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Assessing Zinc's Role in India's Infrastructure Development Initiatives

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In an exclusive interview with Industry Outlook Magazine, Arun Misra, CEO and Whole-time Director of Hindustan Zinc, discusses the importance of zinc production in India's growth, highlighting its role in the infrastructure, automotive, and energy storage sectors. He emphasizes zinc's versatility, sustainability initiatives like the low-carbon EcoZen, and the projected rise in demand driven by infrastructure investments and clean technologies, which are crucial for India's future development. With over 33 years of experience, he previously served in key roles at Tata Steel and has led Hindustan Zinc to global leadership in sustainability, receiving multiple accolades, including 'CEO of the Year' and a Top 30 CEOs ranking by Startup Lanes.

Could you provide an overview of zinc production in India and its role in the country's growth and development?

India's **zinc production industry** is growing steadily. As of 2023, India is the world's fourth-largest zinc producer, contributing about 7% of global output. From 2017 to 2022, the industry saw a compound annual growth rate (CAGR) of 4%, while in 2023-2024 alone, the Indian demand jumped to 20% on the back of the country's massive infrastructural push and strong rebound post covid restrictions removal. **Steel**, a major raw material in India's infrastructure push, witnessed the highest growth in terms of production as our country became the top steel producer worldwide. Zinc is primarily used for **steel galvanization**, which protects steel from corrosion—a significant issue costing India up to 5% of its GDP annually.

Zinc galvanization is essential for infrastructure projects, extending the lifespan of steel structures and reducing maintenance costs. It is also crucial for the automotive sector to galvanize vehicle bodies to prevent rust and corrosion in the face of harsh heat, cold, and rain. Additionally, zinc is used in die-casting alloys in the automotive sector and in the **renewable energy sector**. It protects wind turbines and solar panels from harsh conditions. Zinc is also gaining importance in the energy storage sector as a safe and reliable alternative to lithium-based batteries, with technologies like zinc-ion, zinc-air, and nickel-zinc being developed to support the global energy transition.

Zinc will play a major role in India's future, especially in projects like the National Infrastructure Pipeline and Gati Shakti Yojana, which require durable materials. As India's automotive and renewable energy sectors grow, and with the government's focus on infrastructure, zinc's significance will only increase. Hindustan Zinc, the world's second-largest integrated producer, is well-positioned to cater to these emerging needs. The Indian zinc market is projected to grow by 5.2% in FY 2024-25, driven by urbanization and infrastructure development.

Considering the current industry landscape, what are the key benefits of zinc galvanization for upcoming infrastructure projects?

Steel is highly vulnerable to corrosion from pollution, heat, chlorides, and vehicular emissions, leading to structural weakness, costly repairs, and disruptions. Zinc galvanization provides crucial protection for infrastructure projects, offering superior corrosion resistance and durability.

Galvanization coats steel with a protective zinc layer, shielding it from moisture, air, and corrosive pollutants, which prevents rust and extends the lifespan of steel structures. In harsh environments, galvanized steel can last over 50 years in rural areas and 30 to 35 years in urban or coastal regions. In the absence of galvanization, corrosion can severely compromise infrastructure within 5 to 10 years.

The process also strengthens the steel, making it more resistant to mechanical damage during transport and installation. This durability reduces maintenance needs and ensures safety, lowering long-term costs. Additionally, galvanized steel's versatility and design flexibility allow for customization and efficient construction, making it a cost-effective and practical choice for various projects.

Beyond its traditional use in the steel sector, what are some emerging applications for zinc?

Zinc is expanding its role beyond traditional steel applications, demonstrating its versatility across various industries. It is gaining traction in the energy storage sector, and Hindustan Zinc is also exploring the application of zinc in the battery ecosystem. These batteries offer a more stable and safer alternative to lithium-ion batteries, which are prone to combustion due to their less stable chemistry. Unlike lithium, which is rare, expensive, and needs to be imported into India, zinc is abundant in India, making it a more economical and locally available option. Zinc-based batteries provide long-duration storage, enhanced energy performance, lower ownership costs, and reliable operation in all weather conditions, making them highly versatile.

Zinc is also finding new applications in high-tech manufacturing and the electronics industry or use in next-generation devices, including **spintronics, sensors, solar cells, and LEDs**, particularly through zinc oxide.

Zinc is also the second-most important nutrient in the human body. Hence, in agriculture, zinc-based fertilizers are proving effective in enhancing crop growth and addressing zinc deficiency, a significant health concern in developing countries, especially among children. These fertilizers offer more efficient nutrient delivery than traditional zinc compounds, helping to combat zinc deficiency in crops.

Given the increasing emphasis on environmental sustainability, could you discuss some innovative solutions being developed to address global environmental challenges?

Zinc is crucial to a **low-carbon future**, and as the world's second-largest integrated producer, Hindustan Zinc continues to innovate. We are proud to launch Asia's first low-carbon zinc, EcoZen, reflecting our commitment to decarbonization and offering customers a competitive edge in decarbonizing their own value chain. Produced using renewable energy, EcoZen has a carbon footprint 75% lower than the global average, at less than one tonne of carbon equivalent per tonne of zinc. It is one of the most sustainable options that reduces carbon emissions by about 400 kg per tonne of steel galvanized for infrastructure protection and supports the low-carbon transition.

We work closely with our customers to develop innovative product solutions, and our zinc offerings are the first in the country to be Environmental Product Declaration (EPD) verified - providing comparable data on the product's environmental footprint. We are also BIS certified for their high quality. We design and develop products to serve the customers' emerging needs as per their specifications, keeping environmental consciousness at the core of product development.

Looking ahead, how do you anticipate the demand for zinc evolving in the coming years, and which sectors are expected to drive this growth?

Zinc demand is expected to grow significantly, driven by key sectors like construction and energy storage. The construction sector, particularly in emerging economies like India, will remain the largest consumer of zinc due to increasing infrastructure investments.

India's ambitious projects in roads, railways, public infrastructure, and smart cities are projected to double zinc demand in the next 5 to 10 years, supported by government policies.

India's growth and infrastructure development rely heavily on metals like zinc. Its use in galvanization will ensure the durability and longevity of public infrastructure, ensuring that it will last for generations, while its role in **clean technologies** and energy storage highlights its importance in the nation's progress.