PowerLine TransTech India 2024
EXHIBITION AND CONFERENCE

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New Delhi, Monday, October 7, 2024 DAILY NEWS #1

TransTech India 2024 Begins

TransTech India 2024 gets off the ground today. The three-day exhibition and conference, being hosted by *Power Line* magazine, is India's biggest event in the transmission sector. The event is being officially supported by the Ministry of Power. The country's top four transmission developers – Power Grid Corporation of India Limited, Adani Energy Solutions Limited, IndiGrid and Sterlite Power – are also supporting the event. Pankaj Agarwal, Secretary, Ministry of Power, Government of India and Ravindra Kumar Tyagi, Chairman and Managing Director, Power Grid Corporation of India will both address the event.

The mission of TransTech India is to provide a platform for industry leaders and innovators to exchange insights, showcase technology advances and forge collaborations that will shape the future of power transmission. In recent years, the transmission system has undergone a remarkable transformation. The growth in the sector has been characterised by not just physical network expansion but also a move towards higher voltages and new technologies. The aim is to make the grid more robust and agile.

The event will have more than 1,400 visitors from over 280 organisations, representing developers, government agencies, state transcos, system operators, regulators, technology providers, EPC contractors, financiers/investors, consultants, etc. We will have representation from almost every state and every segment of the industry.

The exhibition, which has attracted leading technology players and equipment manufacturers, will showcase cutting-edge solutions, innovative projects and noteworthy initiatives.

A high-level conference, with a stellar cast of speakers, is also being held for stakeholders to discuss key trends, developments, challenges and opportunities in the Indian transmission sector.

The conference will cover topics such as: Industry Perspective; Transition to Clean Energy; State Utility Perspectives and Plans; EPC Perspective; O&M Best Practices and Asset Management; Transmission System Planning; Grid India Initiatives; Renewable Energy Evacuation; Offshore Wind Transmission; and Skill Development for Transmission.

TransTech 2024 will thus put the spotlight on key facets of the Indian power transmission sector and facilitate dialogue and discussion among industry stakeholders. ■

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Modernising the Grid

Technology advances and expansion transform the transmission segment

Start India's transmission sector has achieved remarkable progress over the years, evolving from a fragmented network into a cohesive and interconnected grid. The segment has seen advancements in the form of both expanding physical infrastructure and technological innovations, establishing the country's electricity grid as one of the largest synchronous grids in the world. The sector has played a key role in supporting India's growing energy demand while facilitating the integration of renewable energy sources. These advancements are pivotal as India works towards achieving its ambitious climate goals and modernising its energy infrastructure for future needs.

Segment size and growth

As of August 2024, the total length of transmission lines at the 220 kV level and above stood at 488,423 ckt km, comprising 55,202 ckt km at the 765 kV level, 204,787 ckt km at the 400 kV level and 209,059 ckt km at the 230/220 kV level. At the high voltage direct current (HVDC) level, line length stood at 9,655 ckt km at the ±800 kV level, 9,432 ckt km at the ±500 kV level and 288 ckt km at the ± 320 kV level. The country's total inter regional capacity stands at 118,740 MW.

The total transmission line capacity addition during 2023-24 was 14,203 ckt km. In 2024-25, as of August 2024, the segment added 2,879 ckt km of line length. The country's total interregional capacity stood at 118,740 MW.

The total transformation capacity stood at 1,269,350 MVA as of August 2024, comprising 297,700 MVA at the 765 kV level, 464,738 MVA at the 400 kV level and 473,412 MVA at the 230/220 kV level. The HVDC capacity stood at 18,000 MVA at the ±800 kV level, 13,500 MVA at the ±500 kV level and 2,000 MVA at the ±320 kV level.

The total transformation capacity addition during 2023-24 was 70,728 MVA. During 2024-25, the total added transformation capacity stood at 18,270 MVA in August 2024.

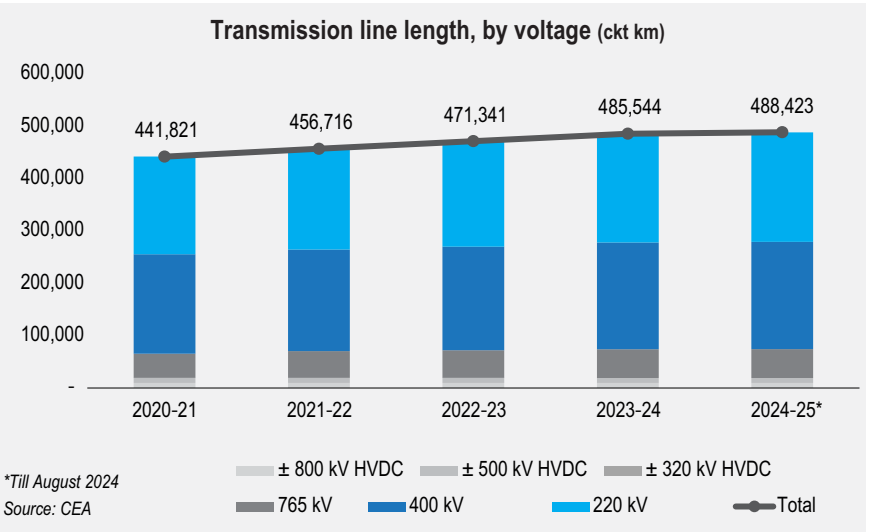
Policy and regulatory developments

Deviation settlement mechanism, 2024: In August 2024, the Central Electricity Regulatory Commission (CERC) notified the CERC (Deviation Settlement Mechanism and Related Matters) Regulations, 2024. These regulations seek to ensure, through a commercial mechanism, that grid users do not deviate from their schedule of drawal and injection of electricity in the interests of the security and stability of the grid. As per the notification, for secure and stable operation of the grid, every grid-connected regional entity shall adhere to its schedule as per the grid code and shall endeavour not to deviate from it. The deviation shall generally be managed through the deployment of ancillary services, and the computation, charges and related matters in respect of such deviation shall be dealt with as per the provisions of these regulations.

Guidelines for compensating RoW issues: In June 2024, the Ministry of Power (MoP) issued new guidelines for compensating right of way (RoW) issues related to transmission lines. These guidelines aim to expedite construction and ensure timely completion by effectively addressing RoW issues, particularly in urban areas. The updated guidelines, which replace previous ones, specify compensation for damages related to RoW under the Electricity Act. The compensation shall be payable only for transmission lines supported by a tower base at a 66 kV voltage level or above, and not for sub-transmission and distribution lines below 66 kV.

Procedure, Terms and Conditions for Grant of Transmission Licence and Other Related Matters Regulations, 2024: In May 2024, the CERC notified the CERC (Procedure, Terms and Conditions for Grant of Transmission Licence and Other related matters) Regulations, 2024. As per the regulations, no person shall be eligible for grant of licence for interstate transmission of electricity unless selected through the process under the competitive bidding guidelines issued under Section 63 of the Act, or selected by the central government or its authorised agency to implement a project under the regulated tariff mechanism. Further, the transmission licence shall, unless revoked earlier, continue to be in force for a period of 25 years from the date of issue. The transmission licence for transmission assets whose tariff is determined by the commission under Section 62 of the Act, shall, on completion of 25 years from the date of issue of licence, stand automatically renewed for another period of 25 years at a time, unless revoked earlier.

Electricity (Amendment) Rules, 2024: The MoP notified the Electricity (Amendment) Rules, 2024, in January 2024 with two primary aims: promoting the development of dedicated transmission lines and facilitating open access to the electricity grid. The rules now allow consumers with specified energy loads and energy storage systems to establish, operate and maintain dedicated transmission lines themselves, without the requirement of a licence. The rule covers companies/entities with loads over 25 MW and 10 MW on the interstate and intra-state transmission networks respectively. The new Rule 21 exempts these entities from obtaining a licence, provided they comply with relevant regulations, technical standards and guidelines.



TBCB update

As of August 2024, 113 ISTS projects have been bid out to public and private players since 2009 under the tariff-based competitive bidding (TBCB) mechanism. Of these, 48 have been secured by Power Grid Corporation of India Limited (Powergrid) and 65 have been won by private players. Of the private sector projects won so far, 34 have been commissioned and the remaining 31 are under construction. Of Powergrid's projects, 20 have been commissioned and 28 are under construction. Key private players in the transmission segment include Sterlite Power, Adani Energy Solutions Limited, IndiGrid, ReNew Transmission Ventures and Apraava Energy.

Emerging trends

With the growing renewable energy integration, the needs and requirements of the transmission network are evolving, requiring attention. HVDC is expected to play a key role in green energy evacuation corridors, while the deployment of static synchronous compensators will be vital for voltage stability. Further, the useof advanced and digital technologies for network management and the effective maintenance and monitoring of assets will be crucial as the sector gears up for greater renewable energy integration.

Transmission utilities are increasingly turning to predictive maintenance strategies, utilising data analytics to assess equipment health and make informed, proactive decisions. Technological advancements such as drones equipped with thermos visual scanning, high resolution video and corona cameras are being adopted for real-time monitoring of transmission lines, substations and reactors. These tools enable utilities to quickly and efficiently detect vulnerabilities in the grid, offering a more effective, cost-efficient and faster alternative to traditional ground-based line patrolling. Aerial surveillance and remote inspection technologies are now being used to develop intelligent digital twins integrated with artificial intelligence (AI) to create accurate digital replicas of transmission lines and towers for optimised maintenance and record-keeping.

Outlook

As per the recent announcement by the Union Minister for Power, the newNational Electricity Plan for centraland state transmission systems aims tomeet a peak demand of 458 GW by 2032. The transmission network is set to expand from 485,000 ckt km in 2024 to 648,000 ckt km by 2032, with the transformation capacity increasing from 1,251 GVA to 2,342 GVA. Additionally, nine new HVDC lines (33.25 GW) will supplement the existing 33.5 GW, while interregional transfer capacity will rise from 119 GW to 168 GW. The plan, covering networks of 220 kV and above, is estimated to cost Rs 9,150 billion. It will support the growing electricity demand, renewable energy integration and green hydrogen projects.

Overall, ambitious plans underscore the sector's future trajectory, with substantial capital investments earmarked for expanding transmission infrastructure and enhancing interconnectivity. These endeavours aim to bolster the nation's energy resilience, facilitate renewable energy integration and propel India towards a sustainable energy future. ■

Growth in transformer capacity, by voltage

	AC transformation capacity (MVA)				HVDC (MW)			
Year	220 kV	400 kV	765 kV	Total	±320 kV	±500 kV	±800 kV	Total
2020-21	395,541	361,727	238,700	995,968	1,000	13,500	15,000	29,500
2021-22	420,637	393,113	257,200	1,070,950	2,000	13,500	18,000	33,500
2022-23	444,404	425,748	276,700	1,146,852	2,000	13,500	18,000	33,500
2023-24	464,947	457,933	294,700	1,217,580	2,000	13,500	18,000	33,500
2024-25*	473,412	464,738	297,700	1,235,850	2,000	13,500	18,000	33,500

*Till August 2024
Source: CEA

Interview with R.K. Tyagi

"POWERGRID is committed to fulfilling the country's future transmission needs"

In a recent interview with *Power Line*, R.K. Tyagi, Chairman and Managing Director, Power Grid Corporation of India Limited (POWERGRID), discussed the state of India's power sector, particularly the transmission segment, amid the ongoing energy transition. He also outlined the steps needed to strengthen the grid to support the growing renewable energy capacity and highlighted the emerging technologies transforming the transmission sector, along with POWERGRID's future priorities…

What is your assessment of the current state of the power sector, especially the power transmission segment?

The energy sector has been a crucial driver of growth in India, with the electricity sector reporting a substantial growth between FY 2023 and FY 2024. Renewable energy investments have surged, aligning with the government's ambitious targets. As of today, India's non-fossil energy capacity has crossed 200 GW, which accounts for about 46 per cent of the total capacity. Between 2014 and 2023, the clean energy sector in India attracted Rs 8.5 lakh crore ($102.4 billion) in new investments. An additional Rs 30.5 lakh crore in investments is expected between 2024 and 2030, creating significant economic opportunities. The energy transition is also expected to generate over 3.5 million jobs by 2030, according to the Council on Energy, Environment and Water, through investments in renewable energy and energy efficiency. The key drivers of future energy demand include industrial development, increased use of consumer durables, expansion of AI technologies and digital infrastructure, and growth of the green hydrogen economy. In India, energy demand is expected to rise from 1,752 BUs in 2023-24 to 2,473 BUs by 2031-32, with a major portion coming from non-fossil fuel sources.

India's transmission sector has undergone a significant transformation over the years, transitioning from a fragmented network to a well-integrated and interconnected grid. The sector has taken significant strides in expanding the grid's physical infrastructure and consolidating it into one of the largest synchronous grids globally. Looking ahead, as India aims to meet 50 per cent of its generation capacity from non-fossil fuel sources by 2030 and given the rising significance of electricity in the nation's energy mix, substantial investments will be imperative in both the interstate and intra-state transmission networks.

The National Electricity Plan (NEP) projects that non-fossil fuel-based capacity will increase from 200 GW in 2023-24 to 500 GW by 2029-30. To support this expansion, transmission schemes worth Rs 198,645 crore are under planning, bidding, or approval, and are expected to be integrated into the grid by 2028-29, according to Central Transmission Utility rolling plans.

What are the key issues and challenges facing the power transmission segment?

Key challenges in the power transmission segment include forest clearances, land acquisition and right of way (RoW). These issues are being addressed with the assistance of the Government of India, respective state governments and innovative technological solutions. Due to massive growth in transmission, timely availability of critical equipment such as transformers and GIS is another challenge. Further, the integration of renewable energy itself presents challenges due to its variability and intermittency, which makes grid stability difficult to manage. To address these challenges, advanced planning is being undertaken along with the adoption of state-of-the-art technologies such as flexible AC transmission systems (FACTS), high voltage direct current (HVDC) systems, STATCOMs, battery energy storage systems and smart grid solutions. Apart from the above, in today's interconnected world, cybersecurity is also a major challenge and protecting transmission infrastructure from cyberthreats is essential to maintain grid security and reliability. We are proactively taking measures in this regard.

What steps are required to strengthen the electricity grid with the growing renewable energy capacity?

To support the large-scale integration of renewable energy, there is a need for grid expansion and upgradation, including the development of new transmission lines and substations, especially in renewable-rich areas, which is already taking place. As stated earlier, advanced technologies, such as HVDC and FACTS, should be deployed for efficient long-distance power transmission. To ensure grid stability, energy storage solutions should be implemented. Digitalisation, smart grid solutions and real-time monitoring of systems will play a key role in enhancing grid management and stability. Further, regional and international interconnections should be strengthened to

optimise resource utilisation and support regional energy security.

What are the challenges associated with offshore wind evacuation?

Infrastructure development in offshore environments requires advanced technology and high capital investment, making it a complex process. As India prepares for its first offshore wind project, challenges related to various statutory clearances, unexplored work environment, availability of a skilled workforce, supply chain and logistics are anticipated. However, we are hopeful to overcome above challenges and complete the project in time.

What emerging technologies are transforming the transmission segment?

Several emerging technologies are revolutionising the power transmission segment. Digital substations utilising advanced communication standards are being implemented to enhance operational efficiency. HVDC systems are expanding and enabling long-distance power transmission. Technologies such as STATCOM and static var compensator (SVC) are helping to manage voltage stability and support renewable energy integration. New-age technologies like AI and robotics, which have a huge potential, are being increasingly used in our asset management. In addition, environment-friendly gas is being used in place of SF6. Mobile substations, tank-rupture proof transformers, insulated cross arms, photonic coating on conductors, etc., are some of the other emerging technologies.

What have been the key performance highlights of POWERGRID in the past year?

As of March 31, 2024, POWERGRID operated a transmission network of around 177,699 ckt. km of transmission lines and a power transformation capacity of around 527,446 MVA with 278 substations spread across the country.

POWERGRID's operational performance in FY 2023-24 showcased exceptional reliability, strategic foresight and a commitment to cutting-edge technology. Our transmission network achieved 99.85 per cent availability with tripping per line reduced to 0.28. During FY 2023-24, POWERGRID recorded a total income of Rs 46,913 crore and profit after tax of Rs 15,573 crore on a consolidated basis. The company's gross fixed assets stood at Rs 275,991 crore, on a consolidated basis. POWERGRID emerged as a successful bidder in 13 TBCB projects with an aggregate tariff of Rs 2,888 crore.

Some of the key projects commissioned during the year include the 400 kV D/C Fatehgarh-III (Ramgarh-II)-Jaisalmer-II line, the 400 kV D/C Lower Subansiri-Biswanath Chariyali-II line linked with hydro generation of about 2,000 MW at Lower Subansiri, and the 400 kV D/C (Quad) Sitamarhi-Dhalkebar international line between Nepal and India. In total, assets worth Rs 7,618 crore were capitalised on a consolidated basis during the year. Despite difficult terrain, extreme weather conditions and RoW issues, POWERGRID achieved these milestones.

What are POWERGRID's top priorities and key focus areas going forward?

POWERGRID's top priorities and key focus areas include expanding the transmission network to support 500 GW of renewable energy by 2030. The company is focusing on deploying cutting-edge technologies and innovative solutions towards efficient project management and operation of assets. POWERGRID is committed to advancing green technologies, including alternatives for SF6 gas, use of natural ester oil in transformers and reactors, etc.

The outlook for India's power sector in the near to medium term is poised for transformative growth, largely driven by the country's ongoing energy transition and its ambitious renewable energy targets. Under the new NEP (Transmission), the transmission network in the country will be expanded from 4.85 lakh ckt. km in 2024 to 6.48 lakh ckt. km in 2032. During the same period, the transformation capacity will increase from 1,251 GVA to 2,342 GVA. Nine HVDC lines of 33.25 GW capacity will be added to the 33.5 GW currently operating. The interregional transfer capacity will increase from 119 GW to 168 GW.

One of the most significant upcoming projects is the development of the Green Energy Corridor for Ladakh, which includes the construction of the Pang to Kaithal HVDC line along with state-of-the-art VSC stations at Pang and Kaithal being implemented by POWERGRID.

In the near to medium term, regional and international interconnections will be vital for optimising resource utilisation and ensuring energy security. Cross-border power exchanges are also expected to increase. POWERGRID is committed to fulfilling the country's future transmission needs. ■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Interview with S.R. Narasimhan

"Ensuring grid integrity and security is our top priority"

In a recent interview with *Power Line*, S.R. Narasimhan, Chairman and Managing Director, Grid Controller of India Limited (Grid-India), commented on the current state of the power sector and its performance during the past one year. He also spoke about the cybersecurity measures needed to ensure grid security and address the needs of the grid, particularly with increasing renewable energy integration. Edited excerpts...

How has the sector performed in the past one year or so?

India's power sector has made remarkable strides and set new benchmarks in meeting the growing energy demand. Highlighting the robustness of the Indian grid amid ever-increasing electricity demand, the grid frequency remained within the IEGC-prescribed band for 74 per cent of the time in the past year.

The Central Electricity Regulatory Commission (CERC) notified the IEGC 2023, which came into force on October 1, 2023, marking a new era in the Indian power sector. Subsequently, access to the ISTS transitioned to the General Network Access (GNA) regime, bringing about a paradigm shift in power market operations.

All regional load despatch centres and the National Load Despatch Centre worked diligently to ensure the successful implementation of IEGC-2023 and GNA regulations from October 1, 2023. Their tireless efforts and coordinated actions were crucial in managing a smooth transition to the new regulatory regime. Also, as per the provisions of IEGC 2023, Grid-India is now performing an assessment of reserve requirements on a year-ahead basis, day-ahead basis and intra-day basis.

Ancillary services are an essential pillar of electricity market design and contribute to the reliability and security of the national grid. GRID-INDIA has continuously taken initiatives to expand the footprint of secondary reserve ancillary services and tertiary reserve ancillary services (TRAS) from interstate to intra-state level, from thermal to renewable energy.

During 2023-24, the total generation capacity added in the power system was 24,312 MW, comprising thermal 5,948 MW (including gas), hydro 78 MW, solar (including rooftop and off-grid solar) 15,033 MW and wind 3,253 MW. New wind and solar generating stations commissioned in 2023-24 have been integrated into the respective renewable energy management centres (REMCs). As of March 31, 2024, 45.35 GW of wind and 58.21 GW of solar capacity are being monitored through these REMCs.

However, high renewable energy penetration presents significant grid management challenges. Between January 2022 and June 2024, a total of 57 grid events occurred in renewable energy pockets connected to the ISTS, each involving a generation loss ranging from 1,000 MW to 7,000 MW. The matter has been taken up with all the developers for ensuring compliance to the CEA's technical standards.

An important step towards the clean energy transition is the Carbon Credit Trading Scheme 2023, notified by the Ministry of Power on June 28, 2023. GRID-INDIA will serve as the registry for the Indian carbon market.

What are the unresolved issues in the sector?

As the country undergoes a massive energy transition, it is widely recognised that a range of operational and electricity market reforms are necessary to operate effectively under this new energy landscape. The rapidly evolving and transitioning energy scenario calls for continuous innovation and flexibility on the part of both suppliers and procurers. Meeting the future demand requirements through predominantly renewable energy sources calls for innovative strategies. There is a need for suitable amendments in the CEA's standards, mandating demand response from new bulk load entities, viz., data centres, electrolysers for green hydrogen.

Scientific resource adequacy planning is the need of the hour to ensure that an optimal resource mix is developed and forms the basis for a capacity market in the future. Resource adequacy is the foundational basis for deeper energy market operations and the introduction of measures such as market-based economic despatch and market-based integration of renewable energy.

Recently, the country has been facing an acute shortage of downward reserves due to the high injection of renewable energy into the grid and lower demand during the monsoon period. With interstate reserves exhausted and thermal generators operating at their technical minimum levels, the inadequacy of downward reserves poses a serious grid security challenge for system operators. There is a need to enable flexibilisation of thermal fleet (MTL reduction from 55 per cent to 40 per cent) at both ISTS and intra-state levels. Energy storage capacity needs to ramp up sharply, commensurate with wind and solar capacity. Additionally, implementing SCED at the intra-state level is essential to achieve national optimisation. Enhanced forecasting tools, incorporating AI and machine learning (ML), are also critical to reducing the need for reserves in grid management.

What are the cybersecurity measures needed to maintain a secure and stable grid?

The cybersecurity architecture necessary to maintain a secure and stable grid, especially from the grid operators' perspective, encompasses security implementation in both the operational technology (OT) and information technology (IT) domains. The design and implementation of security controls should necessarily address risks associated with all the three pillars, viz., people, process and technology. Proper hardened segregation of IT and OT is one of the key areas to focus on. The OT security implementation must also focus on establishing peripheral security around the legacy system. Identification and necessary replacement plan of the legacy environments and configuration of adequate security controls and monitoring of the legacy applications and hardware resources help plugging-in the major gap in threat dynamics of the OT systems. It

is important that all players and establishments of the integrated power system ensure suitable security at its perimeter as well as the inter-connectivity in between.

Physical security is a critical aspect of the overall security strategy. The critical information infrastructure locations should be suitably safeguarded through advanced access controls mechanisms that include biometric systems to prevent unauthorised entry. Adherence to the regulatory provisions, guidelines and directions from various statutory bodies and intelligence agencies must be ensured.

To enhance visibility, organisations should establish and operate next-generation security operations centres (SOCs) equipped with advanced tools, for monitoring the cybersecurity landscape in real-time. Leveraging AI-based systems for behaviour analysis, threat hunting and malware analysis, deep-forensic capabilities, etc., may be utilised for enhancing the security posture and mitigate zero-day threats.

Overall, an emphasis on awareness programmes, regular mock exercises, preparation and enhancement of the cyber crisis management plan and effective collaboration among all responsible entities must be ensured to build a robust, cybersecure and resilient grid.

What more needs to be done at the grid level to manage the growing renewable energy integration?

The Indian electricity sector is evolving to meet the increasing power demand and adapt to a changing energy mix, particularly with the growing penetration of renewable energy. As of August 2024, the installed renewable energy capacity, including large hydro, reached approximately 200 GW, accounting for around 44 per cent of the total installed capacity.

The promotion of energy storage systems is crucial for facilitating India's clean energy transition. Significant advancements in battery technology have emerged, with nickel-chromium, redox-flow, sodium-sulphur and vanadium flow batteries gaining traction alongside traditional lead-acid and lithium-ion variants. Their rapid response rates, quick installation and ability to support multiple start-stop cycles make them essential for addressing renewable energy grid-related challenges in India.

As renewable energy penetration increases, larger balancing areas and shorter gate closures will become critical. Both generators and distribution utilities should have the flexibility to adjust deviations in renewable generation schedules through a liquid electricity market. The future redesign of the electricity market must enable renewable energy to be schedulable and despatchable, either directly in the market or through market-linked pricing. This approach will allow discoms to meet the overall demand optimally without being locked into inflexible, bilateral, long-term contracts.

The increase in renewable energy in the overall energy mix will require reforms, particularly in areas of developing electricity infrastructure, capacity markets, financial products, distribution system operators, better forecasting (AI/ML based forecasting), visualisation of high-resolution data, deepening of electricity markets, resource adequacy planning, robust market monitoring and capacity building at inter/intra state levels.

What are your priorities and key focus areas for Grid-India?

Ensuring grid integrity and security is our topmost priority. Further, GRID-INDIA is committed to ensuring reliable operation of the electricity grid as the country works towards achieving its target of 500 GW of non-fossil fuel generating capacity by 2030. Our internal policies prioritise talent management and workplace diversity, while empowering and motivating system operators to meet growing stakeholder expectations.

GRID-INDIA actively pursues green initiatives to reduce its carbon footprint. We implement energy efficiency measures, digitalise workflows to promote paperless operations, utilise online platforms for collaborative work to reduce travel and adopt a minimalist approach in all functions and infrastructure. Both mindsets and skillsets must adapt to the integration of new technologies, such as electric vehicles, energy storage, green hydrogen and institutions such as aggregators and distribution system operators. modernising control centres with AI tools and maximising system performance are critical for ensuring cybersecure and efficient operations.

Fostering learning is one of GRID-INDIA's core values, extended not only to its own employees but also to the broader power system operators' community, including but not limited to FoR, FOLD and SLDCs. The company is actively involved in various international forums and has established productive collaborations with power system operators worldwide. Additionally, GRID-INDIA has assumed the GO15 presidency for 2024. The organisation also plays an active role in CIGRE (International Council on Large Electric Systems). ■

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Greening the Grid

Roadmap for renewables integration

The Indian electricity transmission sector has been evolving to meet the increasing power demand and keep up with the changing energy mix, particularly the increasing penetration of renewable energy. As of August 2024, the installed renewable energy capacity stood at 200 GW (including hydro), accounting for approximately 44 per cent of the total installed capacity. The capacity is further estimated to rise to 537 GW by 2030. The exponential growth in capacity will necessitate the development of transmission and distribution infrastructure such as reactors, transformers and substations.

Plans for renewables integration

As per the Central Electricity Authority's report on "Transmission System for Integration of over 500 GW RE Capacity by 2030", 50,890 ckt km of ISTS transmission line length and 433,575 MVA of substation capacity are required for integrating additional wind and solar capacities by 2030. This would entail an estimated investment of Rs 2,442 billion.

In terms of voltage-wise line length additions, the required additional transmission systems include 8,120 ckt km of high voltage direct current transmission corridors (+800 kV and +350 kV), 25,960 ckt km of 765 kV AC lines, 15,758 ckt km of 400 kV lines and 1,052 ckt km of 220 kV lines. The report also plans for connecting 10 GW of offshore wind capacity (5 GW each for Gujarat and Tamil Nadu) through submarine cables.

Another key initiative is the green energy corridor I (GEC-I) initiative, under which approximately 24 GW of renewable energy capacity was slated for integration into the intra-state network. The scheme is currently under implementation by state transmission utilities (STUs) of eight renewable-rich states – Andhra Pradesh, Gujarat, Himachal Pradesh, Karnataka, Madhya Pradesh, Maharashtra, Rajasthan and Tamil Nadu. As of March 31, 2023, 9,060 ckt km of transmission lines have been constructed and 21,303 MVA of substations have been charged. Out of the eight states, four have completed all the projects – Rajasthan, Madhya Pradesh, Karnataka and Tamil Nadu. Under the GEC-II scheme, about 19.4 GW of renewable energy capacity is planned to be connected into the intra-state system. The GEC-II scheme has been sanctioned with an estimated project cost of Rs 120.31 billion, including central financial assistance (CFA) of Rs 39.7 billion, while the remaining 67 per cent of the project cost is financed through loans.

There has also been a concerted effort towards constructing both intra-state and interstate transmission systems, which is crucial for the efficient evacuation of renewable power. To enhance grid management capabilities, regional energy management centres have been established. These centres focus on improving the renewable power forecasting and assisting grid operators in effectively managing the variability and intermittency associated with renewable energy sources.

The government has also introduced innovative solutions such as solar-wind hybrid projects, renewable energy projects integrated with energy storage systems, and the supply of renewable energy balanced with non-renewable energy sources to mitigate intermittency issues. In addition, flexibility has been granted in the generation and scheduling of thermal/hydro power stations through bundling with renewable energy and storage power. To further strengthen the renewable energy market, initiatives like green term-ahead market and green day-ahead market have been implemented to facilitate the sale of renewable energy. Furthermore, in a bid to incentivise renewable energy adoption, the government has waived interstate transmission charges on the transmission of electricity generated from solar and wind sources. These efforts underscore the government's commitment to advancing renewable energy integration within the national grid, which is crucial for achieving sustainable energy goals.

Challenges in renewable energy integration

Despite its wind and solar energy potential to address rising energy demands, India faces obstacles in renewable energy infrastructure development. The ageing power grid exacerbates the problem, with many transmission and distribution lines built years ago now incapable of meeting current demands and adapting to extreme weather patterns. Predicting electricity generation is particularly challenging due to the reliance of most renewable energy technologies on weather and environmental conditions. Securing finance has posed a significant hurdle to the advancement

of clean energy resources. The substantial initial investment required and the perceived risks associated with renewable energy projects have deterred investors, leading to a reluctance to engage and making projects financially unfeasible.

Further, traditional transformers encounter challenges in managing and transmitting large quantities of electricity, particularly due to the volatile nature of variable renewable energy installations. These systems generate electricity intermittently, leading to significant and rapid fluctuations in electricity generation. Furthermore, the increasing adoption of rooftop solar in the coming years will result in more prosumers interested in selling electricity to the grid during peak hours and drawing electricity during off-peak periods.

The energy storage strategy is becoming increasingly vital for mitigating fluctuations and ensuring consistent power supply, particularly in large-scale renewable energy projects. These systems not only store surplus energy for varying durations but also enhance the reliability of power supply. Battery technology has seen significant advancements, with nickel-chromium, redox-flow, sodium-sulphur and vanadium flow batteries gaining traction alongside lead-acid and lithium-ion variants. Their rapid response rates, quick installation and ability to support several start-stop cycles make them instrumental in addressing grid-related issues in India.

Transitioning to smart transformers will enable the bi directional flow of energy, allowing electricity to flow from the grid to buildings and vice versa. Smart transformers enhance the resilience of energy grids, making them more adept at handling volatility and grid instability. Dynamic compensation methods, like voltage-sourced converter-based HVDC and static synchronous compensators (STATCOM), are also being employed to maintain grid parameters and stability. Utilising internet of things technology will enable real-time monitoring of grid performance, followed by immediate identification and resolution of potential issues by power companies.

Outlook

The regulatory framework in India is aimed at improving renewable energy connectivity, with the GNA Regulations ensuring equitable access to the central transmission network for all power producers. Ancillary services markets are being established, and efforts to create awareness and build capacity are under way, supporting the effective integration of renewable energy into the grid. The integration of advanced technologies into the grid will enhance its resilience and efficiency, crucial for managing the intermittency of large-scale renewable energy and adapting to evolving load profiles driven by initiatives such as the government's e-mobility programme.

The transmission system is being strategically developed to accommodate approximately 537 GW of renewable energy capacity by 2030, aligning with the government's energy transition objectives.

As per the draft National Electricity Plan (NEP) 2023, a transmission line length of 123,577 ckt km and transformation capacity addition of 710,940 MVA are required during 2022-27. Around 170 transmission schemes, with a collective cost exceeding Rs 3.13 trillion for interstate transmission and approximately Rs 1.61 trillion for intra-state systems, are being implemented. In addition, a designated investment of Rs 151.2 billion is aimed at connecting the Andaman & Nicobar Islands with the mainland. At present, these islands heavily depend on diesel generators, with minor contributions from renewable sources. A groundbreaking initiative proposes to connect the islands via an undersea cable spanning 1,150 km, with the objective of facilitating a transition to green energy by 2028-29. Further, an HVDC link between Madurai, India, and New Habarana, Sri Lanka, with 2x500 MW HVDC terminals is in advanced stages of discussion.

In conclusion, India's robust plans for renewable energy integration demonstrate a clear commitment to sustainable energy goals. Despite challenges in infrastructure development and financing, strategic initiatives, including green energy corridors and advanced grid management technologies, aim to address these hurdles. ■

Planned transmission system by 2030

Category	Capacity (GW)
Existing renewable energy capacity (as of October 31, 2023)	179.0
Renewable energy capacity for which the ISTS network is under implementation (includes 64.1 GW of network under construction and 63.8 GW of network under bidding)	127.9
Renewable energy capacity for which the ISTS network has been planned	154.9
Renewable energy capacity to be added to the intra-state network under the GEC scheme	25.9
Additional hydro capacity likely to be added by 2030	16.6
Margin available in the ISTS network for the integration of generating capacity	33.3
Total	**537.6**

Sources: Draft National Electricity Plan-Transmission, CEA

Interview with Devesh Bansal

"Skipper has achieved significant milestones in the transmission segment"

In a recent interview with *Power Line*, Devesh Bansal, Executive Director, Skipper Limited, discussed the evolution of India's power transmission sector, driven by rising energy demands and renewable integration. He highlighted the sector's challenges and opportunities, as well as Skipper's manufacturing capabilities, recent achievements and future growth plans. Edited excerpts…

What are your views on the current state of the power transmission sector in India?

India's transmission landscape is undergoing a rapid transformation, driven by increasing energy demands, a shift towards renewable energy and infrastructure modernisation. The country now has one of the world's largest synchronous power grids. Key trends in the sector include…

- The government's ambitious target to install 500 GW of renewable energy by 2030 is pushing the transmission and distribution (T&D) sector to adapt to the large-scale integration of renewable energy sources. This demands significant enhancements in grid capacity, particularly in remote areas where renewable energy projects are concentrated. In the recently announced National Electricity Policy (NEP), there is a clear mandate to modernise transmission infrastructure to support renewable energy integration and ensure energy security.
- Furthermore, there is an increasing focus on the decentralisation of the grid and the adoption of smart grid technologies. This will ensure better load management, reduce transmission losses and improve grid stability. The policy also highlights the need for energy storage solutions, aligning with our efforts to enter the battery energy storage system (BESS) space.

Could you provide an overview of Skipper Limited's manufacturing capacity and testing facilities for power transmission products?

Our manufacturing and testing capabilities enable us to deliver high-quality solutions. Skipper Limited operates four state-of-the-art manufacturing plants, strategically located in Eastern India (three in West Bengal and one in Assam) to cater to both domestic and international markets. With over 300,000 mtpa of production capacity, we are well-positioned to meet the growing demand for transmission infrastructure. Skipper produces a wide range of transmission towers for electrical power T&D networks, as well as solutions for EHV substations. We have recently expanded into the BESS space. As an alternative to traditional lattice towers, we manufacture steel poles, monopoles and high masts that are used for power distribution networks, telecom aerial cabling, flag masts and signboards. Poles are particularly ideal in urban areas with zoning constraints.

One critical aspect of manufacturing transmission components is ensuring their quality and load-bearing capacity. Skipper's state-of-the-art tower testing facility in West Bengal, spanning 14 acres, ranks among the largest globally. It can handle towers up to 1,200 kV, with heights of 120 metres (the highest in the country), optimal loading capacities of up to 1,200 tonnes per leg and large base widths of up to 35 metres. Notable tests include 765 kV S/C and 400 kV D/C monopoles, and 220 kV D/C, 500 kV D/C and 765 kV D/C towers. The station utilises dual-speed VFD-driven electrical winches for smooth loading and an automated central loading and supervision system.

What have been the key recent business highlights for Skipper Limited in the transmission segment?

In recent times, Skipper Limited has achieved significant milestones, particularly in the power transmission segment. Alongside our established expertise in transmission lines, we have diversified into EHV substations and BESS, marking our evolution into a comprehensive solutions provider.

We experienced an outstanding 97 per cent revenue growth in the first quarter of FY 2025 compared to the same period last fiscal. In terms of profitability, our PAT doubled to Rs 324 million from Rs 162 million in the same quarter of the previous year, with a notable sales margin of 3 per cent. We also secured new orders worth Rs 7,650 million for engineering product supplies and EPC works from key regions like the Middle East and Africa, and major domestic clients, including Powergrid and state electricity boards.

Our domestic T&D segment shows signs of strong recovery, while we continue to see sustained momentum in international markets. The order bidding pipeline stands at Rs 115,000 million internationally and Rs 65,500 million domestically. These achievements reflect our commitment to meeting global energy demands and advancing green energy solutions. With the recently announced NEP driving expansion, we expect continued growth and new opportunities through 2030.

One of the key order wins in the previous fiscal was securing a Rs 737 crore order for the design, supply and construction of a 765 kV transmission line project for Powergrid in February 2024. In October 2023, we secured orders worth Rs 588 crores, with a substantial portion coming from Power Grid Corporation of India Limited. In November 2023, the company won domestic orders worth Rs 924 crores from Powergrid and other clients, along with a substantial order of Rs 2,570 crores for BSNL's 4G telecom projects.

What is the company's current order book? What is the share of power transmission within it, and how has this grown over the years?

Skipper Limited's current order book stands at an impressive Rs 58,440 million, with the power T&D segment contributing significantly. Of this, 86 per cent of the orders are from the domestic market and 14 per cent from international markets. The T&D segment has been a major driver of our growth, with its share in the overall order book expanding due to increased demand in both domestic and international markets.

Our robust order bidding pipeline further strengthens our position, with bids totalling Rs 115,000 million internationally and Rs 65,500 million domestically. This growth is driven by Skipper's strategic focus on large-scale transmission infrastructure projects and the company's proactive participation in renewable energy integration initiatives. With its strong performance in the domestic market and expanding global reach, Skipper has solidified its standing as a key player in the power transmission segment.

What are the company's future plans for capacity expansion and growth in the power transmission sector?

Skipper Limited has ambitious plans for capacity expansion and growth in the power transmission sector. We are set to increase our manufacturing capacity by 75,000 mtpa by the end of this fiscal. We also aim to double our current capacity of 300,000 mtpa over the next five fiscal years, focusing on modern innovations and the latest industry trends.

In addition to transmission lines, Skipper has expanded its offerings to include EHV substations and the rapidly growing BESS space, aligning with global trends towards renewable energy integration and energy storage solutions. This expansion positions us to support India's energy grid transformation in line with the NEP, which emphasises the need for modern, resilient transmission infrastructure and enhanced energy storage capabilities to accommodate the country's increasing share of renewable energy.

With this strategic growth plan, we aim to enhance our production capabilities, improve operational efficiencies and cater to large-scale infrastructure projects. As we continue to grow, Skipper will focus on cutting-edge technologies and sustainable practices, ensuring that we remain a leader in the global power transmission and energy storage sectors. ■

Power Links

Regional interconnections to strengthen cross-border trade

Cross-border grid interconnections play a crucial role in facilitating the energy transition by enabling the efficient utilisation of surplus electricity across boundaries. Time diversity in renewable energy generation can be effectively leveraged through these interconnections. The cross-border power transfer between India and neighbouring countries occurs through intergovernmental bilateral cooperation via memorandum of understandings (MoUs) or power trade agreements. Planning, system operation, commercial agreements, and regulatory matters related to cross-border interconnection are conducted in accordance with bilateral agreements between governments.

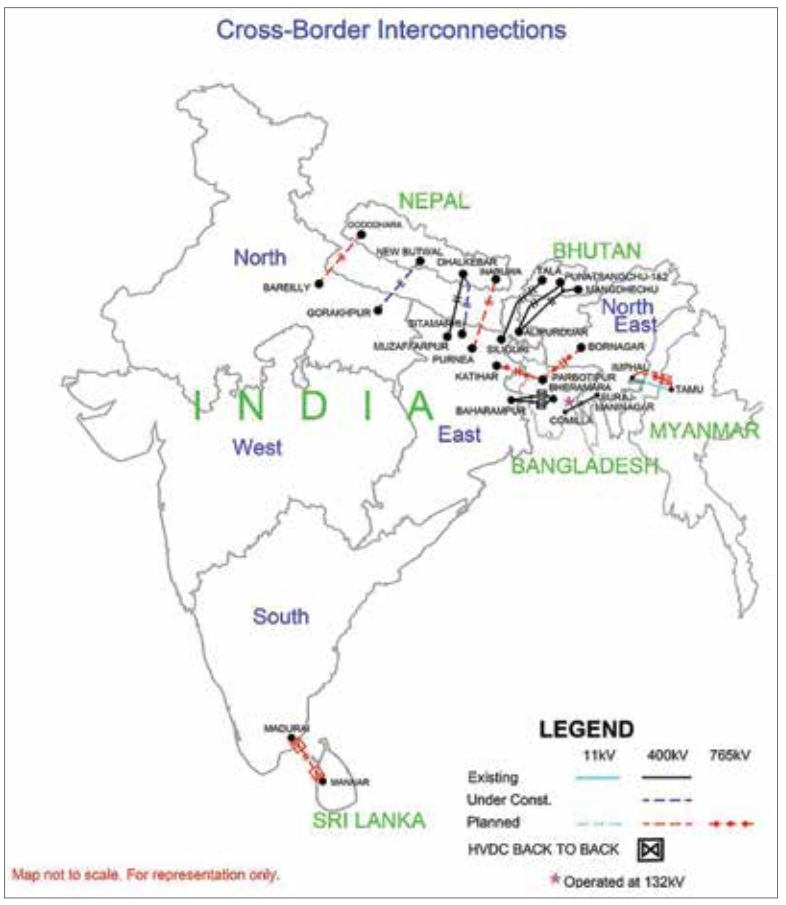
India's central location in the South Asian region and its political boundaries with SAARC/BIMSTEC countries such as Nepal, Bhutan, Bangladesh, Myanmar and Sri Lanka position it as a key player in coordinating interconnections with these nations. This collaboration aims to optimise regional resources effectively, thus enhancing the energy security of the entire region.

Currently, Bhutan and Nepal export hydroelectric power to India, which, in turn, exports power to these countries during lean hydro season. India also exports power to Bangladesh, with discussions underway for an advanced interconnection between the two countries.

At present, exchange of power between India and neighbouring countries (Nepal, Bangladesh, Bhutan and Myanmar) is taking place in synchronous as well as in asynchronous mode. Transmission links (at 11 kV, 33 kV, 132 kV and 400 kV levels) have been established between the border states of Bihar, Uttar Pradesh, Uttarakhand, Tripura, West Bengal and Assam. Some interconnections are under construction and several cross-border interconnections have been planned. At present, about 4,100 MW of power is being exchanged with the neighbouring countries through cross-border links and the same is likely to increase to about 7,000 MW by the end of 2026-27. Interconnection between India and Sri Lanka is at an advanced stage of discussion. Under the One Sun One World One Grid initiative, interconnection of the Indian Electricity Grid with the electricity grids of Maldives, Singapore, UAE, Saudi Arabia, etc. is under discussion.

India-Bhutan

In 2006, an agreement was signed between India and Bhutan for cooperation in hydroelectric power, including the development of projects, transmission systems, and electricity trade, involving both public and private sector participation. At present, about 2,070 MW power from the existing hydroelectric projects (HEPs) in Bhutan is being exported to India. These projects are the Chukha HEP (336 MW), Kurichu HEP (60 MW), Tala HEP (1020 MW), Dagachu HEP (126 MW), and Mangdechu HEP (720 MW). The existing transmission links include the Chukha (Bhutan)-Birpara (West Bengal) 220 kV D/C line, Chukha (Bhutan)–Birpara (West Bengal) via Singhigaon (Bhutan) 220 kV S/C line, Kurichu (Bhutan)–Gelephu (Bhutan)-Salakati (Assam) 132 kV S/C line, Tala (Bhutan)–Siliguri (West Bengal) 400 kV 2xD/C line, Jigmeling–Alipurduar 400 kV D/c (Quad) line, Punatsangchu-I–Alipurduar 400 kV D/c (Quad) line and Punatsangchu-II–Alipurduar 400 kV D/c (Quad) line. Power from the HEPs in Bhutan along with other hydro project in Sikkim and north eastern region can be transferred to other parts of India through high capacity multi terminal ±800 kV, 6,000 MW Biswanath-Chariali– Alipurduar – Agra HVDC bipole link.



India-Bangladesh

An MoU was signed between India and Bangladesh in January 2010, regarding cooperation in the power sector. The MoU covers collaboration in power generation, transmission, energy efficiency, renewable energy development, and the establishment of grid connectivity between the two nations. India is supplying power to the extent of 1,160 MW to Bangladesh through the Baharampur (India)-Bheramara (Bangladesh) 2x400 kV D/C line along with the 2x500 MW HVDC back-to-back Station at the Bheramara as well as the Surajmaninagar (Tripura)–Bangladesh (Comilla) 400 kV D/C line (operated at 132 kV). Further, there is a planned linkage of the Katihar (India)–Parbotipur (Bangladesh)–Bornagar (India) 765 kV D/C line.

India-Nepal

India and Nepal signed an agreement on "electric power trade, cross-border transmission interconnection and grid connectivity" in October 2014. The agreement, inter alia, envisages cooperation in the power sector, including developing 112 transmission interconnections, grid connectivity, and power exchange and trading through the governmental, public and private enterprises of the two countries on mutually acceptable terms. The existing links include the Muzaffarpur (India)-Dhalkebar (Nepal) 400 kV D/C (Twin) line and the Tanakpur HEP-Mahendra Nagar 132 kV S/C line. The linkages between the Gorakhpur (India)–New Butwal (Nepal) 400 kV D/c (Quad) line and the Arun-3 HEP (Nepal)–Dhalkebar (Nepal)–Sitamarhi (India) 400 kV D/c (Quad) line for evacuating power from the Arun-3 (900 MW) HEP and other hydro projects that are under implementation.

There are existing as well as planned interconnections at voltage levels of 132 kV and below between Nepal and the power grids of Bihar, Uttar Pradesh and Uttarakhand. The links from Bihar (BSPTCL) to Nepal include the Kataiya–Kusaha S/C line, Ramnagar–Gandak/Surajpura (Nepal) S/C line, New 132 kV Katiya–Kusaha S/C on D/C line and New 132 kV Raxaul–Parwanipur S/C on D/C line (132 kV links). The links between Uttar Pradesh and Nepal consists of the Nanpara-Nepalgunj S/C line and the Paliya –Dhangadi line (33 kV links).

Further, planned links between Bihar and Nepal involve the stringing of the second circuit of the Kataiya-Kushaha and Raxaul-Parwanipur 132 kV lines. Similarly, Uttar Pradesh (UPPTCL)-Nepal projects include the Nanpara-Kohalpur and Nautanwa-Mainhiya 132 kV D/C lines for grid connectivity between the regions.

India-Myanmar

In October 2016, an MoU was signed between India and Myanmar concerning cooperation in the power sector. The MoU entails collaboration on power sector investments, generation, transmission, energy efficiency, renewable energy development, power trading, consultancy services and human resource development to enhance productivity and efficiency.

Since April 2016, India has been supplying approximately 2-3 MW of power from Manipur to Myanmar via an 11 kV transmission line running from Moreh in Manipur, to Tamu Town in Myanmar. Furthermore, both countries have agreed to set up a 500 MW HVDC interconnection between Imphal in India, and Tamu in Myanmar. Discussions are also underway regarding the setting up of low-voltage radial interconnections between the Indian states of Arunachal Pradesh, Manipur, Mizoram and Nagaland, and Myanmar.

India - Sri Lanka

The detailed project report for a HVDC link between Madurai and Mannar, featuring 2x500 MW HVDC terminals utilising voltage source converter technology, is currently in its finalisation stage.

Outlook

In sum, cross-border grid interconnections play a crucial role in the energy transition. Through intergovernmental cooperation and agreements, countries in the South Asian region are collaborating on power generation, transmission and trade, aiming to enhance energy security and promote sustainable development. India's central role in coordinating interconnections with neighboring countries is further strengthening regional cooperation. With ongoing projects and agreements, India is poised to achieve greater integration and resilience in its energy infrastructure, ultimately benefiting the entire South Asian region. ■

Cross-border transfer capacity by 2028-29 (MW)

Country	Existing	Under construction	Planned	Total
India-Bangladesh	1,160	0	1,000	2,160
India-Bhutan	2,070	2,220	0	4,290
India-Myanmar	3	0	505	508
India-Nepal	1,200	1,900	3,070	6,170
India-Sri Lanka	0	0	500	500
Total	**4,433**	**4,120**	**5,075**	**13,628**

Source: CTUIL's ISTS rolling plan 2028-29 (Interim Report)

Interview with Prakash Agrawal

"The transmission segment is set to witness transformative growth"

In a recent interview with *Power Line*, Prakash Agarwal, Director, RR Ispat (A unit of GPIL) discussed the growth of the power transmission segment, increasing renewable energy integration and emerging technologies. He highlighted the company's offerings and emphasised its commitment to modernisation, sustainability and future growth. Edited excerpts...

What is your assessment of the current state of the transmission segment?

The power transmission sector is witnessing a major transformation, driven by the integration of renewable energy sources such as solar and wind. At HIRA, we are stepping up to support this shift by providing self-sustainable structures across the country.

This evolution is characterised by a transition from conventional methods to innovative solutions. The use of design and surveying software such as POWERLINE demonstrates the industry's commitment to modernisation and efficiency. In addition, advancements in smart grid technology and digital substations are significantly improving the reliability and control of the transmission network.

HVDC technology is also gaining traction, particularly for long-distance transmission, making it a vital component for connecting offshore wind farms. These developments reflect a proactive approach to addressing power transmission challenges, ultimately paving the way for a more resilient and sustainable energy future.

What are the new and emerging designs and technologies of transmission towers and poles? What are their key benefits?

The power transmission sector is navigating a complex landscape, with challenges such as high costs, environmental concerns, regulatory issues, and transport and installation hurdles.

At HIRA, we are leveraging advanced tools and innovative approaches to effectively address these challenges. To tackle cost concerns, we are focused on reducing raw material expenses as much as possible. On the environmental front, we are transitioning from traditional lattice towers to monopoles for transmission lines. This shift not only reduces the land footprint but also minimises wildlife disruption. Monopoles occupy less space, making them less intrusive to the surrounding ecosystem. Additionally, these structures have no interior access, which discourages wildlife habitation. We further enhance safety with bird guards to prevent nesting, unlike lattice towers, which often attract rodents and birds.

We are also incorporating composite materials such as fiberglass and carbon fibre, which provide superior strength-to-weight ratios and corrosion resistance. This enables the construction of taller, more slender structures that are both lightweight and durable.

Moreover, we are developing smart towers equipped with sensors, cameras and communication technologies to enhance operational efficiency. Our modular designs simplify transportation, assembly and maintenance.

With the latest advancements in design methodologies for monopoles, we can create structures that effectively address environmental concerns, while ensuring reliability, cost efficiency and resilience against extreme weather conditions. These innovations position us to meet the evolving needs of the power transmission industry while promoting sustainability.

What market opportunities do you foresee in the power transmission segment over the next one to two years?

The power transmission segment is set to witness transformative growth fuelled by increasing demands, technological advancements and a shift towards sustainable energy solutions such as renewable energy integration and modern designs such as monopoles. Companies that capitalise on these emerging opportunities will be well-positioned to lead in this evolving market.

What are RR Ispat's key offerings and solutions in the transmission space?

Our key offerings and solutions in the power transmission space include:

- Transmission line towers and substation structures (up to 765 kV), approved by key entities such as Powergrid, GETCO, MPPTCL, CSPTCL, and many more
- Monopoles
- Lattice towers and distribution poles for rural electrification
- Railway overhead electrification structures
- Solar structures including module mounting structures and irrigation structures

Could you provide an overview of the company's manufacturing facilities for power transmission products?

With a team dedicated to ethical business and innovation, we have expanded our product range, adopted cutting-edge technologies and prioritised customer satisfaction. In just a decade, we have become a leading name across India.

- RR Ispat has commissioned its HR Coil Cum Structure Mill, in technical collaboration with STECH, with an annual capacity of 2,00,000 mtpa for angles, channels, beams and strips. The mill is now approved by Powergrid to supply angles, ranging from 65x65x4 mm to 200x200x20 mm in E250 and E350 grades.
- We are specialised in the design, engineering and manufacturing of galvanized steel transmission line towers (single/double/multi-circuit) with a capacity of 60,000 mtpa. We also manufacture substation structures with a capacity of 6,000 mtpa.
- We have introduced monopoles, our latest solution for modern power infrastructure. With the same commitment to quality, our monopoles are designed to meet the demands of urban and challenging environments, particularly right-of-way constraints, by setting new standards in power transmission.
- We provide solutions for power lines carrying low-voltage electricity from substations to homes and businesses as well as from renewable energy production centres to substations. Our manufacturing capacity for this product is 24,000 mtpa.

- Our railway OHE structures ensure efficient power transmission with cantilevers supporting the contact wire system and various mast types adapted to different track conditions. We have a production capacity of 24,000 mtpa.
- We also manufacture several solar structures for module mounting, irrigation pumps, etc.
- We also have our own galvanising plant with an annual capacity of 120,000 mt.

What are the company's future plans and key priority areas in the transmission segment?

RR ISPAT, a unit of Godawari Power and Ispat Limited, has emerged as Central India's most trusted steel brand. Specialising in design, engineering, manufacturing and project management of transmission line towers (33 kV to 765 kV), substation structures, monopoles, high masts, solar structures and rural electrification systems, we deliver comprehensive solutions. With increasing demands and technological advancements in the transmission sector, we are all set to provide top-notch modern infrastructure to meet India's future infrastructure requirements.

At HIRA, we are excited to expand our presence in the TLT and railway segments. To support this initiative, we have launched our hot rolled coil cum structure mill, which has received approvals from Powergrid and CORE. Previously, we relied on external sources for raw materials for TLT and railway fabrications. However, with a production capacity of 200,000 mt per annum, we can now manufacture our own raw materials and also meet market demands. This not only enhances our operational efficiency but also positions us as a key supplier in the industry. ■

TransTech India 2024

Agenda: Monday, October 7, 2024 (Day 1)

Time: 9:45-10:55

Inaugural and Keynote Address

- R.K. Tyagi, CMD, Powergrid Corporation of India
- Pankaj Agarwal, Secretary, Ministry of Power

Note: Mr Agarwal will be addressing the event either on October 7 or on October 8.

Time: 10:55-11:35

Tea/Coffee Networking Break

Time: 11:35-12:30

Industry Perspective

- Manish Agarwal, CEO (Conductors & Telecom), MD (T&D), APAR
- Guilherme Mendonca, Head, Energy, Siemens
- Arun Sharma, CEO, Sterlite Power
- Satish Talmale, COO, IndiGrid

Time: 12:30-13:20

Transition to Clean Energy

- Alok Kumar, Fmr. Secretary, Ministry of Power
- S.K. Soonee, Fmr. & Founder CEO, POSOCO (now Grid-India)
- S.R. Narasimhan, CMD, Grid Controller of India

Time: 13:20-14:10

Technology Showcase

- Kamalakannan Thiruvadi, Regional Executive, South Asia, Bentley Systems
- Gaurav Malhotra, Deputy General Manager, Polycab
- Hitesh Mundhada, Vice-President (South Asia), CTC Global

Time: 14:10-15:10

Lunch

Time: 15:10-16:10

State Utility Perspectives and Plans

- A.V.K. Bhaskar, Director Grid, AP TRANSCO
- Upendra Pande, MD, GETCO

Time: 16:10-17:10

EPC Perspective

- Sharan Bansal, Executive Director, SKIPPER
- Ankit Bhardwaj, EVP & BD, Global Product & Services, Sterlite Power
- Rajeev Dalela, President, Kalpataru Projects International
- Venkat Muvvala, CEO-Infra & EPC Business, Jakson Group
- Joji Sebastian, VP and Head T&D, Larsen and Toubro
- Abhishek Sil, VP – Sales and Tendering, KEC International

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- Progress under RDSS
- State initiatives
- Private discom viewpoint
- Regulators' perspective
- Smart metering and AMI
- NSGM and smart grid update
- Costs, power purchase and tariff outlook
- Demand-side management
- Cybersecurity
- Role of power exchanges
- MDMS and data analytics
- EV charging infrastructure
- Technology showcase - (AI/ML, IoT, blockchain, etc.)
- Loss reduction and revenue protection
- Solar rooftop: discom viewpoint
- Etc.

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