PowerLine TransTech India 2024
EXHIBITION AND CONFERENCE

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Dwarka, New Delhi

New Delhi, Tuesday, October 8, 2024 DAILY NEWS #2

Future of Transmission

Inaugural Address

R.K. Tyagi, Chairman and Managing Director, Power Grid Corporation of India, delivered the inaugural address at the Power Line TransTech India 2024 Conference and Exhibition. He began his address by highlighting the global shift towards cleaner energy, driven by the urgent need to combat climate change and reduce carbon emissions. India, being rich in renewable energy resources (especially solar and wind), has the potential to become energy secure through renewable energy development, he noted. India is already making progress in this direction, with renewables capacity surpassing 200 GW, and is on track to achieve 500 GW by 2070. To manage the variability of renewable energy, it is essential to integrate diverse renewable energy sources across regions.

Further, Tyagi observed that the energy transition can only be achieved with a reliable and robust transmission system, and that there can be no transition without transmission. Under the new National Electricity Plan, the transmission network is set to grow from 485,000 ckt km in 2024 to 650,000 ckt km by 2032. Transformation capacity will also increase from 1.25 million MVA to 2.34 million MVA. The plan entails an estimated investment of Rs 9,150 billion. He noted that this expansion is critical for meeting the rising electricity demand, integrating renewable energy and accommodating green hydrogen loads into the grid.

Tyagi also highlighted that building transmission infrastructure comes with geographical, technical and social hurdles. Laying transmission lines through difficult terrain, while balancing environmental concerns and community opposition can lead to delays and cost overruns. Securing clearances is a time-consuming process that impacts project timelines. Further, global supply chain disruptions pose a challenge, particularly for high-tech components such as transformers and HVDC parts. To mitigate this, local manufacturing and initiatives such as Make in India are crucial. One of the most pressing challenges is the shortage of skilled manpower, and there is a need for training and capacity building across the value chain. Tyagi noted that while advanced technologies such as drones, artificial intelligence (AI) and predictive maintenance are helping enhance grid reliability and reducing downtime, the shortage of skilled personnel remains a critical issue.

> "The transition to clean energy can only be achieved with a reliable and robust transmission system. There can be no transition without transmission."

In conclusion, Tyagi stated that energy transition is one of the most significant challenges of our time, with the power transmission sector at its core. From overcoming geographical, technical and social challenges to leveraging AI, drones and advanced analytics for asset management, there is a need to innovate and adapt. Although the road ahead is long and challenging, the potential rewards of a cleaner, more sustainable energy future make every effort worthwhile, he added.

Industry Perspective

The Industry Perspective session featured a panel discussion among Manish Agarwal, CEO (Conductors and Telecom), MD (T&D), APAR; Guilherme Mendonca, Head, Energy, Siemens; Arun Sharma, CEO, Sterlite Power; and Satish Talmale, COO, IndiGrid, on a wide range of topics, including the state of the sector, industry priorities, new technologies being adopted, challenges and outlook...

According to Manish Agarwal, two key considerations to meet India's renewable energy targets are the development of a robust transmission network and addressing right of way (RoW) and land-related issues. Approximately $5 billion-$6 billion worth of annual investments will be needed for infrastructure development. He noted that RoW issues have been the primary cause of delays for both greenfield and brownfield projects.

On the technology front, he noted that the use of monopoles and lattice towers can significantly help address space challenges. It is also crucial to focus on reconductoring and augmenting existing transmission lines at the planning stage itself, as it is less expensive than setting up new lines.

He emphasised that the industry must focus on indigenisation and reducing the reliance on imports. This will facilitate the development of India as a hub for exports to global markets such as Europe and South America, enabling it to compete on a global scale alongside Chinese players. There is also a need for India to promote free trade agreements at the policy level to promote India's export competitiveness.

Overall, he noted that the outlook for the industry for the next 10-20 years is extremely positive. However, challenges such as higher attrition rates and a lack of skilled manpower persist. It is also critical for India to improve the safety and quality of its products.

Guilherme Mendonca highlighted the rapidly increasing electricity demand in India, which is expected to increase substantially over the next few years due to the growth in high energy-demand sectors, such as electric vehicles, which are yet to achieve full market penetration. He added that decarbonisation will become critical, as India is expected to enforce carbon trading targets by 2026, necessitating industries to transition towards decarbonised operations. Further, economic growth in India's large middle class will lead to a significant increase in electricity consumption.

Regarding future technological requirements, he anticipates a major focus on high voltage direct current (HVDC) systems, for which long-term planning will be crucial. While point-to-point HVDC project implementation has been carried out, DC-level switching will soon be undertaken to connect large generation areas to consumption centres. Further, grid stabilisation technologies and digitalisation will play pivotal roles.

According to Arun Sharma, a key challenge is ROW. He noted that cross-country power transmission line projects have benefitted from strong state support. Stakeholder management, especially by local communities, remains crucial.

Another critical aspect is supply chain management. The volume of work getting awarded is substantial; therefore, the pace of project execution should be improved through mechanisation. Currently, in India, completing around 1 km of lines takes 1,400-1,500 days, compared to less than 1,000 days in Brazil, and only about 350-400 days in the US and Canada. He added that bidding documents should be structured in a way that provides developers with opportunities to deploy technologies that reduce time and costs.

He stated that, going forward, offshore wind, solar, pumped hydro and hydrogen are key emerging technologies expected to play a critical role in achieving the net-zero targets by 2070. He also acknowledged that tariff-based competitive bidding is performing exceptionally well in India and that no other country in the world, except for Brazil, has such an efficient process. The support and efforts of the central government in land acquisition, RoW and coordination with states have been commendable.

According to Satish Talmale, while TBCB has certainly improved efficiency, the challenge for developers now lies in integrating the best technologies into the systems. This is crucial for ensuring the long-term sustainability of projects. While technologies are available, as developers, we need to determine whether there is willingness to incorporate them into the e-reverse auction framework.

As an operator in the renewable energy space, Talmale noted that rapid changes brought by renewable energy trends are making it increasingly difficult to manage the grid in a smarter and more resilient manner. Dynamic shifts are taking place, and while other parts of the world are adapting, India needs to focus on building an ecosystem that can keep pace with these changes.

A key challenge he highlighted is the shortage of skilled labour, particularly in areas such as cybersecurity and digitalisation, which are becoming critical as we move toward smarter grid management. There is also significant potential for capacity building in the battery storage segment, offering a massive opportunity to develop an ecosystem around renewable energy.

On the technology front, he shared that Indigrid has implemented digital asset management, with 100 per cent of its assets now on the platform. They are also implementing an asset health index that monitors the condition of individual equipment, such as transformers circuit breakers and other critical components in the transmission line. They have also implemented a weather forecasting platform to predict challenges such as high wind speeds or lightning that could impact transmission lines.

Transition to Clean Energy

The panel discussion on "Transition to Clean Energy" brought together key sector leaders to discuss the critical role of a robust power transmission system in India's renewable energy future. The esteemed panelists included Alok Kumar, Former Secretary, Ministry of Power; I.S. Jha, Former CMD, Powergrid and Former Member, CERC; S.K. Soonee, Former and Founder CEO, POSOCO (now GRID-India); and S.R. Narasimhan, CMD, Grid Controller of India.

Mr Kumar opened the panel discussion by sharing his views on India's progress towards achieving the country's renewable energy targets. According to him, transmission will be the key to the clean energy transition. However, there are a few challenges. The first is affordability, where the unit cost of high-voltage direct current (HVDC) lines has almost risen fourfold. It is crucial to cost-effectively augment the transmission capacity by appropriately pricing transmission services. The second challenge is the intra-state system, which has been lagging; although the country has done well in developing interstate infrastructure. To achieve the Central Electricity Authority's renewable energy capacity projections, more states must participate in tariff-based competitive bidding.

The third challenge, according to him, is technology, which needs to be addressed by optimising cost, flexibility, quality and resilience. Kumar emphasised that policy certainty and the visibility of long-term planning are the most important factors for attracting investors and supporting the local manufacturing ecosystem.

Reflecting on the current state of the country's energy sector, I.S. Jha emphasised the critical role of advanced technologies, such as higher voltage levels and HVDC systems. He noted that the central challenge that India faces is not technical but rather the enormity of the task at hand. It is evident that current planning processes are insufficient, and the sector requires coordinated planning that encompasses all stakeholders. He emphasised that coordinated planning is a global best practice that must be embraced. The involvement of transmission planners from the outset is essential to address supply chain complexities, including manufacturer engagement and voltage regulation challenges.

Moreover, he stated that prioritising technical criteria is needed to navigate these challenges effectively. It is imperative to ensure that India's transmission grid, one of the best globally, operates in harmony with evolving policies to foster sustained growth and efficiency in its power infrastructure.

Soonee began by addressing key issues concerning the valuation of transmission systems. He emphasised that the functions of transmission lines are often underappreciated, a trend that is expected to change as the sector evolves. He underscored the urgent need for significant investments in transmission infrastructure

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to enhance efficiency and reliability.

He pointed out that India has the opportunity to reconfigure its transmission topology, and urged planners to prioritise the re-optimisation of the existing network to address current inefficiencies. Effective optimisation, he noted, necessitates comprehensive studies that incorporate locational marginal pricing, loss factors and congestion pricing.

Highlighting the complexities of transmission networks, S.K. Soonee advocated for a systems-based approach, viewing transmission as a system of systems. He expressed concern over the shortage of qualified planners in large states. While congestion levels have remained low for the past five years, he warned that future growth may present new challenges.

S.R. Narasimhan expressed his belief that India is gradually progressing towards net zero targets by 2070 and 500 GW of non-fossil energy capacity by 2030. He discussed the work of the Grid Controller of India, and its close involvement in the interconnection of regional grids. He opined that regional transmission capability has become extremely important, and highlighted the number of states that are discussing the need to increase their import capabilities. He also stated that India, with its large geographical footprint, needs to have more transmission planning energy scenarios. Currently, there are nine scenarios covering three seasons, three times a day.

Narasimhan also emphasised the need to improve the technical standards in the power transmission space. This will help build a more resilient power system without the loss of valuable time. Three main areas need attention in the sector, according to him. These are the creation of planning resilience to avoid damage to transmission structures from the increased occurrences of cyclones in coastal zones, stronger concession agreements with defined work responsibilities, and cybersecurity.

In conclusion, power transmission network needs to expand significantly and become highly robust to cater to the large volumes of renewable energy integration expected in the coming years. Further, adequate focus needs to be given to cross-border trading and integration of distributed renewable energy systems into the power grid.

State Utility Perspective

The session on State Utility Perspective featured remarks by Upendra Pande, Managing Director, GETCO; and A.V.K. Bhaskar - Director Grid, APTRANSCO, on their state transco's performance, plans, challenges and outlook.

Upendra Pande began his address by highlighting Gujarat's key role in renewable energy integration in India, contributing 22.4 GW or 12 per cent of the country's total renewable capacity. The state's overall installed capacity stands at 45,500 MW, with about 50 per cent coming from renewable energy. By 2030, the state aims to contribute 100 GW toward India's target of 500 GW.

Pande emphasised that Gujarat's transmission system is being expanded to meet future needs. From 2,300 substations as of 2023-24, the state plans to increase this number to over 3,300 by 2029-30. It also plans to add 55,000 ckt km of transmission lines and expand its transmission capacity to 250,000 MVA by 2030. Gujarat is committed to harnessing its immense solar (235 GW) and wind (142 GW) potential through a combination of solar and wind energy projects. This will necessitate the development of 14 GW of additional transmission infrastructure. A key initiative in the state is the provision of daytime power for agriculture, which would require special infrastructure to deliver solar power during peak solar hours.

The state has also launched the Akshay Urja Setu Portal, which simplifies the process for renewable energy developers. This portal provides a transparent platform, mapping existing substations and available transmission capacity while tracking applications in order to streamline the connectivity process for developers, enhancing the ease of doing business in Gujarat.

In addition, the state is investing in advanced transmission infrastructure, including high-capacity HTLS conductors to reduce its land footprint. The introduction of 765 kV systems will facilitate bulk power transmission, particularly to remote regions or urban areas with growing energy demands. The state is also focusing on improving power quality through STATCOMs for stable power supply.

He added that the state is prioritising sustainability in its transmission network, with the addition of green substations that use environment-friendly materials such as ester-oil filled transformers and SF6 free circuit breakers. Gujarat is also prioritising cybersecurity in its transmission infrastructure.

By 2030, the state aims to play a pivotal role in achieving India's renewable energy targets while integrating innovative and sustainable technologies to enhance power generation and transmission capabilities.

According to A.V.K. Bhaskar, Andhra Pradesh has achieved energy surplus and the state's per capita consumption has increased from 1,480 kWh in 2019 to 1,797 kWh in 2024. The transco also maintained one of the lowest transmission losses in the country at 99.82 per cent in FY 2024. The utility's current network comprises 371 extra high tension substations with a total capacity of 66,638 MVA, and over 32,569 ckt km of transmission lines. Andhra Pradesh's grid handled around 81,000 MUs in 2023-24, with a peak demand of 13,712 MW this summer.

Outlining the company's key priorities, Bhaskar noted that in order to address the intermittency of wind and solar generation, the company is planning pumped storage projects and battery storage systems, which will also support future grid expansion. Smart grid technologies and green energy corridors for renewable energy evacuation are being prioritised, along with data analytics for predictive maintenance. Further, digital skill development programmes for employees are another focus area. Over the next five years, 71 new substations are planned, along with 4,696.32 ckt km of transmission lines and 16,506.5 MVA of transformation capacity augmentation.

Gas-insulated substations (GISs) are being installed at critical locations, including a 400 kV GIS at Thallayapalem, 400 kV and 220 kV GISs at Atchutapuram, and a 132 kV GIS at Kapuluppada (a 132 kV GIS at Moghalrajpuram is operational). In addition, APTRANSCO is using monopole transmission towers to reduce space requirements, with the 220 kV Nunna-Gundala line currently being upgraded to monopoles. Underground cables are also being deployed in cyclone-prone areas to enhance reliability.

However, the utility faces several key challenges such as rising wind speeds and natural disasters. Highlighting APTRANSCO's swift response, Bhaskar shared that power was restored within 48 hours after cyclones Hudhud and Titli. Meanwhile, land acquisition and right-of-way issues in forest areas have emerged as hurdles, leading to increased costs and project delays. ■

Interview with Pratik Agarwal

"The grid must evolve to handle increased electricity volumes"

In a recent interview with *Power Line*, Pratik Agarwal, Managing Director and Chairman, Sterlite Power Limited and Serentica Renewables, discussed the current state of the power sector, transmission challenges and future trends. He also shared insights into Sterlite Power's strategies and priorities moving forward. Excerpts…

What is your assessment of the current state of the power sector?

The power sector in 2024 has shown significant progress, reflecting both achievements and ongoing challenges. Over the past year, the government has taken significant steps to facilitate this growth, including policy reforms, improvements in the ease of doing business and the implementation of renewable purchase obligations. However, the sector has been facing challenges owing to global supply chain disruptions, fluctuating coal prices and the rising demand for power.

As of August 31, 2024, India's installed capacity is 450 GW, with 153 GW coming from renewable energy sources alone. This clearly demonstrates that the country is backing its vision with a strong on-ground performance as it marches towards its ambitious 500 GW renewable energy target.

No system is complete without a robust transmission network. However, India's transmission infrastructure continues to lag behind, posing a significant challenge in power evacuation from renewable projects. While, the sector has seen improvements in grid modernisation efforts, with a focus on smart grids and digital technologies, the intermittency of renewable energy sources has underscored the need for energy storage systems.

What opportunities do you see for private developers in the transmission sector over the next one to two years?

There is a substantial gap in transmission infrastructure, particularly in renewable-rich states. Private developers can play a crucial role in bridging this gap by investing in and developing new transmission lines. The government's focus on privatisation and reforms, such as the push for competitive bidding in transmission projects, create further opportunities for private participation. Additionally, the rise of green energy corridors and HVDC systems presents avenues for private developers to invest in advanced transmission technologies. Private sector involvement in grid modernisation initiatives, including smart grids and digital technologies, will also be crucial for enhancing grid resilience and stability as renewable energy integration intensifies.

In the short term, the emphasis on energy storage solutions, driven by the intermittency of renewable energy, opens up prospects for developers to integrate storage with transmission projects, thereby creating more resilient and flexible grid systems.

What are the new and emerging requirements of the transmission grid?

One of the key requirements of the transmission grid is the expansion and modernisation of infrastructure to help achieve India's renewable energy target. Transporting power over long distances through HVDC will be a game changer. However, it should be technologically agnostic so that developers are incentivised to build capacities efficiently.

The establishment of submarine cable systems will be another requirement. With the government planning to auction 37 GW of wind capacity, India will need to develop the necessary supply chains to support this.

As land becomes a scarce resource and right-of-way (RoW) issues become more profound, upgrading existing corridors will also be necessary. In this regard, planners should consider RoW width reduction technologies such as HTLS and monopoles.

Grid flexibility and resilience are also critical, requiring advanced energy storage solutions, FACT devices and smart grids to manage the intermittency of renewables and enhance stability. Decentralisation and digitalisation are emerging trends, as smaller-scale renewables and rooftop solar demand a more intelligent grid capable of real-time monitoring and automation to optimise performance and prevent disruptions.

Cross-border connectivity is gaining importance necessitating infrastructure upgrades and regulatory alignment.

What are some of the latest technologies being deployed by Sterlite Power?

Our latest advancements include the deployment of high-performance conductors, such as aluminium conductor steel supported and aluminium conductor composite reinforced. These conductors are designed to enhance thermal and electrical performance, enabling higher transmission capacities and reduced line losses. In urban and challenging terrains, we are increasingly utilising medium voltage covered conductors. These conductors require less clearance than conventional overhead lines.

Our projects are incorporating HVDC technology, which is crucial for efficient long-distance and offshore power transmission. HVDC technology enables us to transfer power over extensive distances with minimal losses, facilitating the integration of remote renewable energy sources.

To support the rise of digital infrastructure, we are expanding our optical ground wire solutions, including options with 96 and 144 fibres. These solutions provide robust communication capabilities essential for modern grid management and the adoption of advanced digital technologies.

What have been the key business highlights for Sterlite Power in the past year?

We manage a diverse portfolio of 33 transmission projects across India and Brazil, spanning 16,529 ckt km, with a total capex of approximately Rs 450 billion. In 2023, we achieved a significant milestone by completing the Lakadia-Vadodara Transmission Project in Gujarat, India's largest green energy corridor. This investment of Rs 20.24 billion is capable of evacuating up to 5,000 MW of power, making it a crucial

component of the 30,000 MW hybrid renewable energy park in Kutch, which is set to become the world's largest.

This year, we also secured major green energy transmission projects in Rajasthan, including Parts G and F. These projects involve a 700 km transmission line designed to evacuate over 20 GW of renewable energy from the state's renewable energy zones (REZs). Additionally, we have just commissioned our flagship Mumbai Urja Marg project, which is another critical ISTS project with the potential to deliver 4,000 MW of green power to Mumbai, facilitating the city's transition from thermal power plants.

One of our major developments in financial year 2024 was securing the Khavda Phase IV (7 GW): Part C project, a green energy transmission system in Gujarat. This is Sterlite Power's second green energy transmission project in the state, and fifth overall. The project involves the construction of a 258 km 765 kV transmission corridor and a 6,000 MVA GIS substation, among other critical components. It will play a pivotal role in evacuating 7 GW of renewable energy from the Khavda renewable energy park, which is part of India's largest hybrid solar and wind park.

Our Global Products and Services (GPS) segment has demonstrated strong performance. In the second quarter of financial year 2024, we secured new orders worth approximately Rs 20 billion, a substantial increase from the previous quarter. The total order intake for the first half of FY 2024 reached Rs 33 billion, highlighting robust market momentum driven by rising global demand for high-voltage cables, optical ground wires and other transmission components. We have secured Rs 24 billion in funding from REC Power Development and Consultancy Limited for the Beawar transmission project. We are also exploring equity investments, debt financing and green financing. Our partnership with GIC to create a $1 billion platform for power transmission in India underscores our commitment to infrastructure development and the nation's energy transition.

What are your top priorities for Sterlite Power in the next one to two years?

Sterlite Power remains focused on three strategic priorities over the next one to two years - expanding our transmission infrastructure, growing our GPS business and accelerating green energy initiatives.

Transmission infrastructure expansion: We are committed to significantly expanding our transmission build-own-transfer portfolio, currently valued at approximately Rs 120 billion. Over the next five years, our goal is to increase this to Rs 400 billion by taking on complex, high-impact projects. These include key initiatives such as green energy corridors in Rajasthan and Gujarat, as well as the recently completed Lakadia-Vadodara transmission project, which delivers 5,000 MW of renewable energy from Kutch to the national grid.

Growth of GPS: Sterlite Power's GPS business continues to witness remarkable expansion, driven by high-performance, green products, and specialised and specialised EPC services In the first quarter of FY25, we secured orders worth Rs 15 billion across both domestic and international markets, reflecting a 15 per cent quarter-on-quarter increase in our order book. With this latest addition, our total order book has now surpassed Rs 65.6 billion.

Green energy projects: We are actively supporting India's renewable energy targets through large-scale green energy corridor projects. Notable among these are the REZs, which will help evacuate 20 GW of renewable power, and the Kishtwar Transmission Project, crucial for hydropower evacuation in Jammu & Kashmir. Additionally, by leveraging advanced technologies such as drones, LiDAR and helicranes, we aim to enhance operational efficiency and deliver world-class projects.

What is the outlook for the power sector in the near to medium term?

India's power sector is on the cusp of a significant transformation. With peak demand projected to exceed 400 GW by 2031-32, there is an urgent need for a robust and expanded power infrastructure. The disruptions caused by electric vehicles, smart buildings, green hydrogen and data centres will only continue to drive up demand.

The government's ambitious goal of renewable energy capacity, combined with the growing contributions from solar and wind energy, signals a decisive shift towards cleaner energy. This transition will be driven by a series of supportive policies aimed at promoting energy efficiency and sustainability. In addition, with foreign direct investments in the sector exceeding $18 billion, the stage is set for further growth and innovation.

In the near to medium term, we foresee an increase in public-private partnership. Key initiatives such as the development of green energy corridors, the roll-out of enhanced smart meters and a focus on energy storage solutions will be instrumental in managing the growing power demand while ensuring grid reliability. ■

Optimising Space Usage

MoP releases guidelines for RoW compensation

The Ministry of Power (MoP) has introduced new guidelines for right-of-way (RoW) compensation for transmission lines, including those in urban areas. These guidelines are designed to streamline the construction of transmission lines and ensure their timely completion by effectively addressing RoW issues and standardising the compensation calculation method to bring consistency across various projects and regions.

Determination of compensation

Applicability: The compensation guidelines apply to transmission lines with tower bases operating at voltage levels of 66 kV and above, excluding sub-transmission and distribution lines below 66 kV. States and union territories (UTs) can adopt these guidelines in their entirety or issue their own modified guidelines. ln the absence of state government guidelines, the guidelines issued by the central government will apply for determining compensation.

Compensation determination: According to the new guidelines, the compensation is determined based on the circle rate, guideline value, or Stamp Act rates of the land. If the market rate is higher than these values, the land value is established according to the prevailing market rate, as assessed by the district magistrate, district collector or deputy commissioner. This assessed land value forms the basis for compensation and is communicated by the respective authority.

Tower base compensation: The compensation for the tower base area will be 200 per cent of the land value. The tower base area includes the area enclosed by the four legs of the tower at the ground level, with an additional one metre extension on each side.

Corridor compensation: The compensation amount for the RoW corridor will be 30 per cent of the land value. Land within the RoW corridor, as defined in Schedule VII of the Central Electricity Authority (Technical Standards for Construction of Electrical Plants and Electric Lines) Regulations, 2022, will be eligible for this compensation. This payment is intended to address the potential reduction in land value due to the presence of overhead lines or underground cables within the RoW corridor. Further, the guidelines state that no construction activity of any kind will be permitted within the RoW of the transmission line.

Alternate compensation: In areas where landowners have been offered or have accepted an alternative mode of compensation under the transfer of the development rights policy of the state or UT, the licensee or utility should deposit the compensation amount with the corporation, municipality, local development authority or the relevant state government.

Landowner identification and payments: During the check survey conducted at the execution stage, the names of landowners whose properties fall within the transmission line's RoW will be recorded. According to the guidelines, the compensation payments will be made as a one-time, upfront amount. Whenever feasible, compensation will be disbursed using various digital payment methods, including the Aadhaar-enabled payment system and unified payments interface.

Standard operating procedure for TSPs

According to the guidelines, states/UTs and transmission developers should follow standard operating procedures. The transmission service provider (TSP) is responsible for identifying landowners, issuing notices and collecting the necessary documents, including proof of identity and ownership. Revenue officials will verify land records against revenue maps. For land with multiple owners, the TSP must secure a no-objection certificate from all co-owners, attested by the sarpanch and revenue office.

The TSP will measure the tower footing and corridor area in the presence of the landowners, obtaining their signatures and those of the revenue officials. If disputes arise regarding land rates, the district magistrate or an authorised magistrate will address the issue and determine compensation. The TSP is responsible for compensation, covering tower footing, corridor surface, working area and access roads, including both permanent and temporary structures, based on the assessment.

Conclusion

The guidelines suggest that when laying transmission lines in areas with RoW constraints, various technologies should be considered to optimise space usage, such as steel pole structures, narrow-based lattice towers, multi circuit and multi voltage towers, single-side stringing with lattice or steel poles, cross-linked polyethylene underground cables, gas insulated lines, compact towers with insulated cross arms, and voltage source converter-based high voltage direct current systems.

In recent years, RoW compensation issues have become a major bottleneck for transmission projects, causing delays due to landowners demanding higher payouts. Disputes over RoW and land acquisition are significant barriers to the development of renewable energy projects. The MoP's revised guidelines aim to streamline transmission line construction by addressing RoW challenges. These guidelines introduce advanced technologies and comprehensive procedures to optimise space usage and ensure fair compensation for landowners. ■

Key Statistics

Transmission growth across utilities

Transmission line addition in FY 2024-25
(up to August 2024) (ct. km)

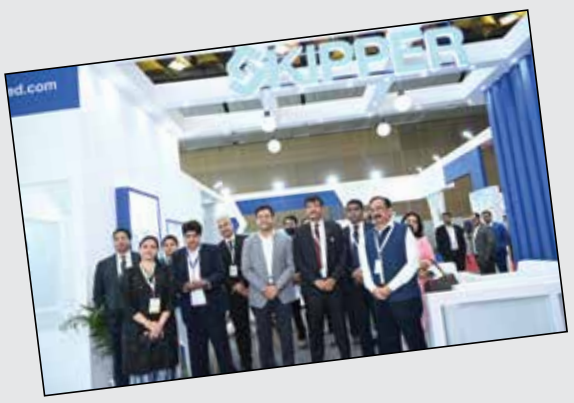
State/UT/Developer		220 kV	230 kV	400 kV	765 kV	Total
State	Andhra Pradesh	54				54
	Bihar	313				313
	Chhattisgarh	45				45
	Gujarat	180				180
	Himachal Pradesh	11				11
	Karnataka	232				232
	Madhya Pradesh	139				139
	Maharshtra	143				143
	Odisha	4				4
	Punjab	111		14		125
	Tamil Nadu		9	140		149
	Telangana	77		208		285
	Uttar Pradesh	151		587		738
	West Bengal	4				4
Centre	Powergrid				405	405
	DVC	52				52
Total		**1,516**	**9**	**949**	**405**	**2,879**

Transformation capacity addition in FY 2024-25
(up to August 2024) (MVA)

State/UT/Developer		220 kV	230 kV	400 kV	765 kV	Total
State	Andhra Pradesh	670				670
	Bihar	320				320
	Chhattisgarh	320				320
	Delhi	200				200
	Gujarat	380				380
	Haryana	680				680
	Himachal Pradesh	200				200
	Madhya Pradesh	800				800
	Maharashtra	525				525
	Odisha	340				340
	Punjab	740		1,000		1,740
	Rajasthan	280				280
	Tamil Nadu	350		1,600		1,950
	Telangana			315		315
	Uttar Pradesh	2,140		760		2,900
	West Bengal	320				320
Central	Powergrid	200		2,815	3,000	6,015
	DVC			315		315
Total		**8,115**	**350**	**6,805**	**3,000**	**18,270**

DVC: Damodar Valley Corporation; Powergrid: Power Grid Corporation of India Limited
Source: Central Electricity Authority

Snapshots from Day 1



TransTech India 2024

Agenda: Tuesday, October 8, 2024 (Day 2)

9:30-10:30
State Utility Perspectives and Plans
- T. Jagath Reddy, Director-Transmission, TG Transco
- Avinash Nimbalkar, Director-Projects, MSETCL
- B.B. Mehta, Director-SLDC, OPTCL
- Swapnendu Kumar Panda, Member-Technical, DVC

10:00-11:30
Workshop on Power Line Systems: Overview of Recent Features in PLS-CADD, Tower, and PLS-Pole
- Brandon Grillon, Director, Power Line Systems, and Tim Cashman, Bentley Systems

10:30-11:20
O&M/Asset Management
- Nihar Raj, Head–O&M, Adani Energy Solutions
- Amitanshu Shrivastava, Head–Transmission, IndiGrid

11:20–11:50
Tea/Coffee Networking Break

11:50-13:20
Technology Showcase
- Sangeen Desai, Manager, Business Development, Keller
- Kumar Kishlay, Senior Product Specialist, Presales, Trimble
- Ajay Kohli, President, Marketing, Kanohar Electricals
- Albert Molloy, Global Product Manager OC, Metalube
- Monal Wagh, Head BD, Bajel
- Pradeep Agnihotri, DGM, R&P Application Engg, APAR

12:00-13:30
Masterclass on Effective Use of Insulated Aerialwork Platforms for Live Line Works
- Travis Martyn, Altec Worldwide

13:20-13:50
Transmission System Planning
- Ashok Pal, Dy. COO, CTUIL

13:50–14:50
Lunch

14:50-12:15
Regional and State Plans
- Sanil C. Namboodiripad, MD, NETC

15:15-16:15
Focus on Renewable Energy Evacuation
- Purnendu Chaubey, Senior Vice-President, ReNew
- Varchasvi Gagal, CEO, Datta Power Infra
- Sarit Maheshwari, CEO, NTPC REL
- Mahesh Vipradas, Vice-President, Sembcorp India

16:15-16:45
Future Forward for Transmission
- S.K. Soonee, Fmr. & Founder CEO, POSOCO (now GRID-INDIA)