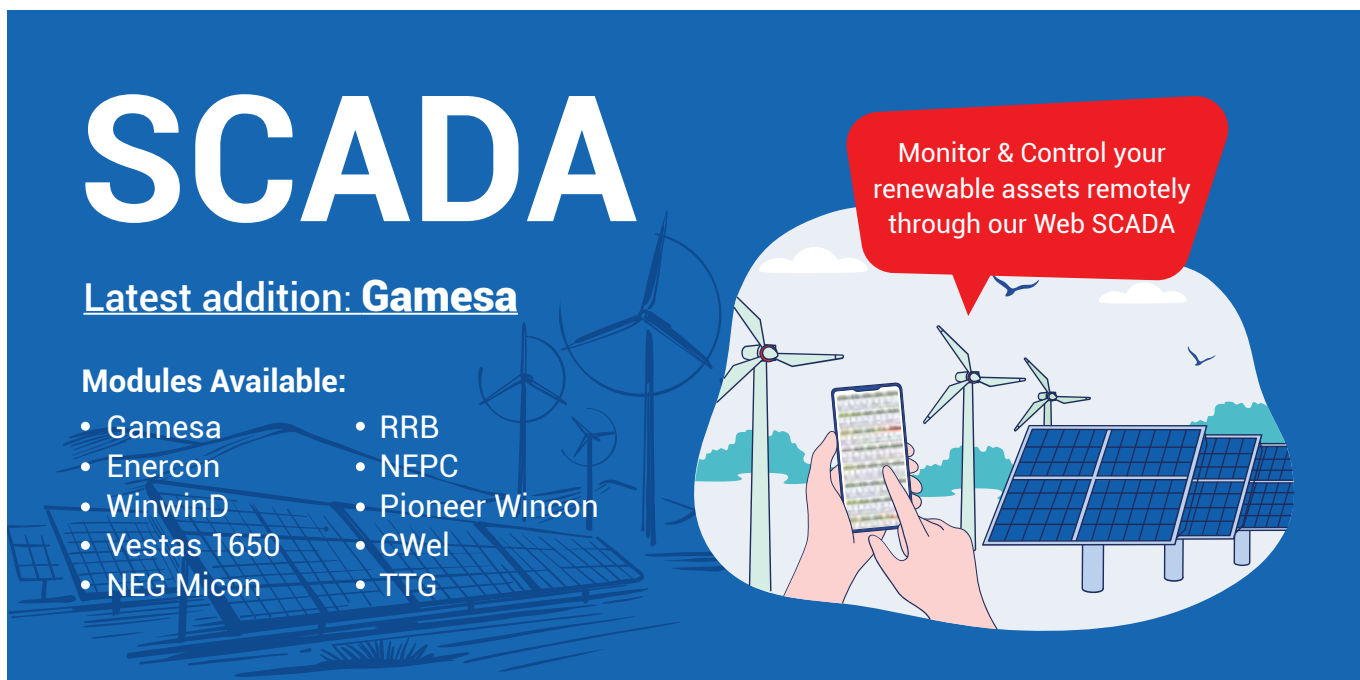
When a member pointed out that a large area comes under the Ministry of Defence, Mr Devaraj said that IWPA has sought coordinates of the red zones where turbines cannot be installed, as Maharashtra also faces the same issue.

To a member's query on an OEM renegeing on O&M contractual obligations, Mr Devaraj said that though IWPA could not intervene since it was only between two entities, it was to address such issues that IWPA has been organising the all-India multi-brand AMC meets, bringing stakeholders on a common platform so that asset owners could choose a service provider ideally suited to their needs. A member pointed out that there were other problems including shared facility being with the OEM developer, and hence asset owners were not able to opt for an independent service provider. Mr Devaraj said that IWPA could facilitate a dialogue between the OEMs and turbine owners to find a solution.

To a question on extension of PPA after 20 years, it was pointed out that the turbine owner has to get the health of the turbine assessed and then can get the open access agreement extended by three or five years.

Vote of thanks

Mr Jigar Shah, treasurer of Gujarat State Council, proposed the vote of thanks.



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Possibility in every drop

Wind pattern and power generation in Tamil Nadu – March 2024

Rainfall: As per historical data, the average Tamil Nadu sub-division rainfall expected in March was 19.9 mm. However, with 1.2 mm recorded, the state experienced a very large deficient of 94%, marking a lower spell compared to the last 32 years.

Rainfall recorded in western ghats' wind pass-wise districts were:

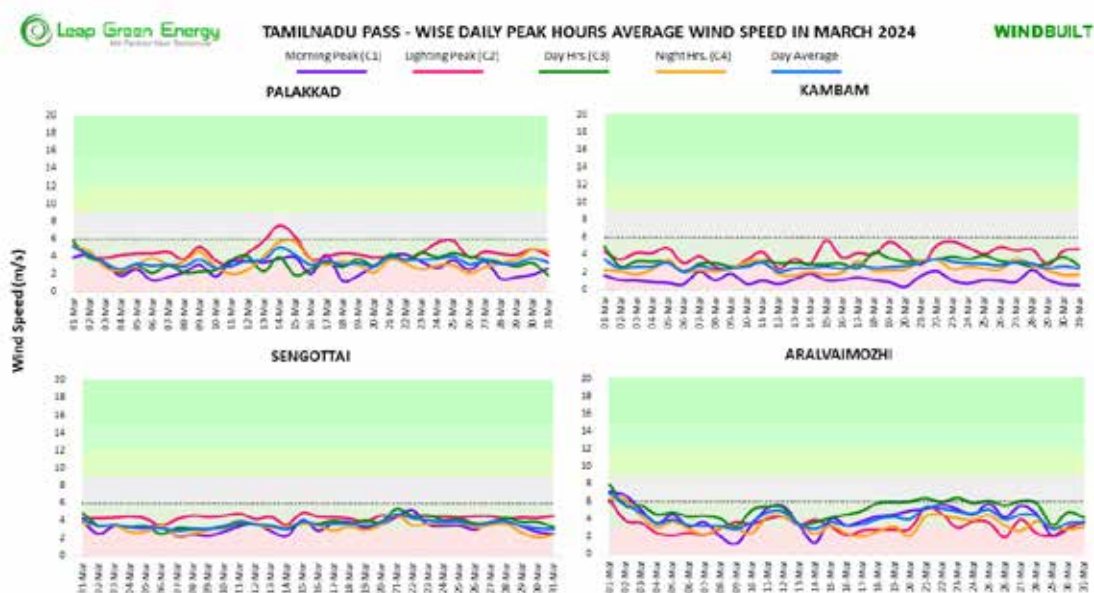
- Palakkad-Coimbatore 0.4 mm (-98%)
- Kambam-Theni 1.5 mm (-96%)
- Sengottai-Tenkasi 2.2 mm (-96%)
- Aralvaimozhi-Tirunelveli 7.1 mm (-83%)
- Palk Strait-Thoothukudi 6.9 mm (-79%)

Year	2023	2022	2021	2020	2019	2018	2017
Rainfall in mm	34.3	12.1	7.4	3.9	3.1	25.8	35.4

Historic rainfall

Wind activity

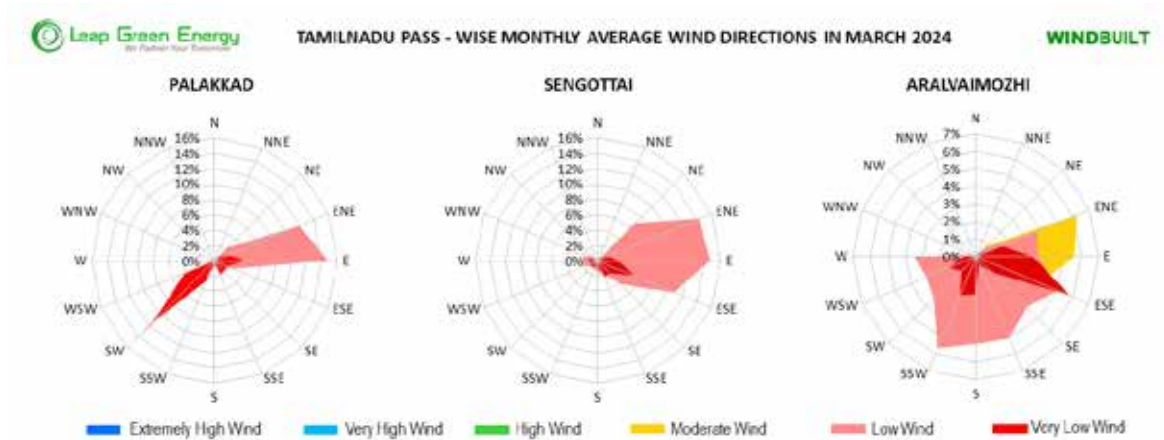
- **Cyclonic circulations:** There was no cyclone formation over the north Indian Ocean.
- **El-Niño Southern Oscillation (ENSO):** El Niño conditions were observed. Equatorial sea surface temperatures (SSTs) were above average across the central and east-central Pacific Ocean. The tropical Pacific atmospheric anomalies are weakening. A transition from El Niño to ENSO-neutral is likely by April-June 2024 (85% chance), with the odds of La Niña developing by June-August 2024 (60% chance). The most recent Oceanic Niño Index (ONI) value (January 2023 – March 2024) had 1.5°C anomaly and for the month of March, the value had 1.15°C anomaly.
- **Indian Ocean Dipole (IOD):** At present, positive Indian Ocean Dipole (IOD) conditions are observed over the Indian Ocean, with the latest anomaly value for March recorded as 0.73°C.



Average peak wind speed

- **Madden Julian Oscillation (MJO):** The Madden Julian Oscillation (MJO) Index was in phase 3 during the first three days of the month, with an average amplitude of 1.87.
- **Pass-wise average wind speed:** Palakkad, Kambam, Sengottai and Aralvaimozhi wind passes had average wind speeds of 3.4 m/s, 2.7 m/s, 3.6 m/s and 4.1 m/s, respectively. Notably, during the day, the average wind speed at Aralvaimozhi Pass increased to 5.1 m/s, with the maximum day average wind speed reaching 8.0 m/s on 1 March, 2024.

Wind direction

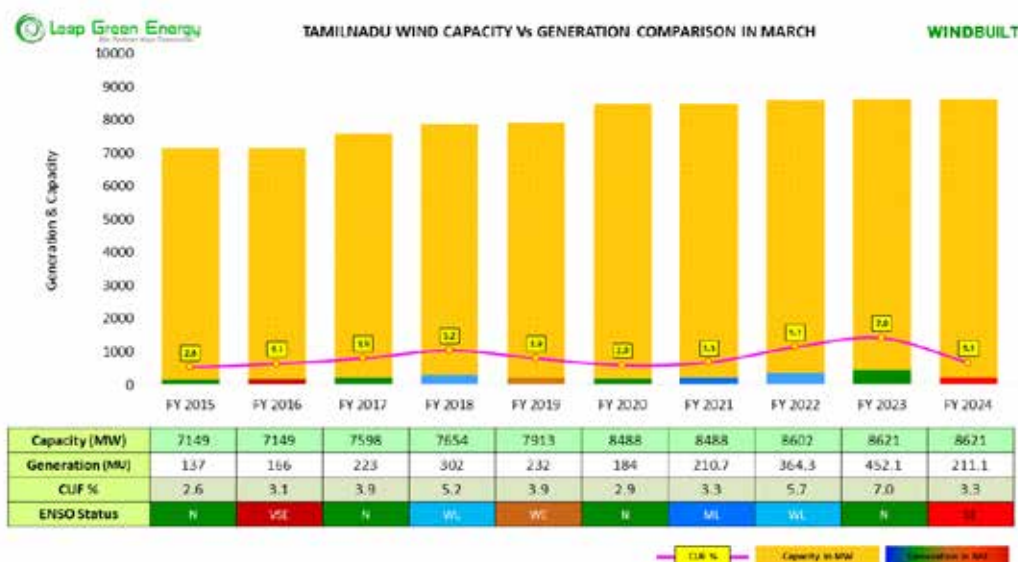


Average wind direction

Palakkad Pass wind directions were 30.2% in SW, 21.4% in the east and 16.6% in ENE. In Sengottai Pass, the wind directions were 20.5% in ESE, 18.8% in the east and 16.8% in ENE. In Aralvaimozhi Pass, wind directions were 14.9% in ESE, 13.6% in the east and 12.7% in ENE.

Wind power generation

In March 2024, wind power evacuation contributed to 1.7% of Tamil Nadu's total energy demand met.



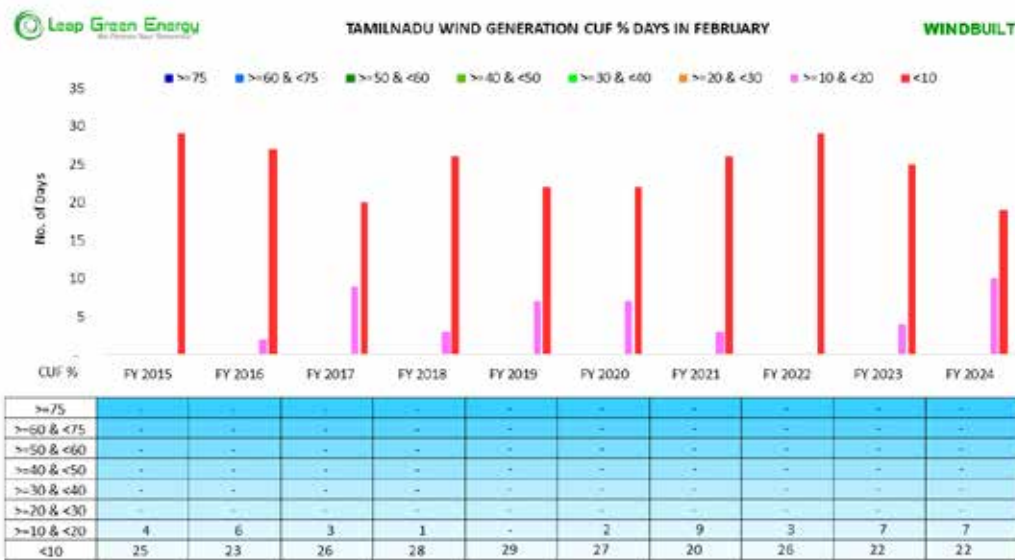
Monthly generation comparison

- **Maximum generation:** On 1 March, the maximum evacuation reached 22.26 MU, constituting 5.8% of the total demand met.
- **Minimum generation:** On 6 March, the minimum evacuation was 2.81 MU, constituting 0.7% of the total demand met.

Only on one day the generation was between 20 and 30 MU, for four days it was between 10 and 20 MU, and for the remaining 26 days, it was less than 10 MU. During March 2024, 211.1 MU of wind energy was evacuated from Tamil Nadu, which is 3.3% of CUF, which is 53.30% lesser than the CUF of March 2023.

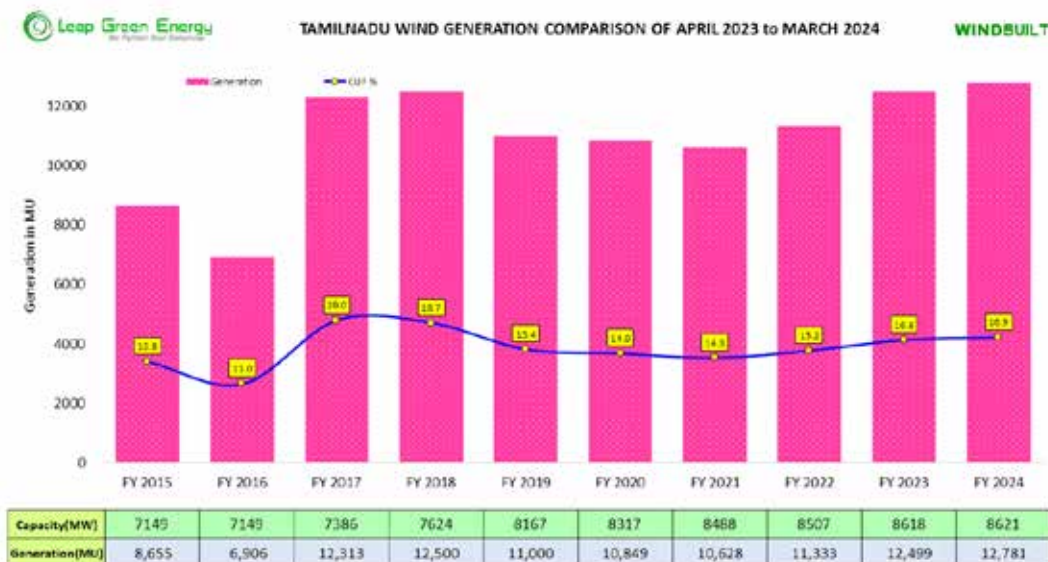
Capacity Utilisation Factor (CUF)

As regards capacity utilisation factor, for only one day it was between 10 and 20%, and for the remaining 30 days, it was less than 10%.



CUF frequency

FY cumulative generation as on March 2024



Cumulative FY-wise generation comparison

During FY 2024, 12,781 MU of wind energy was evacuated, which amounts to 16.9% CUF of the total installed capacity of 8,621 MW.

Energy consumption comparison

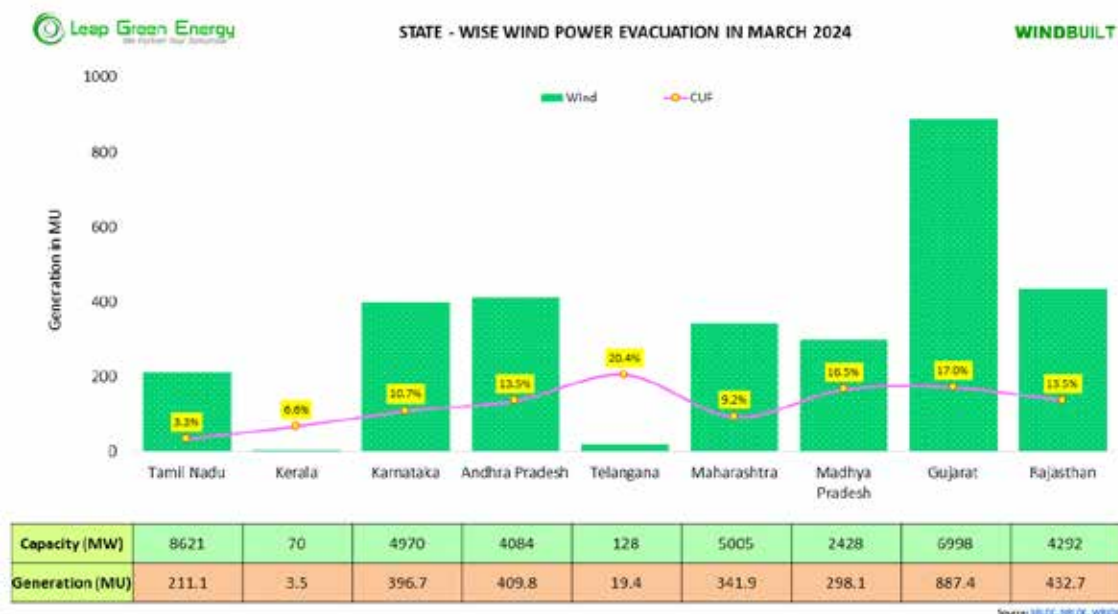
As regards the energy utilisation of Tamil Nadu, 60.2% of energy was taken from the national grid, followed by 21.9% of thermal, 9.4% of solar, 3.9% of other resources like bio-mass and co-generation, 1.7% of wind, 1.6% of hydro and 1.3% of gas.

In March, the energy consumption was 12,171 MU and 12% higher than that last year.

- **Maximum consumption:** The maximum consumption was 417.19 MU on 29 March 2024.
- **Minimum consumption:** The minimum consumption was 350.59 MU on 03 March 2024.

State-wise wind power evacuation

In March 2024, Telangana had the maximum wind power capacity utilisation of 20.4%, Gujarat had 17%, Madhya Pradesh had 16.5%, Rajasthan had 13.5%, Andhra Pradesh had 13.5%, Karnataka had 10.7%, Maharashtra had 9.2%, Kerala had 6.6% and Tamil Nadu had 3.3%. An aggregate quantum of 3,000.6 MU was evacuated, which was 11% CUF of the total state grid-connected capacity of 36,596 MW of wind power in the country.



State-wise generation comparison

Reduction in carbon emission and water consumption

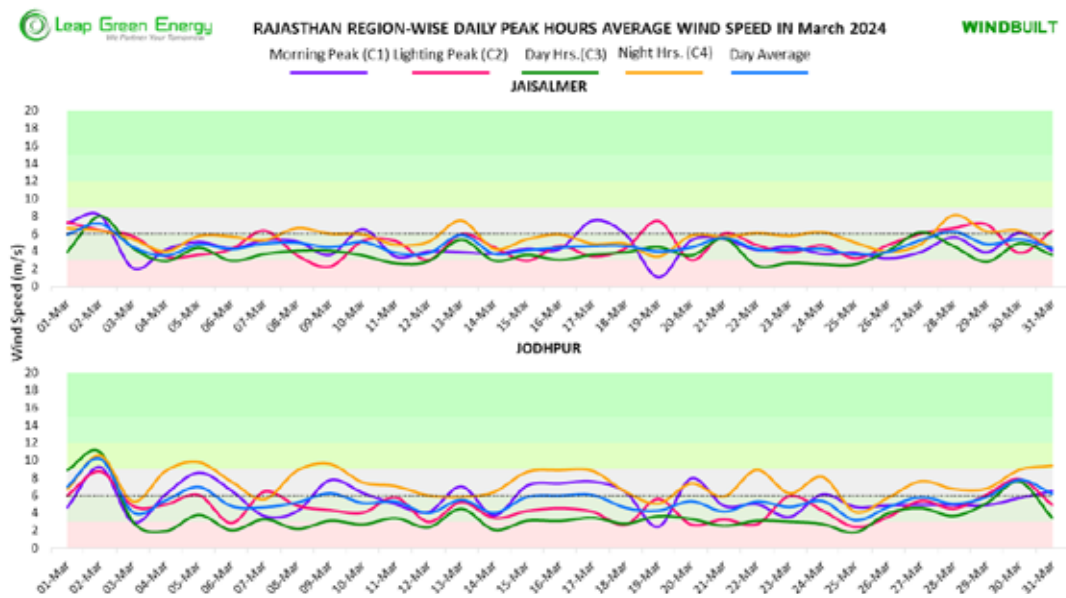
Wind power generation in Tamil Nadu during March 2024 has resulted in reduction of carbon emission and water consumption of about 1,96,932 tonnes and 25 million litres, respectively. Cumulative reduction of carbon emission and water consumption were 1,19,21,332 tonnes and 7,647 million litres respectively during FY 2024.

Feedback & queries: prabhu@leapgreenenergy.com

Wind pattern and power generation in Rajasthan – March 2024

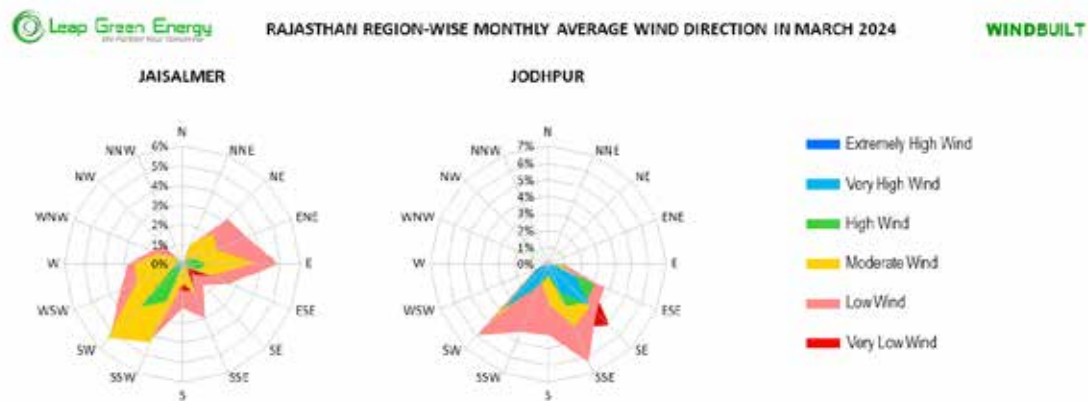
Rainfall: In March, 1.5 mm and 4.1 mm of rainfall were recorded in west Rajasthan and east Rajasthan. Compared to the normal rainfall of 4.3 mm and 4.2 mm respectively, these are lower spells in both the regions, compared to last year.

Wind speed: The average wind speed was 4.7 m/s in Jaisalmer and 5.5 m/s in Jodhpur regions. Both the regions' wind speeds were high compared to last year. The average wind speeds recorded last year were 4.3 m/s and 3.9 m/s respectively. However, the maximum average wind speed sustained was 11 m/s during the day hours on 2 March in Jodhpur region.



Wind speed

Wind direction



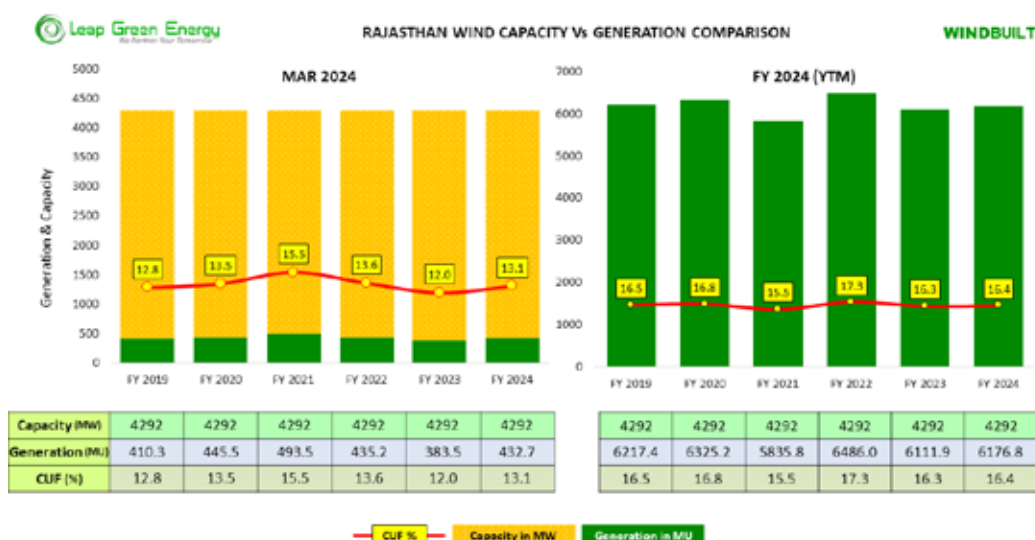
Wind direction

In March, Jaisalmer region's wind directions were 16.3% in SW, 12.0% in SSW and 11.3% in the east. Jodhpur region's wind directions were 21.8% in SW, 19.4% in SE and 19% in SSE.

Wind generation

In March 2024, 432.7 MU of wind energy was evacuated in Rajasthan, which contributed to an average of 4.8% of the state's total electricity demand met.

- **Maximum generation:** The maximum evacuation was 36.52 MU on 2 March, which accounted for 14.6% of the demand met.
- **Minimum generation:** The minimum evacuation was 4.42 MU on 25 March, which accounted for 1.8% of the demand met.
- **CUF:** The wind capacity utilisation factor for March worked out to 13.1% and for FY 2024 it was 16.4%.



Monthly generation comparison

Reduction in carbon emission and water consumption

Wind power generation in March 2024 has resulted in reduction of carbon emission and water consumption of about 4,03,564 tonnes and 70 million litres respectively. The cumulative reduction for FY 2024 is 57,61,438 tonnes of carbon emission and 1,517 million litres of water consumption.

Feedback & queries: prabhu@leapgreenenergy.com

NOTABLE QUOTE

While standalone wind and solar projects will continue to be awarded through auctions, going forward, the share of more round-the-clock RE projects in auctions will increase substantially. Additionally, government's announcement of viability gap funding for the development of battery energy storage systems with a capacity of 4,000 MWh, is a welcome step towards mass adoption as storage cost continues on the downward trajectory over the next decade.

Devansh Jain, INOXGFL. Courtesy: ETEnergyWorld

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IWPA's representations

- For the Draft National Electricity Plan (Volume II: Transmission) that covers the period up to 2030, IWPA submitted its comments to Central Electricity Authority on 15 April. As the draft considers a small RE capacity addition of 8 GW in Tamil Nadu compared to the other states, and as the proposed addition is at variance with the policy announcement of 33 GW by 2027, IWPA requested a re-examination of the figures. It was also pointed out that the proposed transmission capacity addition was meant to cater to the evacuation of wind energy only. As this indicates that the possible capacity addition of solar power has not been taken into consideration, IWPA requested the same to be considered for the proposed transmission plan. Other aspects, such as new technology options for transmission lines and silt removal in hydel reservoir, among others, were also included in the comments.
- IWPA submitted its preliminary comments on the Draft Consultative Paper on Harmonic Current Control in Inverter based resources (IBR) / Distributed Energy Resources (DER) to TNERC on 10 April. As the draft paper is highly technical and has several cross references, IWPA sought an extension of time for submitting detailed comments.
- IWPA wrote to TNERC and TANTRANSCO on 2 April, on the commercial implementation of the Forecasting, Scheduling and Deviation Settlement and related matters for Wind and Solar Generation Regulations 2024, informing the commission that a majority of the members have nominated a qualified coordinating agency (QCA). As the QCA would be able to upload forecasts only after they have been trained and provided with web access, IWPA requested that the commercial implementation be enforced only from the date that the QCA is able to upload forecasts.
- On the Draft Distribution Perspective Plan 2030, IWPA submitted its comments to CEA on 1 April. As a target or percentage has not been fixed to define the best practices in distribution and as metering has not been completely done in all the states, IWPA requested fixing of targets with timelines for 100% metering of all consumption and to evolve key performance indicators. Considering the present HT / LT ratio in the states and the national average, it was requested to fix a realistic target. IWPA suggested a few key performance indicators, such as line loss reduction target, voltage standards in different distribution network, billing efficiency and HT / LT ratio.
- IWPA submitted its comments to CERC on 28 March, on the Draft Detailed Procedure for Reallocation of Connectivity within ISTS Connectivity Complex. While it was requested not to impose any time restriction for applying for reallocation of connectivity, a clause on the permissibility of reallocation was sought to be amended. The amendment was requested considering the possibility that a subsequent substation may be located near the project than the substation on which connectivity was secured. Clarifications were sought on the payment of bay charges, and if CTUIL would permit reallocation if antecedent substation or pooling station within the ISTS Connectivity Complex had not been notified as closed for granting connectivity.

NOTABLE QUOTE

Discoms increasingly prefer new-age RE tenders, including wind-solar hybrid tenders, which offer a better power generation profile, stable and firm power and smoother output.

Somesh Kumar, EY India. Courtesy: ETEnergyWorld

Ministries' announcements

Summary of announcements that pertain to the wind industry, made by various ministries

DATE	MINISTRY	DETAILS
18 April 2024	18 April 2024	<p>IREDA to boost green hydrogen and renewable energy manufacturing projects</p> <p>Indian Renewable Energy Development Agency Ltd (IREDA) has opened an office in Gujarat International Finance Tec-City (GIFT-City), Gandhinagar, to provide debt options denominated in foreign currencies. This will facilitate natural hedging and significantly reduce the financing costs for green hydrogen and renewable energy manufacturing projects.</p> <p>Speaking at the World Future Energy Summit 2024, Abu Dhabi, the IREDA CMD emphasised the role that energy storage will play in achieving the National Green Hydrogen Mission's ambitious target of producing 5 million metric tons per annum by 2030, and the need to enhance research and development to reduce cost and improve performance of energy storage solutions. CEA projects a storage requirement of nearly 400 gigawatt-hours (GWh) by 2030-32, with an estimated investment of more than Rs 3.5 lakh crores.</p> <p>Source: https://pib.gov.in/PressReleasePage.aspx?PRID=2018150</p>
13 April 2024	Ministry of Power	<p>Government to operationalise gas-based power plants to meet summer demand</p> <p>To meet the high electricity demand in the country during the summer season, the government has decided to operationalise gas-based power plants. To ensure maximum power generation from gas-based generating stations, government has issued directions under Section 11 of the Electricity Act, 2003 – under which a generating company shall, in extraordinary circumstances operate and maintain any generating station in accordance with the directions of government). Many of the gas-based generating stations (GBSs) are currently unutilised, due to commercial considerations. The order will be valid from 1 May, 2024 to 30 June, 2024.</p> <p>As per the arrangement, GRID-INDIA will inform the GBSs in advance, of the number of days for which gas-based power is required. The GBSs having power purchase agreements (PPAs) with distribution licensees shall first offer their power to PPA holders. If the power is not utilised by any PPA holder, then it shall be offered in the power market. The government has other measures too, to meet the summer demand.</p> <p>Source: https://pib.gov.in/PressReleasePage.aspx?PRID=2017826</p>

Media bites

A summary of news that pertain to the wind industry

Media bites – National

Five companies to develop NTPC's 1 GW wind-solar hybrid projects

19 April, 2024

NTPC Limited has announced the successful bidders of its auction to develop 1,000 MW of inter-state transmission system connected wind-solar hybrid projects, tranche V. Sprng Energy, Ampln Energy Transition, and Juniper Green Energy have won 150 MW each, at the per kWh rate of Rs 3.41, Rs 3.42 and Rs 3.43, respectively. ReNew and Avaada Energy have won 300 MW and 250 MW by quoting Rs 3.44 and Rs 3.47 per kWh, respectively.

At least one of the project's resources (wind or solar) must have a rated power capacity equivalent to or exceeding 33% of the total contracted capacity. The developers can propose hybrid projects with or without an energy storage system. NTPC has mandated the use of indigenously manufactured solar modules listed in the approved list of models and manufacturers. And only type-certified wind turbine models in the revised list of models and manufacturers will be allowed.

Source: <https://renewablewatch.in/2024/04/19/ntpc-declares-winners-of-its-1-gw-wind-solar-hybrid-auction/>

NTPC Green Energy signs MoU with Indus Towers for RE projects

19 April, 2024

With an ambitious target of 60 GW of RE capacity by 2030, from its current capacity of 3.5 GW and 28 GW in the pipeline, NTPC Green Energy (NGEL) has signed a memorandum of understanding (MoU) with Indus Towers Limited (ITL) – India's leading telecom infrastructure provider that manages more than 2 lakh telecom towers and communication structures.

ITL's RE portfolio expansion plan is part of its net zero commitments. The MoU entails a joint development of grid-connected RE projects including wind, solar and storage.

Source: <https://telecom.economictimes.indiatimes.com/news/industry/ntpc-green-energy-inks-pact-with-indus-towers-to-develop-renewable-energy-projects/109422628>

Mahindra Group to develop 150 MW hybrid project

15 April, 2024

Mahindra Group will develop a 150-MW solar and wind hybrid project in Maharashtra, in line with its commitment to achieving 100% renewable energy across its businesses by 2030.

The project, worth Rs 12 billion, will be developed by the group's renewable energy platform Mahindra Susten, in which Ontario Teachers' Pension Plan Board took a 30% stake in 2022. It marks Mahindra Susten's entry into the hybrid renewable energy segment.

The system will consist of 101 MW of wind capacity and 52 MW of solar capacity, with part of its output to be supplied to the auto and farm businesses of automotive producer Mahindra & Mahindra. The power plant is set to integrate more than 80% locally manufactured components.

Source: <https://renewablesnow.com/news/indias-mahindra-to-develop-150-mw-solar-and-wind-project-854819/>

Media bites – International

Fred. Olsen plans 100-MW hybrid energy park in Scotland

23 April, 2024

Norway's Fred. Olsen Renewables AS is seeking the Scottish government's consent to build a 100-MW hybrid renewable energy complex, its first such project in the country.

The Lees Hill Renewable Energy Park in the Scottish Borders will incorporate onshore wind, solar power and battery storage capacity.

Plans for the contemplated project have been subject to public consultation since 2022 and altered in response to feedback. The project has been revised to cut the total number of turbines and reduce the area for the solar photovoltaic (PV) panels.

The submitted proposal with the government consists of six turbines of up to 200 metres in height and a 60-MW solar plant, to be coupled with a 60-MW battery storage facility.

Source: <https://renewablesnow.com/news/fred-olsen-seeks-permit-for-100-mw-hybrid-energy-park-in-scotland-855460/>

Giga Storage gets permit to build 600 MW battery in Belgium

23 April, 2024

Dutch energy storage developer Giga Storage BV has secured a permit to build a 600-MW/2,400-MWh battery energy storage system (BESS) park in Belgium.

Known as Giga Green Turtle, the complex will be made up of 720 battery units and is set to become Europe's biggest battery site. The large-scale park will be installed in Dilsen-Stokkem, Limburg province, to store wind and solar power and inject it into the grid during periods of low generation. Its operation will cover the average energy consumption of 330,000 families daily, Giga Storage estimates.

Amstelveen-based Giga Storage aims to realise 3 GW of BESS projects in Belgium by the end of the decade. Its first project in the country is the Blue Marlin scheme, which will add 300 MW of battery storage capacity in Limburg's Kinrooi municipality, across the Dutch border.

Source: <https://renewablesnow.com/news/giga-storage-wins-permit-of-600-mw-battery-in-belgium-855490/>

Protium marks one-year milestone in green hydrogen production

23 April, 2024

Protium Green Solutions, UK-based green hydrogen company is celebrating the one-year anniversary of Pioneer 1, its first operational hydrogen production facility. The company is one of a handful of UK companies operating commercial hydrogen production facilities in order to build expertise and pave the way for future developments.

Since March 2023, Pioneer 1 has been operational in South Wales, with the hydrogen produced used in trials for fleets and transport, alongside various projects for customers across the UK.

In Q4 2024, Protium will open its second hydrogen production facility, making it the only company in the UK with two operational facilities producing commercially available hydrogen from renewables.

Scaling up production to meet the demand seeded by Pioneer 1, the new facility will feature a 2.5 MW

electrolyser. Ten times larger than Pioneer 1, this facility will reduce carbon emissions by 156,000 tonnes annually – the equivalent of removing 37,000 cars from UK roads.

Source: <https://www.renewableenergymagazine.com/hydrogen/protium-marks-oneyear-milestone-in-green-hydrogen-20240423>

Socomec launches energy storage system grid lab

19 April, 2024

To develop technology for grid security, resilience and reliability, France-based Socomec, a global manufacturer of energy storage solutions, has launched the energy storage system (ESS) grid lab near Strasbourg in France.

The multi-million euro energy storage development centre has a highly modular and flexible testing environment, with the capacity to replicate different storage project conditions and installation. The new facility will test the capabilities for a range of energy storage projects for customers that would otherwise be unfeasible in real-world networks.

On-site generators allow the facility to simulate grids from across the globe, including different local voltage and frequency types. The grid lab provides testing through its own microgrid of up to 3MW, which consists of a range of platforms.

Socomec energy storage solutions specialist Flavien Martos said, “By being able to replicate the grid scenarios where our customers need storage solutions, no matter where they are in the world, we can run development and factory acceptance checks of the custom storage offerings we provide.”

Source: <https://www.smart-energy.com/industry-sectors/new-technology/energy-storage-system-grid-lab-launched-near-strasbourg/>

Battery powers Dutch coast smart grid project

17 April, 2024

The municipality of Hague and Dutch grid operator Stedin are running a project to develop a battery-powered smart beach electric grid to power the coast of Scheveningen. The project involves an autonomous electricity grid that can self-regulate; a complete low-voltage network on a small scale, equipped with solar panels, heat pumps and charging stations.

The project will power various beach pavilions, a beach volleyball stadium and other major event venues. The new beach battery – constructed from recycled batteries sourced from EVs – has a capacity of 360kWh and can power a beach pavilion for two days.

Based on technology from Utrecht-based energy storage startup Eddy Grid, during sunny afternoons surplus solar energy is stored and utilised later when there is a high demand. This approach helps balance the Dutch energy grid, avoiding peak periods and ensuring optimal resource allocation.

Stedin faces the challenge of increasing congestion on the electricity grid. This battery exemplifies a smart solution to optimise grid capacity utilisation, according to Danny Benima, the CFO of Stedin. After a two-year trial period, Stedin plans to extend this model to other low-voltage networks across the country.

Source: <https://www.smart-energy.com/industry-sectors/smart-grid/beach-battery-powers-dutch-coast-smart-grid-project/>

Arevon and MCE to develop 250 MW energy storage project

17 April, 2024

Arevon Energy, Inc., a renewable energy developer that builds and operates solar and storage projects, has signed an agreement with electricity provider MCE for 188 (MW) of the Cormorant Energy Storage Project.

Cormorant Energy Storage is a 250 MW/1,000 MWh stand-alone battery energy storage system which will be constructed in two phases in Daly City, California.

Cormorant Energy Storage will feature state-of-the-art battery technology that will store energy during non-peak hours and discharge energy to provide power when it is needed during peak demand periods. Once both phases of the project are operational, Cormorant Energy Storage will be able to power more than 55,000 homes daily, facilitating the addition of more renewable energy resources into the region.

Source: <https://www.renewableenergymagazine.com/storage/arevon-announces-agreement-with-mce-for-250-20240417>

Japan's Jera launches 20 GW global green energy platform

15 April, 2024

Japanese power utility Jera Co has launched a UK-based global green energy business to speed up its investments in the sector and deploy 20 GW of renewable energy capacity by 2035 to back its 2050 zero-carbon emissions goal.

JERA Nex, headquartered in London, will develop, invest in, own and operate RE assets across the offshore and onshore wind, solar and battery storage sectors. The newly established entity will develop its own projects and will also “consider selective acquisition opportunities”.

The Japanese utility will kickstart the business by transferring most of the assets of its 3 GW installed RE fleet and its 10-GW development pipeline to JERA Nex.

Source: <https://renewablesnow.com/news/japans-jera-launches-20-gw-global-renewable-energy-platform-854735/>

Grid-connection permit issued for 850-MW Aussie battery

12 April, 2024

The 850-MW/1,680-MWh Waratah Super Battery (WSB) project in New South Wales is on track to be fully energised by next summer after receiving the technical green light from the Aussie market operator.

The Australian Energy Market Operator (AEMO) announced the issuance of Generator Performance Standard (GPS) approval for the project, the first such permit awarded to a large-scale battery energy storage system (BESS) project in the country. The specific approval sets the performance standards that generators and storage projects should meet to ensure the grid's stability and reliability and avoid disruptions during the interconnection of their facilities.

The super battery will be installed at the site of the decommissioned Lake Munmorah coal-fired power complex in New South Wales' Central Coast region. Akaysha Energy, owner of the WSB project, won a state government tender to develop and build the AUD-1-billion complex in October 2022 and secured planning permission the following year.

Source: <https://renewablesnow.com/news/grid-connection-permit-issued-for-850-mw-aussie-supper-battery-854462/>

Wind power installations in India up to March 2024

Installation in March 2024 **732.84 MW**
 Installation from April 2023 to March 2024 **3,253.39 MW**
 Cumulative installations up to March 2024 **45,886.51 MW**

S. No.	State	Installations March 2022	Installations March 2023	Apr 23	May 23	Jun 23	Jul 23	Aug 23	Sep 23	Oct 23	Nov 23	Dec 23	Jan 24	Feb 24	Mar 24	Total during FY 23~24	Total Operational in FY 23~24	
1	Andhra Pradesh	4096.65	4096.65	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4096.65
2	Gujarat	9209.22	9978.92	165.1	271.8	484.1	119	43.6	31.50	77.30	4.80	47.70	0.00	25.20	473.70	1743.80	11722.72	
3	Karnataka	5130.9	5294.95	0	8.1	10.5	0	0	0	0	214.20	68.16	221.16	101.19	101.35	724.66	6019.61	
4	Kerala	62.5	62.5	0	0	0	0	0	0	0	0	0	0	1.00	0	1.00	63.50	
5	Madhya Pradesh	2519.89	2844.29	0	0	0	0	0	0	0	0	0	0	0	0	0	2844.29	
6	Maharashtra	5012.83	5012.83	13.5	0	54	0	56.05	10.80	5.40	0.00	5.40	0.00	37.40	12.60	195.15	5207.98	
7	Rajasthan	4326.82	5193.42	0	0	0	0	0	0	0	0	0	0	2.40	0	2.40	5195.82	
8	Tamil Nadu	9866.36	10017.165	56.35	51.005	25.5	48	49.95	52.65	25.05	52.30	51.30	11.83	17.25	145.19	586.38	10603.54	
9	Telangana	128.1	128.1	0	0	0	0	0	0	0	0	0	0	0	0	0	128.10	
10	Others	4.3	4.3	0	0	0	0	0	0	0	0	0	0	0	0	0	4.30	
	Total	40357.57	42633.125	234.95	330.9	574.1	167.0	149.6	95.0	107.75	271.30	172.56	232.99	184.44	732.84	3253.39	45886.51	

Source: Ministry of New & Renewable Energy

State-wise wind energy evacuation – March 2024

State	State-grid connected installed capacity (MW)	Mar-24			FY 2023-24 Cumulative		
		Demand met (MU)	Wind energy (MU)	%	Demand met (MU)	Wind energy (MU)	%
Andhra Pradesh	4,084.00	7357.71	409.77	5.57	80,787.93	8,491.25	10.51
Gujarat	6,998.00	11331.70	887.40	7.83	1,46,251.70	14,073.20	9.62
Karnataka	4,970.00	10018.23	396.71	3.96	95,255.26	8,950.41	9.40
Madhya Pradesh	2,428.00	6800.00	298.10	4.38	96,520.30	3,867.40	4.01
Maharashtra	5,005.00	16376.80	341.90	2.09	2,01,694.50	7,533.23	3.73
Rajasthan	4,328.00	8937.23	430.51	4.82	1,06,895.90	6,143.16	5.75
Tamil Nadu	8,621.00	12171.44	211.13	1.73	1,26,566.03	12,765.68	10.09
TOTAL	36,434.00	72,993.11	2,975.52	4.08	8,53,971.62	61,824.33	7.24

An IWPA compilation

Renewable energy update

RE capacity added in February 2024

Karnataka – wind	: 101 MW
Rajasthan – solar	: 715 MW
Gujarat – solar	: 212 MW
Chhattisgarh – solar	: 107 MW
Tamil Nadu – solar	: 80.79 MW
Madhya Pradesh – solar	: 50 MW

Monthly RE generation

RE generation in March 2024: 16,789.31 MU (higher by 13% from February 2024). Solar and wind power generation increased in March 2024 by 23.5% and 3% respectively, on a month-on-month basis.

Source: JMK Research & Analytics

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