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CONDUCTORS & INSULATORS THE TRANSMITTERS & GUARDIANS OF ELECTRICITY

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- **FOCUS:** Next-Gen Overhead Conductors; Indian Experience & Future Directions for Outdoor Insulation; Porcelain Insulators for Railway Electrification

CONDUCTORS

The Indian conductor market is entering a phase of sustained structural growth, supported by large-scale transmission infrastructure expansion, grid modernisation, RE integration, railway electrification, reconductoring initiatives, and steadily rising power demand.

Devendra Goel, Managing Director, Lumino Industries Limited, notes the market has nearly doubled from Rs102 billion in FY2020 to about Rs227 billion in FY2026. He estimates the industry will continue its upward trajectory at a 12-15 percent CAGR, reaching Rs400-460 billion by FY2031. "Growth opportunities will be driven by high-voltage transmission projects, RE evacuation infrastructure, grid-strengthening programmes, and reconductoring of existing networks," he notes.



Devendra Goel

The outlook is further reinforced by global trends. The worldwide transmission line market is projected to grow at a CAGR of around 5.2 percent during 2025-2034, while the global reconductoring market is expected to expand at a faster 8.5 percent CAGR between 2025 and 2030. India is anticipated to outpace global growth in this segment, with the domestic reconductoring market expected to register an estimated 15-17 percent CAGR, reflecting the country's growing need to maximise transmission capacity within existing right-of-way (RoW) constraints and accelerate RE deployment.

Market Trends: Shift Towards High-Performance Conductors

A key trend in the conductor market is the shift from conventional products to high-performance, application-specific technologies designed for modern power networks.

According to **Selesh Gupta, CEO, JSK Industries Ltd and Chairman, IEEMA Conductor Division**, growing electricity demand and increasing RoW constraints are driving this transformation. "The market is evolving from conventional conductors to high-ampacity conductors due to the rise in demand and RoW issues," he says. Gupta believes that continued investment in



Selesh Gupta

research and development (R&D), innovative designs, and the adoption of industry best practices will further accelerate opportunities for high-performance conductors (HPCs), particularly in the distribution segment.

Echoing this view, **Manish Shrivastav, Chief Business Officer, Specialised EPC Business, APAR Industries Limited, and Vice Chairman, IEEMA Conductor Division**, notes that utilities are increasingly prioritising solutions that offer higher current-carrying capacity, lower transmission losses, improved thermal performance, and more efficient utilisation of existing transmission corridors. "As a result, there is growing interest in advanced technologies such as high-temperature low-sag (HTLS) conductors, low-loss conductors, and other high-performance conductor solutions, while demand for conventional conductors remains strong.



Manish Shrivastav

Shrivastav also identifies reconductoring as a key emerging trend. By replacing existing conductors with advanced, higher-capacity alternatives, utilities can significantly enhance transmission capability using existing infrastructure. This approach avoids many RoW challenges and provides a faster, more cost-effective route to network expansion and clean energy expansion.

As transmission networks face increasing pressure to accommodate rising loads and renewable generation, the industry's focus is steadily shifting towards conductor technologies that deliver greater efficiency, capacity, and operational reliability.

Demand Drivers

The conductor market is being driven by long-term policy goals and structural shifts in India's energy sector. With India targeting 900 GW of sustainable energy generation by 2035, demand for conductors required to evacuate, transmit, and distribute this power is expected to rise steadily over the coming decade.

Gupta believes the country's ambitious RE ambitions will create sustained demand for transmission infrastructure and the conductors that form its backbone. He believes the requirement for power evacuation solutions will continue to grow year-after-year as new generation capacities come online.

innovations will be instrumental in building a smarter, more resilient, and sustainable power grid capable of supporting India's long-term energy transition goals."

While demand fundamentals remain robust, the industry is simultaneously undergoing a significant technological transformation, with manufacturers investing heavily in advanced materials, automation, and product innovation.

Improved Performance & Reliability: Technological Advancements in Conductor Manufacturing

Conductor manufacturing is becoming more technology-driven, with advances in materials, design, automation, and digital engineering delivering higher performance, lower losses, and greater product consistency.

Technological advancements are not limited to transmission conductors alone. **Saurabh Mahajan, Chief Marketing Officer-T&D Products, APAR Industries Limited**, notes that significant developments are also taking place in transformer applications. He highlights the growing importance of continuously transposed conductors (CTCs), which are manufactured by continuously transposing individually insulated copper strands. "These conductors help minimise Eddy-current losses, improve heat dissipation, and provide the mechanical strength required for reliable transformer operation. As power systems become more electrified and increasingly dependent on RE, such high-performance conductor technologies are expected to play an important role in enhancing grid efficiency and reliability."

The industry is also witnessing wider adoption of advanced conductor technologies. Goel points to "innovations such as AL-59, high-ampacity conductors, high-performance conductors (HPC), HTLS conductors, TS conductors, aluminium encased carbon core conductors (AECC), and metal matrix composite conductors (MVCC). These solutions are designed to improve current-carrying capacity, thermal performance, operational efficiency, and long-term reliability."

At the manufacturing level, Goel observes a growing emphasis on superior raw material quality, precision engineering, advanced testing systems, computer-aided design tools, and the development of specialised technical expertise. Together, these factors are helping manufacturers deliver products



Saurabh Mahajan

that meet increasingly stringent performance requirements.

For Gupta, future progress will be driven by technologies that enable "maximum power transfer at lower operating temperatures, supported by live-line monitoring systems, predictive performance assessment, and adherence to global quality standards."

Sustainability is emerging as another key focus area. Mahajan notes, "Low-carbon transmission solutions are gaining attention as utilities and developers seek to reduce the environmental footprint of their infrastructure while aligning with evolving international requirements such as the Carbon Border Adjustment Mechanism (CBAM)."

Overall, technological advancement in conductor manufacturing is moving the industry towards solutions that combine higher capacity, lower losses, enhanced thermal performance, greater reliability, manufacturing flexibility, and reduced environmental impact – attributes that will be essential for supporting the next generation of power infrastructure.

Towards Market Credibility & Localisation

As the conductor industry scales up to meet future transmission requirements, strengthening domestic technological capabilities and building global credibility are becoming key priorities. Industry leaders believe that long-term competitiveness will depend not only on manufacturing capacity but also on innovation, indigenous technology development, and world-class testing and validation capabilities.

Goel emphasises the need for greater investments in R&D, advanced materials, product development, testing infrastructure, and technical expertise. He highlights, "Continuous innovation in high-performance conductor technologies will be critical to strengthening domestic capabilities and enhancing India's global competitiveness."

The export opportunity is also expanding. Goel notes that India's conductor exports have grown from approximately Rs25 billion in FY2020 to Rs38 billion in FY2026, highlighting the industry's increasing acceptance in international markets and its potential for further global expansion.

For Mahajan, strengthening market credibility requires moving beyond manufacturing localisation towards the development of indigenous technologies, engineering expertise, and resilient domestic supply chains. "In the case of advanced conductor technologies, this calls for sustained investments in R&D, process innovation, materials engineering, and application-specific product development, along with the capability to design, test, and validate products to international standards."