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RNI REGISTRATION NO. 11403/1966

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Single Copy Price: ₹ 150/-
Annual Subscription: ₹ 1620/-, Foreign: USD 180

Registered Office: 26, Maker Chambers VI, 2nd Floor, Nariman Point, Mumbai 400 021, INDIA.
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E-mail: sales@jasubhai.com

PLACE OF PUBLICATION
JASUBHAI MEDIA PVT. LTD.

210, Taj Building, 3rd Floor, Dr. D. N. Road, Fort, Mumbai 400 001, Tel: +91-22-4037 3636

Published by Mr Hemant K. Shetty
Address: 406-D, The Karachi Citizens Co-Op Hosg Soc Ltd., Juhu Varsova Link Road, Andheri West, Mumbai - 400053.

Printer: Harilal Gangaji Patel

Printing Press (Name & Address): The Great Art Printers
25, Unique House, S A Brelvi Road, Fort, Mumbai 400 001.

Published from Jasubhai Media Pvt .Ltd. 3rd Floor, Taj Building, 210, Dr. D N Road, Fort, Mumbai 400 001.

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India is advancing towards the vision of Viksit Bharat 2047 and a robust bio-economy: Shri Tejveer Singh, Secretary, DCPC

New Delhi: India has an immense potential to emerge as a global leader in the bio-economy and bio-based agri-input sector due to its strong scientific base, rich biodiversity, and rapidly growing start-up ecosystem. This was stated by Shri Tejveer Singh, Secretary, Department of Chemicals and Petrochemicals (DCPC), Ministry of Chemicals and Fertilizers, while addressing the valedictory session of the two-day symposium-cum-workshop, BIOPSF 2026, in New Delhi.

The BIOPSF 2026 event, themed around "Next Gen Bio-Inputs – Bio-based Pesticides, Stimulants and Fertilizers," was organized by the Institute of Pesticide Formulation Technology (IPFT), Gurugram — an autonomous institution under the DCPC, Ministry of Chemicals and Fertilizers. The event was hosted at the National Agricultural Science Complex (NASC), New Delhi.

Shri Singh noted that several positive factors, including increased policy support for sustainable agriculture and targeted bio-economy initiatives will lead India on the path to becoming a global leader in the domain of bio economy and bio based agri-input sector.

The DCPC Secretary also expressed confidence that scientific excellence, effective industry-academia partnerships, and the technological contributions of emerging young innovators will shape the sustainable agricultural solutions of tomorrow.

Highlighting the practical aspects and success of bio pesticides, Shri Tejveer Singh emphasized that the ultimate success of bio-pesticides also depends upon the development of robust formulation technologies that can enhance product stability, field efficacy, ease of application, and overall farmer acceptance.

Furthermore, the DCPC Secretary added that as India advances toward its vision of 'Viksit Bharat 2047' and a robust bio-economy, there is a growing need to strengthen indigenous technological capabilities, promote translational research, and encourage startup-led innovation in bio-based chemicals, crop protection technologies, and sustainable agricultural inputs.

LANXESS celebrates anniversary of iron oxide production

Mumbai: Specialty chemicals company LANXESS is celebrating a century of iron oxide pigment production at its Krefeld-Uerdingen site. Since 1926, more than 15 million tons of iron oxide pigments have been produced here. This quantity could be used to produce more than 200 billion liters of paint — enough to cover an area the size of Germany five times over.

Due to their long durability, these iron oxide pigments are primarily used to color paving stones, roof tiles, coatings, and plastics. Examples include the red asphalt in front of Buckingham Palace in London and the facade of the Soccer City Stadium in Johannesburg.

"People encounter our pigments every day—on streets, roofs, and facades," says Michael Ertl, head of the Inorganic Pigments business unit at LANXESS, at the anniversary event. "Thanks to the pioneering spirit of our employees in Krefeld, our pigments have become indispensable in many other applications as well."

These applications include artificial turf for sports fields, airbags and brake pads in the automotive industry, and catalysts for chemical production processes. The use of pigments in electromobility, as a precursor material for batteries in electric cars, is also currently being pursued.

"What has been created at LANXESS in Krefeld-Uerdingen over the past 100 years is a piece of industrial history of inestimable value — and, at the same time, a living part of the present. The pigments manufactured at the Chempark Krefeld-Uerdingen are in demand worldwide," emphasizes Frank Meyer, Mayor of the City of Krefeld, adding, "The chemical industry faces a major challenge, but those who view the transformation as an opportunity and focus on reinvention are paving the way to the future."

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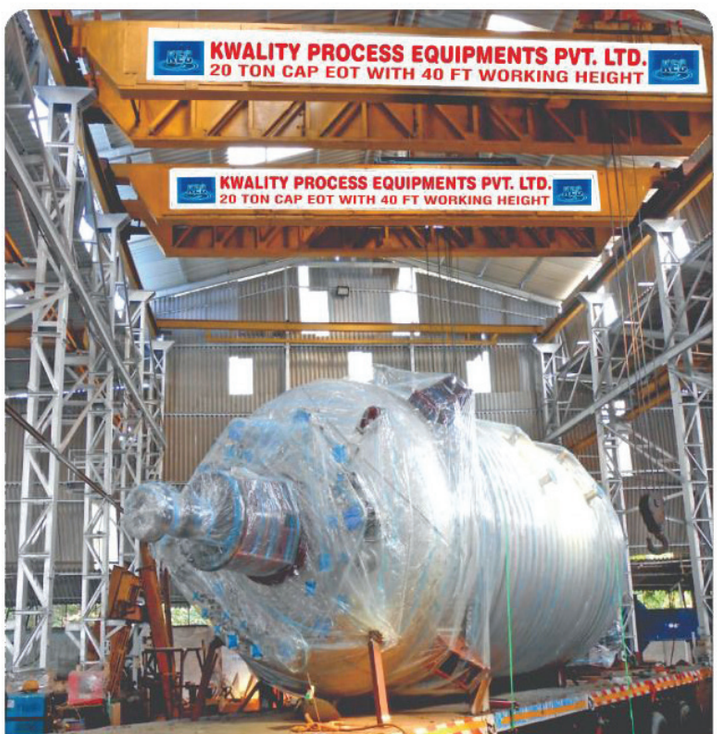

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25 KL SS 904L Reactor

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Kirloskar Brothers launches smart skid mounted fire pump set

Ms. Madhuritai Misal, Hon. Minister of State for Urban Development, Government of Maharashtra, during inauguration of Kirloskar Borthers Limited's smart skid mounted fire pump set.

Pune: Kirloskar Brothers Limited (KBL) has launched its smart skid mounted fire pump set, marking a significant advancement in intelligent fire protection. The system was inaugurated by Ms. Madhuritai Misal, Hon. Minister of State for Urban Development, Government of Maharashtra.

Designed as a fully integrated, factory-tested solution, the smart skid mounted fire pump set combines FM/UL-certified motor and engine pump sets with IoT-enabled remote monitoring. Delivering a flow rate of 170 m^3/hr (748.49 US gpm) at a head of 100 metres (≈ 142 psi), the system ensures reliable, high-performance fire protection with enhanced operational readiness, real-time performance visibility and predictive maintenance.

The pre-packaged, plug-and-play design eliminates the need for extensive civil foundations and skilled on-site labour, significantly reducing installation time and cost. Built-in safety features and OEM-backed quality assurance further enhance system reliability. At the core of the solution is KirloSmart™ Fire, KBL's IoT-based remote monitoring platform that enables real-time tracking of pump performance from any location. This proactive monitoring reduces the risk of equipment failure and ensures fire protection systems remain operational at all times. Depending on project requirements, this smart skid-mounted system can be integrated with standard fire pump sets as well as MSMO (Multi Stage Multi Outlet) fire pump sets.

The smart skid mounted fire pump set is ideal for a wide range of applications, including commercial buildings, hotels, educational institutions, hospitals, railway stations, warehouses, congested marketplaces, industrial facilities, residential housing and construction sites. Its retrofit-ready design makes it especially suitable for space-constrained locations and for upgrading ageing fire protection systems, allowing easy transportation, positioning and commissioning.

Carbon Emerging as a Business, Trade and Credit Risk Variable for India Inc.: Rubix Data Sciences

Mumbai: Carbon is rapidly moving beyond sustainability disclosures to become a measurable business cost, export competitiveness factor, and emerging credit-risk variable for Indian companies, according to a new report by Rubix Data Sciences and Breathe ESG. According to the report, titled, 'Carbon as a Business Variable: Trade, Risk, and the Evolution of India's Carbon Market', carbon exposure is increasingly beginning to influence cost structures, profitability, capital allocation, supply-chain decisions, and credit-risk assessment frameworks. Regulatory expectations from institutions such as the RBI and SEBI are also gradually pushing businesses and lenders towards deeper carbon and ESG integration.

India has emerged as a significant voluntary carbon market, with over 375 million carbon credits issued between 2010 and 2025. However, the report notes that much of the value created through these credits has accrued outside India, with limited linkage to domestic emissions reduction priorities. The introduction of the Carbon Credit Trading Scheme (CCTS) and the broader Indian Carbon Market framework reflects a shift towards retaining both economic as well as environmental values within the domestic system, the report elucidates.

The report also highlights significant execution bottlenecks within India's carbon ecosystem. Rubix's analysis of over 1,100 Verra-certified Indian carbon projects found that only about one-third of projects successfully reach the registration stage, with many facing delays related to verification requirements, monitoring costs, and regulatory uncertainty. According to the report, these delays have direct implications for monetisation, investor confidence, project viability, and the long-term credibility of India's emerging carbon market.

The report further warns that global climate regulations are rapidly changing the economics of international trade. Mechanisms such as the EU's Carbon Border Adjustment Mechanism (CBAM) are effectively turning carbon emissions into a direct export cost for Indian industry, particularly for steel and aluminium exports, with spillover effects on sectors such as cement and fertilisers. Carbon efficiency, the report notes, is increasingly becoming a determinant of pricing power, competitiveness, and market access rather than merely a compliance consideration.

"A large part of carbon risk will not sit within a company's own operations, but within its supply chain. Many businesses, which currently view carbon only from the lens of compliance, may discover that their exposure comes indirectly through suppliers, financing relationships, and export dependencies rather than from emissions alone. As global markets increasingly link carbon exposure with pricing, procurement, financing, and market access, business behaviour and investment decisions are also beginning to shift accordingly. India is now moving into that phase, where carbon is gradually becoming more directly connected to competitiveness, supplier evaluation, and long-term commercial viability", said Mohan Ramaswamy, Co-founder & CEO Rubix Data Sciences.

Welspun One bets big on India's supply chain boom

Neeraj Balani, Chief Customer Officer, Welspun One

Mumbai: Welspun One has announced plans to lease over 10 million sq. ft. over the next three years, nearly double its current operational footprint. The announcement comes off the back of the company's strongest-ever leasing year. In FY 2025-26, Welspun One executed leases and letters of intent totalling over 2.5 million sq. ft., driven by surging demand from third-party logistics (3PL) operators, manufacturers and e-commerce players. Signed deals include a 5.9 lakh sq. ft. single-box facility for Amazon India, a 20-metre-high warehouse for AAJ Supply Chain, and a controlled-environment facility of over 2 lakh sq. ft. built to the precise specifications of a leading medical equipment manufacturer.

Commenting on the performance, Neeraj Balani, Chief Customer Officer, Welspun One, said, "As occupiers consolidate towards developers who offer execution reliability and integrated solutions, we are well positioned to capture this demand across logistics, in-city distribution and port-led infrastructure."

As part of its next growth phase, Welspun One is also expanding beyond large-format warehousing into adjacent segments including in-city distribution, retail and commercial infrastructure. Key projects under construction are India's largest FTWZ development at Nhava Sheva with over 4.5 M Sqft of space, over half a million of multi format asset in Thane for premium retail, commercial and distribution centre, 1.2M sqft logistics park in Chakan, Pune, 1.2M sqft logistics and industrial park in Hoskote, Bangalore and 1.2M sqft logistics and industrial park in Chennai and over 1.5M sqft logistics and industrial park in Cuttak, and over half a million sqft in Tauru and Haily Mandi in NCR. The platform is supported by ongoing construction and capital deployment, with total delivery of additional 3.5M sqft in next 4 quarters across its assets. ■

Henkel appoints Pradhyumna Ingle as Country President for India

Henkel has appointed Pradhyumna Ingle as Country President for India. Based in Navi Mumbai, Pradhyumna will be responsible for driving the company's growth strategy, strengthening market presence, and advancing innovation across its businesses in the country. He will continue to serve in his global leadership roles as Global Head – Infrastructure Protection & Repair and IMEA Head – Manufacturing & Maintenance within Henkel Adhesive Technologies.

With more than 25 years of leadership experience across India, Asia Pacific, North America, and the Middle East & Africa, Pradhyumna has built a distinguished track record. ■

BHEL appoints Aruna Gulati as Head of Solar Business Division, Bengaluru

Bharat Heavy Electricals Limited (BHEL) has appointed Aruna Gulati as the new Head of Solar Business Division (SBD), Bengaluru. She will report to Director (IS & P). She has done her B. Tech (Electrical) and M.Tech (Electrical). She has 35 years of experience having joined BHEL in 1991. She has a demonstrated history of working in the power transmission sector with a strong background in substation engineering, power system studies, HVDC project engineering, and enterprise-tier project management. ■

IMCD appoints Angelique Kruif as Global People Director

IMCD Group, a global leading partner for the distribution and formulation of speciality chemicals and ingredients, has appointed Angelique Kruif as its new Global People Director. She will join the company on 1 June 2026 and become a member of the Executive Committee, bringing more than two decades of senior HR leadership across complex, international organisations. The Global People Director is a new role at IMCD, created to strengthen its focus on people excellence. Angelique Kruif will take on the full HR agenda across the company's global matrix organisation: employee attraction & development, culture, employer branding, and skills development. Angelique Kruif brings over 20 years of HR leadership built across a range of international organisations, with a track record of leading cross border teams, building strong HR foundations and supporting organisations through periods of growth and change. ■

APPOINTMENT NEWS

Maximilian Peter to take charge of the Polymers division of WACKER

Maximilian Peter will take over as head of WACKER's Polymers division, effective May 1, 2026. Holding a doctorate in chemical engineering, he has been with WACKER since 2012. After working in process development, he took charge of Corporate Development and was most recently responsible for Human Resources. As head of the Polymers division, Maximilian Peter will continue to drive forward its regional expansion. Maximilian Peter succeeds Peter Summo, who headed the Polymers division for ten years. Effective May 1, 2026, Summo will take charge of Sales & Distribution. ■

Covestro appoints Klaus Fröhlich as new Chief Financial Officer

The Supervisory Board of Covestro has unanimously decided to appoint Klaus Fröhlich as the new Chief Financial Officer (CFO). The 53-year-old will assume the role from Christian Baier effective October 1, 2026. Christian Baier will leave the company on September 30, 2026. At the same time, Klaus Fröhlich will become a member of the Board of Management of Covestro AG. Klaus Fröhlich is Group Chief Investment Officer at the energy and chemical company ADNOC and has more than 25 years of experience in finance and international investment banking. He previously served as Chief Financial Officer in Saudi Arabia and worked for Morgan Stanley, most recently as Head of Investment Banking for the Middle East and North Africa. ■

Arkem to appoint Laurent Tellier as Chief Operating Officer

Effective July 1st, 2026, Laurent Tellier will be appointed Chief Operating Officer (COO) of Arkema, replacing Marc Schuller who is retiring.

Laurent Tellier will oversee all of the Group's business segments: Adhesive Solutions (Bostik), Advanced Materials (including Performance Additives and High Performance Polymers), Coating Solutions and Primary Materials. Laurent Tellier has over 25 years of experience in industry and internationally, notably in the three major regions where Arkema operates (Asia, the Americas and Europe). ■

Lubrizol and Grasim inaugurate CPVC resin plant in Vilayat, Gujarat

Gujarat: Lubrizol and Grasim Industries Limited have inaugurated a Chlorinated Polyvinyl Chloride (CPVC) resin manufacturing facility in Vilayat, Gujarat. The Vilayat plant expands Lubrizol's ability to deliver end-to-end CPVC solutions for India's growing infrastructure needs, ensuring a reliable, high-quality local supply of CPVC resin and compounds used in pipes and fittings across residential, commercial, and industrial applications. "Lubrizol introduced CPVC technology to India more than two decades ago, and since then, we have witnessed strong growth of the market alongside the country's expanding economy. With the commissioning of this world-class facility in Vilayat, we are strengthening our manufacturing capabilities in India by following a local-for-local approach. This investment underscores our long-term commitment to India by enabling consistent access to high-quality, locally produced materials backed by Lubrizol's global standards of innovation, reliability, and performance," said Abhishek Shrivastav, Managing Director, Lubrizol IMEA.

Jayant V. Dhobley, Business Head & CEO, Global Chemicals, Aditya Birla Group, said, "This brings together Grasim's manufacturing and execution capability in India with Lubrizol's latest technology to deliver reliable CPVC materials for the market. It reflects our approach of building and collaborating to scalable chemical manufacturing capabilities together." CPVC is a high-performance material widely used in hot and cold-water systems, fire sprinkler networks, HVAC, and industrial piping applications due to its superior heat resistance, corrosion resistance, durability, and hygiene. Its performance characteristics make it a preferred material for modern infrastructure projects requiring long service life and dependable water delivery.

Lubrizol remains committed to operating its manufacturing facilities in India with the highest standards of safety and environmental responsibility. Through responsible resource management, eco-conscious manufacturing practices, and adherence to stringent global safety protocols, the company continues to support sustainable industrial growth while delivering advanced material solutions for critical infrastructure.

Lubrizol has recently commissioned an award-winning Global Capabilities Center in Pune, expanded capacity at its CPVC compounding plant in Dahej, expanded its Vikhroli Mumbai office, progressed its CPVC resin manufacturing partnership with Grasim Industries, and announced a dedicated India Innovation Center.

Deepak Chem Tech to build HyCO plant

Vadodara: Deepak Chem Tech Limited, a wholly owned subsidiary of Deepak Nitrite Limited, enters into long-term agreement with Praxair (a Linde company) to build a HyCO plant to manufacture key raw materials for DCTL's upcoming polycarbonate manufacturing facility at Padariya, Dahej, in Gujarat.

Under the agreement, Praxair India will build, own and operate dedicated on-site facility to supply key feedstocks for polycarbonate production. The arrangement establishes a reliable, long-term supply of an essential input for the project. The agreement brings together DCTL's downstream materials platform with Praxair India's expertise in industrial gas infrastructure and operations. The on-site model is expected to support consistent availability and operational efficiency, while enabling DCTL to maintain focus on its core expertise.

DCTL's integrated Polycarbonate facility is intended to play a significant role in the domestic production of a high-performance material that serves several high-growth end-use segments in India, including automotive, electrical and electronics, construction, and consumer applications. The integrated supply arrangement with Praxair India has been structured to support product quality, scalability, and supply chain resilience as the project advances.

"This agreement marks an important step in advancing our polycarbonate project," said Meghav Mehta, ED & CEO, Deepak Chem Tech Limited.

INOXCVA & ITM SLS Baroda to develop Excellence Centre for building India's semicon talent pool

Vadodara: INOX India Limited (INOXCVA), one of the world's leading cryogenic technology solution providers, has entered into a strategic collaboration with ITM SLS Baroda University (ITMBU), for developing a Skilling Centre of Excellence for imparting professional training on orbital welding and process piping skills, which are critical in building the infrastructure for the semiconductor fabrication units and advanced electronics manufacturing facilities.

The proposed centre, to be established at ITMBU's Paldi campus, in Vadodara, will focus on developing highly skilled manpower for the installation, fabrication and maintenance of Ultra-High-Purity (UHP) gas distribution systems, semiconductor process utility infrastructure and advanced orbital welding applications.

The initiative aims to address the growing demand for specialized talent required by the semiconductor industry while supporting India's ambitions under the India Semiconductor Mission (ISM). Through industry-oriented training programmes, practical workshops, certification courses and advanced skill development modules, the centre will help create a sustainable pipeline of skilled professionals equipped to support the expanding semiconductor, OSAT and electronics manufacturing ecosystem in line with global industry standards.

Commenting on the collaboration, Deepak Acharya, Chief Executive Officer, INOX India Ltd., said, "India's semiconductor growth story will require not only world-class infrastructure, but also a highly skilled technical workforce capable of supporting precision manufacturing environments. Through this Centre of Excellence, we aim to create industry-ready talent equipped with specialized skills in orbital welding, process piping and semiconductor utility infrastructure. We believe this initiative can play an important role in strengthening India's semiconductor ecosystem and supporting future investments in advanced manufacturing technologies."

Talking about the collaboration, Ravindra Singh Rathore, Vice President, ITM SLS Baroda University & Trustee, Samata Lok Sansthan, said, "This collaboration represents an important step towards bridging the gap between industry requirements and technical education. By working closely with INOXCVA, we will be able to offer students and trainees access to industry-relevant technologies, practical exposure and specialized skill development programs that can significantly enhance employability in high-growth sectors such as semiconductors and advanced manufacturing."

The Centre is expected to serve students, trainees and working professionals from across Gujarat and other industrial regions, while supporting the broader development of specialized technical capabilities required by high-technology industries. The initiative will also facilitate faculty training, practical industry exposure and hands-on skill development for students and trainees.

Regaal Resources commissions new liquid glucose and maltodextrin powder facilities at Bihar

Bihar: Regaal Resources Limited, one of India's leading maize processing companies, has doubled its maize crushing capacity from 825 TPD to 1,650 TPD. The company has also commissioned a new Liquid Glucose facility with a production capacity of 180 MT per day and a new Maltodextrin Powder manufacturing facility with a production capacity of 50 MT per day at its integrated maize processing complex in Kishanganj, Bihar.

With an investment of approximately ₹389 crore, the expansion marks a significant milestone in the company's growth and product diversification strategy, aimed at strengthening its presence in value-added maize specialty products and derivative segments. With maize processing capacity of approximately 1,650 tonnes per day, the facility is expected to generate around 475 additional direct employment opportunities.

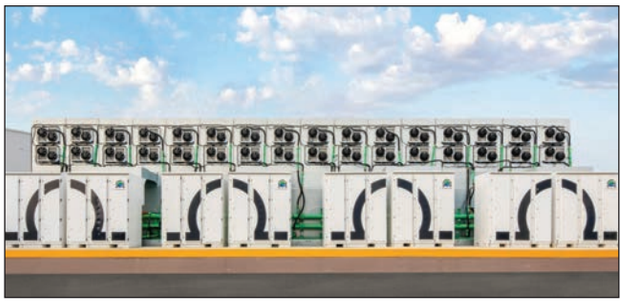
The increased crushing capacity and commissioning of the Liquid Glucose and Maltodextrin Powder facilities

are expected to accelerate the company's transition towards higher-margin specialty and derivative maize products while supporting growing domestic and international demand. Liquid Glucose is widely used in sweets, confectionery, biscuits, ice creams, jams, jellies, pastries, and liquors, while Maltodextrin Powder finds applications across the food and beverage, pharmaceutical, dairy and nutraceutical industries.

The company also plans to further expand its value-added product portfolio, with a range of modified starch products and derivatives including Dextrose Anhydrous, Dextrose Monohydrate, and Hydrol during FY27. These additions are expected to enhance operating leverage, diversify the product portfolio, and enable margin expansion.

Commenting on the development, Anil Kishorepuria, Chairman and Managing Director of Regaal Resources Limited, said, "The commissioning of our expanded crushing capacity to 1,650 MT per day and new derivative manufacturing facilities for Liquid Glucose of 180 MT per day and Maltodextrin Powder of 50 MT per day marks a significant milestone in Regaal's journey towards becoming a diversified maize-based specialty products company. This expansion strengthens our presence in higher Page | 2 value-added maize derivative products and enhances our ability to cater to evolving customer requirements across the food, pharmaceutical, agriculture, and healthcare sectors. At 1,650 MT per day, Regaal will now operate the largest maize wet milling facility in Eastern India, further strengthening our manufacturing scale and long-term growth prospects."

Ohmium and RenewCO2 collaborate to Advance CO2-to-Chemicals Technology



Newark, California and Somerset, New Jersey: Ohmium International Inc., a leading manufacturer of high-efficiency, modular Proton Exchange Membrane (PEM) electrolyzers, has announced its collaboration with RenewCO_2 to bring electrochemical CO_2 conversion technology to commercial scale. This joint development pairing RenewCO_2's patented eCUT-FA™ catalyst technology with the Ohmium Lotus PEM electrolyzer platform and manufacturing capabilities has the potential to accelerate CO_2-to-chemicals commercialization.

"RenewCO2 has developed world-class processes for converting CO2 into valuable chemicals and fuels. We envision Ohmium's manufacturing expertise and electrolyzer platform enabling us to scale rapidly. Together, we're transforming CO2 from liability to resource and accelerating this industrial shift," said Dr. Anders Laursen, RenewCO2 CEO.

According to Dr. Markus Tacke, Ohmium CEO, "Hydrogen and CO_2 are fundamental building blocks for the next generation of organic chemicals. Ohmium's strength lies in delivering scalable, cost effective green hydrogen through advanced PEM electrolysis, while RenewCO_2 brings deep expertise in the electrochemical conversion of CO_2 into valuable chemical intermediates. We believe that together, our technologies can form a powerful, integrated platform to electrify chemical production, unlock circular carbon pathways, and accelerate the commercialization of sustainable fuels and materials."

RenewCO_2's eCUT-FA™ technology cost-effectively converts waste CO_2 into chemical products for existing industrial processes. Paired with Ohmium's state-of-the art PEM technology, the combined technology can enable CO_2-to-product solutions on a commercial scale and electrify chemical production using clean electricity and available feedstocks.

Rochester Midland Corporation acquires Claritychem

Rochester: Rochester Midland Corporation, a leading provider of route-based, technical services and specialty chemical products across water treatment, food safety and other verticals, has acquired ClarityChem Inc., Chemasters LLC and Chematrix LLC (collectively, "ClarityChem"), a provider of custom integrated commercial, institutional, and industrial water and process treatment solutions based in Depew, NY.

With over 30 years of expertise, ClarityChem delivers water treatment solutions for boilers, cooling systems, biocides, closed loop systems, wastewater treatment,

and odor control. ClarityChem additionally provides consultative services across industrial and municipal wastewater treatment systems with expertise across full scale system design, product sourcing, and program implementation.

Jordan Campbell, Senior Managing Director, Peak Rock Capital, said, "The acquisition of ClarityChem accelerates Rochester Midland's growth and industry position within water treatment. This partnership enables Rochester Midland to expand its service presence and capabilities for its valued customer base." Dave Alter, Managing Director of Peak Rock Capital, added, "ClarityChem is a high-quality water treatment business that will increase Rochester Midland's geographic density in the Northeast region. This acquisition further exemplifies Rochester Midland's ability to accelerate growth both organically and through strategic M&A." Jim White, CEO of Rochester Midland, commented, "We continue to seek additional partnership opportunities with like-minded businesses to enhance our world-class water treatment platform with differentiated and value added capabilities for our customers."

Olin and Huntsman announce merger to create $12+ bn integrated North American chemicals leader

Clayton, Missouri and The Woodlands, Texas: Olin Corporation and Huntsman Corporation have entered into a definitive agreement to combine in an all-stock merger of equals to create a leading North American chemicals company. The transaction is expected to generate significant value for shareholders of both companies, with more than $400 million in total identified cost synergies and integration benefits.

The combined organization, which will be renamed OlinHuntsman Corporation following the close of the transaction, will benefit from enhanced scale, scope and expanded chlorine optionality, enabling it to create value across markets and cycles. The vertical integration of Olin and Huntsman's highly complementary upstream and downstream businesses brings together cost-advantaged North American assets and feedstocks with differentiated formulations and high-value advanced materials.

From its global manufacturing platform, OlinHuntsman will deliver to diverse and growing end markets including automotive, construction and infrastructure, and industrial applications. OlinHuntsman will have a structurally lower cost position and an expanded ability to convert advantaged electrochemical units production into downstream materials, unlocking more opportunities to grow.

Lanxess successfully conducts field trial at Chemours to remove PFAS from wastewater

LANXESS- PFAS at Chemours Dordrecht

Mumbai: With Lewatit MDS TP 108, LANXESS offers a selective resin that reliably removes even short- and ultrashort-chain PFAS (per- and polyfluoroalkyl substances) from wastewater. A field trial at fluorochemicals company, Chemours Netherlands B.V. in Dordrecht, has demonstrated that resin delivers this performance at industrial scale. PFAS are commonly referred to as 'forever chemicals' because they break down only very slowly, accumulate in the environment and in living organisms, and can cause harm there. Specifically designed to treat wastewater contaminated with short-chain PFAS, LANXESS developed and launched the monodisperse selective resin Lewatit MDS TP 108 (Mono Dispers Small) in 2024. Compared with conventional ion exchange resins, its resin beads have a diameter approximately one-third smaller. This results in significantly higher capacity and therefore longer service life. Thanks to faster exchange kinetics, the MDS resin maintains its performance even at high flow rates. ■

IFFCO Chairman Shri Dileep Sanghani calls on Union Agriculture & Farmers Welfare Minister Shri Shivraj Singh Chouhan

New Delhi: Shri Dileep Sanghani Ji, Chairman, IFFCO, paid a courtesy visit to the Hon'ble Union Minister for Agriculture & Farmers Welfare, Shri Shivraj Singh Chouhan, in New Delhi.

During the meeting, Shri Sanghani shared insights and key takeaways from his recent visit to the United States, highlighting his participation in various important engagements and discussions related to the agriculture and cooperative sectors. He also briefed the Hon'ble Minister on significant interactions and initiatives undertaken during the visit.

The meeting featured a constructive exchange of views on strengthening collaboration between India and the United States in the areas of agriculture, cooperatives, agribusiness, and farmer empowerment. Discussions also focused on exploring opportunities for greater cooperation to support agricultural advancement and sustainable rural development.

FMC Corporation and Corteva expand access to Rimisoxafen Herbicide technology

Philadelphia and Indianapolis: FMC Corporation and Corteva, Inc., two leading global agricultural science and innovation companies, have announced a co-exclusive strategic supply and license agreement that will expand access to FMC's rimisoxafen technology across North and South America corn and soybean markets. This collaboration will enable more growers across the Americas to control herbicide-resistant weeds, including Amaranthus species – the number one weed resistance challenge globally in soybeans and critical in cross-crop pressure in corn – with this groundbreaking dual mode of action herbicide technology.

"This agreement ensures that more growers across the Americas will have access to rimisoxafen, one of the most innovative herbicide technologies developed in decades," said Leonardo Bastos, FMC vice president and chief marketing officer. "By working with Corteva, we are expanding the reach of this breakthrough technology to help growers effectively manage resistant weeds that threaten their productivity and profitability. Together, we are bringing growers a solution they urgently need. At the same time, FMC is committed to unlocking the full global potential of rimisoxafen across additional crops and geographies, reflecting our confidence in this molecule as a cornerstone of our innovation pipeline."

Under the terms of the agreement, which extends through the next decade, FMC retains all rights of ownership to rimisoxafen and will supply Corteva with the active ingredient. Both companies will develop and commercialize their own exclusive premix formulations for the corn and soybean markets across North and South America, while FMC will continue to develop additional rimisoxafen-based products for other crops and geographies globally. Corteva will make an initial prepurchase payment of $200 million USD for product to be supplied by FMC. Together, both companies are committed to ensuring broad availability of this innovative technology and rapid adoption, supporting growers with durable weed management solutions for years to come.

"By collaborating with FMC on rimisoxafen, we are expanding our ability to provide growers with advanced weed control tools that complement our portfolio," said Cynthia Ericson, Corteva vice president, weed control segment. "This agreement supports our long-term strategy of forging new collaborations that drive value for farmers, as well as a unique growth opportunity with attractive economics for Corteva above our current deep crop protection pipeline set to launch over the next decade." ■

Agrochemicals

FY27 Fertiliser Outlook: West Asia Conflict to Affect Credit Profile

India Ratings and Research (Ind-Ra) has maintained a neutral outlook for the fertiliser sector for FY27, driven by the Government of India's (GoI) continued policy-level support through a subsidy budget of ₹1,710 billion for the year. The budget has been reduced from FY26 (RE) of ₹1,864 billion, due to expected stabilisation in natural gas prices for urea production.

West Asia Conflict

However, the ongoing conflict in West Asia has drastically increased raw material prices for Nutrient-Based fertilisers (NBS) and natural gas. Ind-Ra expects the budgetary allocation to fall short and anticipates additional allocation from the GoI. Over the past three-four years, the sector has received supplementary budgetary allocations when key input material prices increased, ensuring fertiliser availability and economic viability for producers and importers. The latest support was a special package for Di-Ammonium Phosphate (DAP) manufacturers, with an additional ₹3,500 per metric tonne approved by the GoI. The support will continue in FY27 as international DAP prices remain high.

"Ind-Ra expects the West Asia conflict to have some impact on the profitability and credit profile of fertiliser players in FY27, but would be supported by liquidity. Given the increase in gas and other raw material prices, the FY27 subsidy budget for both urea and NPK segment might fall short. However, we draw comfort from the GoI's supplementary subsidy budget allocation in the past", said Pritha Preshi Sharma, Associate Director, Corporate Ratings, Ind-Ra.

Ind-Ra expects the average pooled gas price to remain elevated in FY27 (9MFY26: USD13.4/MMBtu), led by the impact on the regasified liquefied natural gas (RLNG) supply from West Asia because of the ongoing Iran-US-Israel conflict. RLNG formed 85 per cent of the total consumption by the fertiliser sector in FY26 (FY25: 86 per cent).

The RLNG share has increased over the years, led by increased use of natural gas, given

- A higher gas requirement, led by the operationalisation and ramp-up of new urea plants, and
- The diversion of any incremental domestic gas produced towards the higher priority city gas distribution and power sector.

Furthermore, over 50 per cent of India's LNG supply comes through the Strait of Hormuz; thus, the GoI had restricted RLNG supply to the urea segment to 70 per cent of their requirements, but the same have been increased to 90-95 per cent. Furthermore, the average raw materials of NBS fertilisers have increased significantly to USD1,189/t, USD188/t, and USD417/t, respectively (FY25 average: USD977/t, USD172/t, USD157/t) along with availability challenges. This is primarily driven by a disruption in shipping through the Strait of Hormuz, impacted refinery operations, and reduced export quotas from major producers namely China, while demand remained robust.

Ind-Ra expects EBITDA margins/t for NPK products to be subdued in FY27, led by increased input prices and a possible timing mismatch in corresponding NBS subsidy rates, while farm gate prices could remain stable. Players with healthy levels of backward integration into manufacturing of phosphoric acid and sulphuric acid are better positioned, given their ability to capture the margins in the entire chain, than those with heavy import reliance on phosphoric acid and sulphuric acid. Additionally, for imported NPK fertilisers, the cost of insurance and demurrage would be higher, and whether the same would be reimbursed by the GoI would determine the profitability on such cargoes.

For the urea sector, the rationalisation of gas supply might impact gas efficiency savings in two countering ways. Reduced production from gas unavailability could affect plant efficiency levels and gas savings, while higher gas prices might enhance gas savings in absolute terms. Ind-Ra expects this to result in increased subsidy and working capital requirements. Any delay in subsidy revisions can create temporary working capital stress. ■

Innovation – Road Infrastructure

CSIR-CRRI and BPCL Bag Recognition for Innovative Use of End-of-Life Plastic in Road Infrastructure

CSIR-Central Road Research Institute (CSIR-CRRI), in collaboration with Bharat Petroleum Corporation Limited (BPCL), has been recognized by the India Book of Records and Asia Book of Records for establishing the record titled "First Roadblock Section Constructed Using Technical Textile Geocell Made from End-of-Life Plastic."

The felicitation ceremony was held at the CSIR-CRRI auditorium, New Delhi, in the gracious presence of Dr. (Mrs.) N. Kalaiselvi, Director General, CSIR and Secretary, DSIR.

Use of End-of-life Plastic

This achievement marks an important milestone in sustainable road infrastructure development by demonstrating the scientific and practical utilization of end-of-life plastic waste in the construction sector. The recognized technology involves the development and application of technical textile geocells manufactured from processed end-of-life plastic, offering an innovative pathway for converting difficult-to-manage plastic waste into value-added infrastructure materials.

Circular Economy

Director, CSIR-CRRI, Dr. Ch. RaviSekhar, shared that this initiative addresses two critical national priorities: sustainable waste management and resilient road construction. By integrating end-of-life plastic into geocell-based roadblock applications, the technology contributes to circular economy objectives while reducing the environmental burden associated with plastic disposal.

Speaking on the occasion, Dr. Ambika Behl, Scientist F, from CSIR-CRRI, said, "This accomplishment reflects the strength of collaborative research between CSIR-CRRI and BPCL, and reinforces our commitment to developing scalable, field-oriented technologies that contribute to sustainable and resource-efficient road engineering. This recognition by the India Book of Records and Asia Book of Records is an important milestone in demonstrating how scientific innovation can address the growing challenge of end-of-life plastic waste management through practical infrastructure solutions."

Sh. Gagandeep Singh, Scientist E from CRRI, shared that the key aspect of this work was ensuring that the end product not only addressed waste utilization objectives but also met engineering performance requirements in terms of structural integrity, durability, and field applicability. Extensive material characterization, performance evaluation, and validation studies were undertaken to assess the suitability of the developed geocell system for road applications.

First-of-its-kind Innovation

Dr. Mahesh Kasture, Chief Manager, BPCL, highlighted the importance of industry-academia collaboration in translating research into scalable field applications. The achievement also reflects India's growing commitment toward sustainable infrastructure solutions aligned with environmental stewardship and resource efficiency. Dr. T. Chiranjeevi, GM (R&D), BPCL, informed that with the present working mandate of refineries, the formulation of this project was undertaken as part of BPCL's sustainability goals and helps in fulfilling some of its requirements.

Finally, the overall achievement of the record was highlighted and the vote of thanks was proposed by Dr. Vinod Kumar, Chief Scientist, CSIR-CRRI. The record recognition by Asia Book of Records acknowledges the novelty and impact of this first-of-its-kind demonstration in road engineering. ■

Sustainability

Henkel Achieves Carbon-Neutral Production at 2 Sites

Henkel has reached a major milestone in advancing its global sustainability strategy within the Adhesive Technologies business by achieving carbon-neutral production at Kurkumbh, India and Gebkim, Türkiye. The production sites have successfully eliminated Scope 1 and Scope 2 emissions, marking a significant step forward in Henkel's ambition to decarbonize its operations by 2030. These achievements are further contributing to Henkel's science-based climate targets.

Henkel Adhesive Technologies' Kurkumbh facility.

Kurkumbh, India

At Kurkumbh, carbon-neutral operations were achieved by replacing furnace oil–based thermic fluid heaters with high-efficiency electric systems, eliminating fossil fuel use. This transformation required a comprehensive upgrade of the site's energy infrastructure, including the optimization of heat loads, the installation of advanced high-efficiency heat exchangers and significant investments in electrical capacity to support full electrification. Combined with the transition to 100 per cent renewable electricity, these measures enabled the complete elimination of both Scope 1 and Scope 2 emissions of approximately 11,300 tons of CO2 equivalent, marking a major milestone in the site's decarbonization journey.

Gebkim Plant, Türkiye

At its Gebkim Plant in Türkiye, Henkel has implemented a landmark electrification project by fully replacing a natural gas–fired boiler with a high-efficiency electric boiler system. This transition eliminated direct fossil fuel use at the site and reduced Scope 1 emissions to zero resulting in an annual reduction of approximately 956 tons of CO_2 equivalent.

"Achieving carbon-neutral production at two of our key flagship sites in India, Middle East & Africa (IMEA) is a strong step forward in delivering on Henkel Adhesive Technologies' global sustainability ambitions," commented Simon Ulmann, VP Supply Chain & Operations IMEA, Henkel Adhesive Technologies on the latest milestone.

"Achieving carbon neutrality at our Kurkumbh site underscores our strong commitment to sustainable growth, responsible manufacturing, and operational excellence," said Bappa Bandyopadhyay, Director Operations & Projects India, Henkel Adhesive Technologies. "Through renewable energy adoption and continuous efficiency improvements, we have significantly reduced our carbon footprint while upholding the highest standards of safety, quality, and performance. This milestone shows that sustainability and business performance can advance together to create long-term value," he added.

This milestone underlines Henkel's commitment to leading the transformation toward sustainable industry, demonstrating that fossil fuel-free manufacturing is both achievable and scalable across regions. With its brands, innovations and technologies, Henkel holds leading market positions worldwide in the industrial and consumer businesses.

Henkel in India has two legal entities, namely, Henkel Adhesives Technologies India Private Limited (a wholly owned subsidiary of Henkel) and Henkel Anand India Private Limited (a joint venture company of Henkel and Anand Group). The adhesive technologies business operates primarily in the business-to-business realm in the country, while in the consumer brands business, Henkel is present in the "hair" category. Headquartered in Navi Mumbai, the adhesive technologies business has a footprint comprising four manufacturing sites, two innovation centers, a customer experience center, a flexible packaging academy and three application centers serving the footwear, consumer electronics and electronics industries, respectively.■

Innovation

Biopolymer-Based Smart Seeds to Strengthen Rainfed Agriculture

In a significant step towards strengthening climate-resilient agriculture and improving farm productivity, ICAR–Indian Institute of Oilseeds Research (ICAR-IIOR), Hyderabad, has developed and demonstrated an innovative biopolymer-based Smart Seed Coating Technology designed to enhance seed quality, crop establishment, and resilience against biotic and abiotic stresses across a wide range of agricultural crops.

As agriculture faces increasing challenges from climate change, erratic rainfall, drought, temperature extremes, soil degradation, emerging pests and diseases, and declining resource-use efficiency, ensuring superior seed performance has become more critical than ever. Seed is the primary carrier of agricultural technology and serves as the foundation of crop productivity. Even under optimal management conditions, poor seed establishment can significantly limit yield realization. Strengthening seed performance during the early stages of crop growth therefore offers one of the most cost-effective and scalable approaches to improving agricultural productivity.

Seed is the primary carrier of agricultural technology and serves as the foundation of crop productivity. Even under optimal management conditions, poor seed establishment can significantly limit yield realization. Strengthening seed performance during the early stages of crop growth therefore offers one of the most cost-effective and scalable approaches to improving agricultural productivity.

Smart Seed Coating Technology

The Smart Seed Coating Technology (Indian Patent) developed by ICAR-IIOR utilizes biodegradable biopolymeric materials to create a multifunctional protective layer around seeds. The coating acts as a carrier system for beneficial microorganisms, nutrients, micronutrients, crop protection agents, and plant growth-promoting compounds, delivering them directly at the seed-soil interface. This protective microenvironment promotes rapid germination, vigorous seedling growth, enhanced root development, and improved tolerance to environmental stresses during the critical crop establishment phase.

Field demonstrations conducted under farmer field conditions have shown substantial improvements in crop establishment, plant vigor, and productivity. In Groundnut and Soybean, demonstrations conducted in Telangana recorded yield improvements of nearly 30 per cent compared to conventional farmer practices, highlighting the potential of the technology to enhance productivity and profitability. Similar seed enhancement approaches have demonstrated positive impacts across multiple crops under diverse agro-climatic conditions. Multi-location AICRP-Seed trials across soybean, maize, groundnut, chickpea, cotton, mustard, and pigeon pea demonstrated consistent improvements in seedling vigour, crop establishment, and yield, with productivity gains ranging from 12–37 per cent over untreated controls, highlighting the potential of biopolymer-based multilayer seed treatments as a scalable Smart Seed technology for diverse cropping systems.

The technology is particularly relevant for rainfed agriculture, which accounts for a major share of India's cultivated area and is highly vulnerable to climatic uncertainties. Delayed monsoons, intermittent droughts, moisture stress, poor soil conditions, and pest and disease pressures frequently affect seedling emergence and crop establishment, ultimately reducing yields. By improving seed performance and protecting emerging seedlings during the most vulnerable stages of growth, smart seed technologies can significantly enhance crop resilience and reduce production risks.

Smart Seed Coating Technology: Key Highlights

- **The innovative biopolymer-based Smart Seed Coating Technology is designed to enhance seed quality, crop establishment, and resilience against biotic and abiotic stresses across a wide range of agricultural crops.**
- **The Smart Seed Coating Technology (Indian Patent) developed by ICAR-IIOR utilizes biodegradable biopolymeric materials to create a multifunctional protective layer around seeds.**
- **The coating acts as a carrier system for beneficial microorganisms, nutrients, micronutrients, crop protection agents, and plant growth-promoting compounds, delivering them directly at the seed-soil interface.**
- **The technology is particularly relevant for rainfed agriculture, which accounts for a major share of India's cultivated area and is highly vulnerable to climatic uncertainties.**

The ICAR-IIOR Platform

Unlike conventional seed treatments that serve a single purpose, the ICAR-IIOR platform functions as a comprehensive seed enhancement system capable of integrating multiple beneficial inputs into a single application. The technology can be customized for cereals, millets, pulses, oilseeds, fibre crops, fodder crops, vegetables, spices, and horticultural crops, making it a versatile solution for diverse farming systems across the country.

The innovation aligns closely with national priorities on sustainable agriculture, climate resilience, improved seed systems, and enhanced resource-use efficiency. Wider adoption of advanced seed enhancement technologies can contribute significantly to increasing agricultural productivity, reducing input losses, improving nutrient and biological use efficiency, and supporting the country's efforts towards food, nutritional, and economic security.

ICAR-IIOR scientists emphasized that future agricultural growth will increasingly depend on technologies that improve the efficiency and effectiveness of every input used by farmers. Smart Seeds represent an important step in this direction by delivering protection, nutrition, and biological support precisely where they are needed, at the earliest stage of crop growth. Such technologies can help farmers achieve better crop establishment, improved stress tolerance, higher yields, and greater profitability while minimizing environmental impacts.

To maximize the benefits of this innovation, ICAR-IIOR is promoting partnerships with public and private seed systems for large-scale dissemination and adoption. State Seed Development Corporations, National Seed Corporation, Cooperative seed federations, Farmer Producer Organizations (FPOs), seed processing units, seed hubs, custom seed treatment centres, seed entrepreneurs, and private seed companies can play a pivotal role in integrating smart seed technologies into seed production and distribution networks. Such collaborations will help ensure that quality-enhanced seeds reach farmers at scale and contribute to sustainable agricultural growth.

Conclusion

ICAR-IIOR continues to advance research on next-generation seed enhancement technologies involving biopolymers, beneficial microbes, nutrient delivery systems, and environmentally sustainable formulations aimed at transforming conventional seeds into climate-resilient Smart Seeds. The widespread adoption of such technologies can strengthen India's seed systems, improve agricultural productivity, enhance resilience to climate change, and ultimately contribute to improved livelihoods for millions of farmers across the country. ■

Challenges to Reduce Heavy Reliance on Imports of Speciality Chemicals

Recently, Honourable Secretary of Chemicals & Petrochemicals, Government of India, Shri Tejveer Singh, in his inaugural address at India Speciality Chemicals Conclave May 2026, reiterated the GOIs intention targeting USD 1 trillion economy of chemicals and petrochemicals by 2040. He invoked the participation and support of Indian chemical industry to outline the road map to reach the USD 1 trillion target of chemicals and petrochemicals including USD 200 billion or 20 per cent high value speciality chemicals to reduce the heavy reliance on imports. ***Jayant D. Divey, Technology Consultant****, explains in detail the challenges to reduce heavy reliance on imports of specialty chemicals.*

Author
Jayant D. Divey
Petrochemicals Technology Consultant

Petrochemicals demand was estimated to be approx. USD 300 billion in 2025 and expected to rise to about USD 390 billion in 2030. The next target is to reach USD 1 trillion by 2040 which is an ambitious target.

Year from	Year to	Billion $ from	Billion $ to	%CAGR
2025	2030	300	390	5.4
2030	2040	390	1000	10.8
2025	2040	300	1000	8.4

Table 1: Projected Compound Annual Growth Rate (CAGR)

The 2025 to 2030 target looks lower because of plans either already under implementation or projections post pandemic irrespective of prevailing war situation. Therefore, the target 2030 to 2040 looks formidable. The Government of India (GOI) precisely has set such a high target to address the need to invest in the petrochemicals sector significantly and exponentially.

This is the significant strategy as part of *Atmanirbhar Bharat* especially post prevailing war scenario where the emphasis is on to reduce Forex. The petrochemicals for this article are defined as in Table 2.

Global Scenario

The global chemicals market was estimated to be around USD 6.0 trillion in 2025. Commodity or bulk chemicals make up about 80 per cent of the global chemical industry, with the balance 20 per cent being constituted by specialty chemicals.

Specialty chemicals are differentiated from commodity chemicals as follows:

- The extensive innovation and R&D in product development
- Better profitability at lesser capex intensity

Category	USD/T	INR/kg	Volume	Demand Units
Petrochemicals	1000 - 2000	100 - 200	Very High	MTPA / 100KTPA
Low Priced Medium Priced	2000 - 5000	200 - 500	High	KTPA
High Priced	5000 -10000	500 - 1000	Medium	TPA
Specialty Chemicals Very High Priced	>10000	> 1000	Low to Very Low	KGPA to TPA

MTPA – Million Tonnes Per Annum; KTPA – Kilo Tonnes Per Annum; TPA – Tonnes Per Annum; KGPA – Kilograms Per Annum.

Table 2: Petrochemicals

Table : Present Challenges & Path Forward

No.	Challenges	Solutions & Path Forward
1	**Raw Materials** High cost whether local or imported Local unavailability High import dependency Resultant high product cost	▪ Saturate the consumption of surplus chemicals, which are otherwise exported, either by developing new molecules or enhancing the existing capacity ▪ Process integration with commodity chemicals producers in the vicinity for long term supply agreement of precursor chemicals ▪ Develop the configuration of large petrochemicals complexes to produce many precursor chemicals useful for specialty chemicals
2	**Global Acceptance** Becoming competitive in quality and cost in all segments	▪ Institute an agency like REACH (Registration, Evaluation, Authorization and Restriction of Chemicals) ▪ This has been the requirement for some time and needs to be expediated with the support of GOI Ministry ▪ It will help ensure the compliance of quality management systems within the company ▪ It will instill the kind of discipline in the entire business process and thereby allow easy passage to markets in EU and similar countries
3	**Regulatory Compliances**	▪ Regulatory compliances like meeting stringent norms for safety, health and environmental appear as hurdles but essential to become globally acceptable in hazard prone chemicals industry
4	**Industry & Academia / Research Institutions Collaboration**	▪ This is working however in a limited way in states like Maharashtra and Gujarat which has concentration of MSME and large chemical industries and the well-known institutions for over 50 years ▪ Most other states do not enjoy such support. States like Madhya Pradesh Andhra Pradesh, Rajasthan, Odisha etc. where many large industries have been planned in near future need to facilitate such collaboration ▪ This will also give the boost to the quality education and research capabilities of the institutions
5	**Chemical Parks like Infrastructure**	▪ Chemicals Parks like those functional in countries like Germany, Singapore, China are one strong solution to facilitate smooth functioning of MSME chemical industries where common infrastructure for utilities, electricity, effluent treatment, incineration, logistics etc. is provided to allow the individual companies to focus on core manufacturing of the products ▪ Such chemical parks are a necessity in a large country like India which will boost the growth of industry uniformly and create the eco system needed for specialty chemicals.

No.	Challenges	Solutions & Path Forward
5	**Chemical Parks like Infrastructure**	▪ GOI has planned to establish multiple chemical parks in coming years in different parts of India to fast track infrastructure support. ▪ Chemical Parks will also become the nodal point for coordination of items like raw material sourcing, uniform information about products and future requirements, manpower sourcing etc.
6	**Process Automation & Digitalization**	▪ The specialty chemicals are almost exclusively produced by batch reactions and batch processes ▪ Adopting measures like process automation, digitalization at all levels from process to products, simulation and modelling will help improving operational and performance efficiencies while assuring consistency in product quality which is the hallmark of any specialty chemical
7	**Shortage of Skilled Workforce or Talent – Skill Gap**	▪ This is one of the oftcited reasons on many platforms which is very paradoxical ▪ India boasts of the largest population of young educated people and yet the bulk of them are claimed to be either unemployable or those good are simply not much interested in jobs in chemical manufacturing industry ▪ The industry will need to intensify reaching tier 2 and tier 3 institutions for recruitment of chemical engineers and polytechnic diploma holders or reach even colleges for BSc and MSc students ▪ Let these institutions work on small but meaningful projects and assignments involving the students who can join the respective or similar industries ▪ Chemical Parks built with residential estates in the vicinity would also boost the employment ▪ Chemical Parks can also become the hub of facilitating the supply of skilled manpower
8	**Investment**	▪ Substantial new investment is critical to this journey enabled mostly through GOI schemes for developing new molecules or building on exiting strength ▪ There will be efforts to fill the vacuum by Mergers & Acquisitions (M & A) by foreign investors and multinational companies ▪ Attractive because of possible inflow of FDI

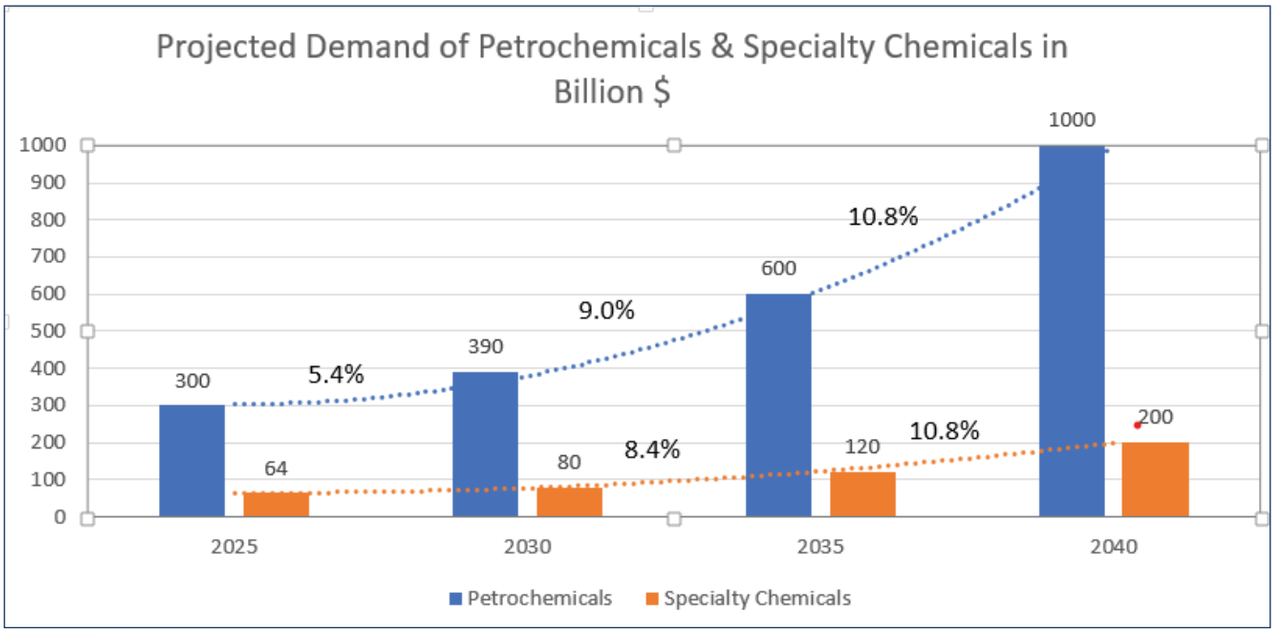


Exhibit 1

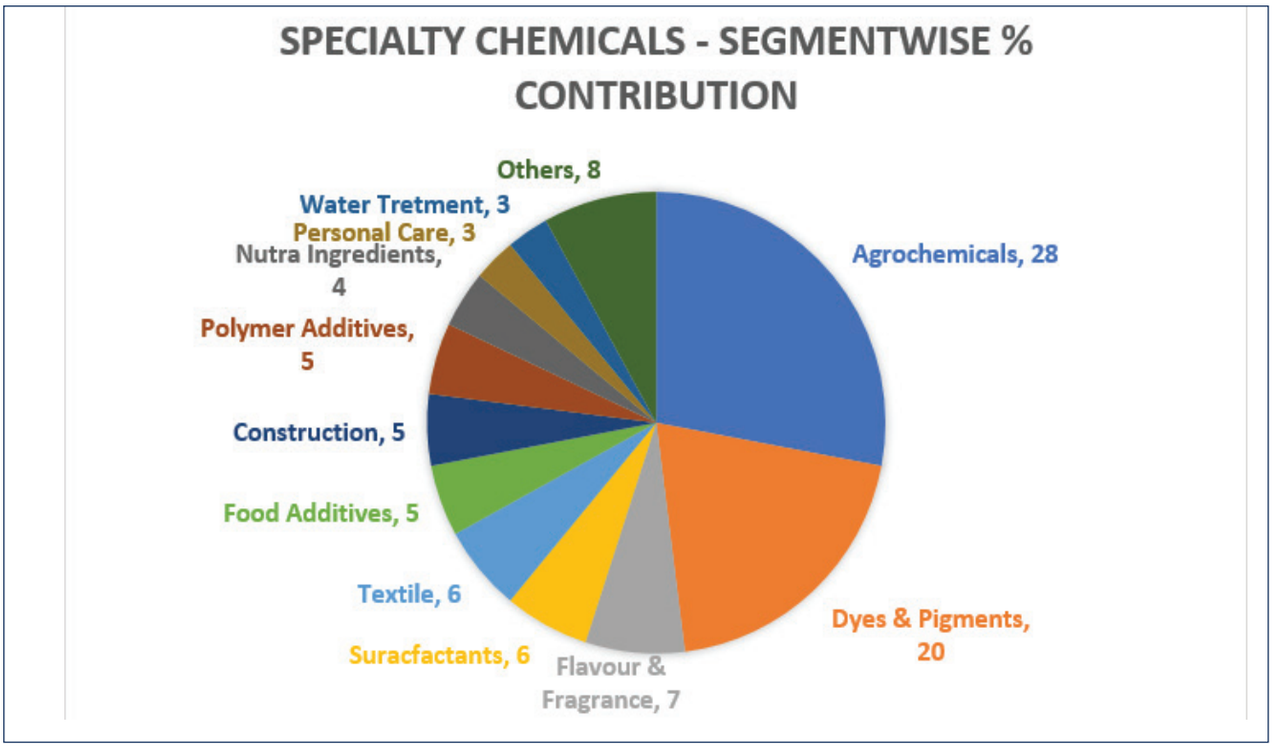


Exhibit 2

- Specialty chemicals are usually used in low quantities (not bulk) but have a higher value and greatly influence the performance of the end-products as against commodity chemicals which are characterized by use in bulk quantities for general applications.

Indian Scenario

Government of India (GOI) has set the target of USD 1 trillion by 2040 for the petrochemicals including specialty chemicals. The present demand of around USD 300 billion is expected to reach USD 390 billion by 2030 which appears eminently achievable. The target further however looks tall order because of jump in CAGR from 5.4 per cent to about 9.0 to 11.0 per cent

in the decade of 2030 (Refer Table 1). Considerable greenfield expansion is on the horizon in the refining and petrochemicals sector in states like Rajasthan (HPCL Rajasthan Refinery Limited), Madhya Pradesh (Bharat Petroleum Corporation Limited and Gas Authority of India Limited), Tamil Nadu (BPCL), Odisha (Indian Oil Corporation Limited), Andhra Pradesh (BPCL), West Bengal (Haldia Petrochemicals Limited) in addition to many ventures in Maharashtra, Gujarat, and few other states. Thus, there appear to exist several opportunities in these segments where bulk requirement is foreseen besides that exists in the similar plants.

The specialty chemicals demand is currently estimated to be about USD 64 billion needs to grow at CAGR from current about 4.6 per cent to about 8.0 to 11.0 per cent in next decade to match the ratio of 20 per cent of petrochemicals by 2040. This indeed looks a very ambitious target since many recent studies have projected its growth to about USD 100 billion by 2033/34. It therefore mandates that specialty chemicals industry will have to grow by quantum leap to keep the pace with the target of USD 200 billion as 20 per cent of USD 1 trillion by total petrochemicals to match the target set by GOI. The projected demand and CAGR of petrochemicals and specialty chemicals is graphically depicted in Exhibit 1.

Globally, the specialty chemicals industry was estimated to be around USD 1.2 trillion in 2025. The significant market has shifted steadily from North America and EU to Asia in the last 2 to 3 decades by corresponding shift in the manufacturing activities. The speciality chemicals industry is estimated to grow faster in emerging markets, such as China and India, on the back of strong growth in end-user industries. One of the most prominent trends in the global chemicals industry has been the emergence of China as a dominant player. This is reflected in an increase in China's share in the global chemicals industry from about 6 per cent in 2000 to around 45 per cent in 2025. China continues to be a clear leader across a wide range of chemicals, with a significantly higher production capacity than its peers including India which boasts of about 10 per cent share. Specialty chemicals Industry in India by segments is graphically depicted in Exhibit 2.

It can be easily observed that agrochemicals and dyes and pigments segments dominate the Indian market in which India ranks among the global leaders. As a corollary, it also implies that very high potential exists in other segments which is waiting to be exploited. The supply chain of speciality chemicals largely originates from commodity petrochemicals. The examples are plenty namely:

- Ethylene, Propylene
- C4s, C5s, C6s (e.g. Benzene), C7s (e.g. Toluene), C8s (e.g. Xylenes), C9s, C10s,
- Phenol, Styrene, Acetic Acid, Polyols, Acrylic Acid, Acrylates, lower and higher alcohols etc. to name a few.

Surprisingly, India is still supposed to be surplus in chemicals like benzene, butadiene etc. which are exported because of lack of demand in Indian market. The demand potential of chemicals like propylene glycol, polyols, acrylic acid, SAP, Polyethylene Wax (PE Wax), Ultra High Molecular Weight Polyethylene (UHMW PE) etc. is still untapped. Most of the Indian commodity petrochemicals plants are importing majority of the specialty chemicals like polymer additives, catalysts, peroxides, host of other chemicals etc. Many of these are in fact imported from China who have progressively captured these markets over the last 20 years. Thus, many segments show immense potential for capturing potential markets. It is possible to combine all (as mentioned in table Present Challenges & Path Forward) and more through sustained efforts for a quantum leap to USD 200 billion by 2040 to usher in new era of speciality chemicals in India!

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GUEST COLUMN

Dedicated Manufacturing Partnerships: The New Growth Architecture of Global Chemical Industry

Pankaj Mehta
Joint President
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The global chemical industry is shifting from traditional centralised models to long-term, collaborative DMPs, driven by geopolitical, supply-chain, energy, sustainability, and customer changes. Multinational firms now partner with specialised manufacturers for process development, scale-up, manufacturing, and supply chain integration, reducing capital, speeding commercialisation, enhancing resilience, and ensuring supply security. India has become a key hub for speciality chemicals and CDMO/CRAMS due to its ecosystem, workforce, policies, and competitiveness. ***Pankaj Mehta, Joint President, Aarti Industries Limited,*** *exemplifies how integrated manufacturing, expertise, safety, and partnerships foster sustainable growth.*

For decades, global speciality chemical manufacturing relied heavily on two pillars: Western technological leadership and Chinese manufacturing scale. Both are now facing structural challenges.

Europe: Rising Costs and Capacity Rationalisation

The European chemical industry is at a breaking point, driven by severe structural pressures that are forcing companies to fundamentally rethink their business models:

- **Dropping Market Share:** Surging import pressures and massive lower-cost expansions abroad have triggered a drastic drop in Europe's share of the global chemical market.
- **Energy Cost Disadvantage:** Structurally high domestic energy prices — particularly for natural gas — severely undercut Europe's energy -intensive production compared to global competitors.
- **Regulatory & Demand Barriers:** Weak local demand and complex regulations further stifle domestic investment.

Multinational firms are abandoning traditional manufacturing footprints, shifting to asset-light strategies and investing in more cost-effective regions to survive.

Dedicated Manufacturing Partnerships offer long-term value through innovation, manufacturing excellence, safety, sustainability, and customer engagement. As speciality chemicals grow more complex and supply chain resilience becomes vital, these partnerships will play a key role in shaping the industry.

Diminishing Chinese Cost Arbitrage and Rise of Supply-Chain Diversification

China is still the leading chemical hub with 42 per cent market share but faces rising labour costs and stricter environmental rules. Overcapacity has lowered prices and profits, prompting government action. Meanwhile, geopolitical tensions and supply-chain issues are leading multinationals to adopt a 'China Plus One' strategy, diversifying production to enhance resilience, risk mitigation, and flexibility beyond just cost savings.

India's Emergence as a Global Chemical Hub

India has become a major beneficiary of the global supply chain realignment, positioning itself as a strategic alternative in the 'China Plus One' framework. The country's ascent is underpinned by several structural and economic advantages:

- **Established Chemical Ecosystem:** The chemical sector operates as a sophisticated web of interconnected producers and consumers. Given its current base, India already possesses the critical mass necessary to benefit from a 'network effect' across the industry.
- **Technical Talent Pool:** The nation has a large pool of top chemical engineers, chemists, and scientists skilled in multi-step synthesis and process optimization.
- **Competitive Cost Structure:** India offers significant capital and operational advantages, including a 30-40 per cent CapEx benefit over global peers due to lower costs for local equipment fabrication, construction, and engineering.
- **Robust Domestic Demand:** India is the world's fastest-growing major chemical market, projected to reach USD 850–1,000 billion by 2040, driven by rising incomes, urbanisation, and needs in food and health security.
- **Government Support and Policy Environment:** Strategic initiatives like PCPIRs, PLI schemes, and 'Make in India' support attracting investment and promoting self-reliance.
- **Institutional and Legal Strengths:** Strong IP laws, rule of law, and liberal foreign investment policies make India attractive for long-term tech partnerships.
- **Strategic Market Access:** India gains strategic trade benefits via FTAs with Japan, South Korea, ASEAN, SAARC, Mauritius, UAE, Australia, EFTA, and has concluded an FTA with the EU. Negotiations with the US are ongoing.

Evolution from Contract Manufacturing to Strategic Partnerships

While exploring options, the industry seeks to strengthen its position. Outsourced manufacturing has become strategic alliances focusing on innovation, supply, quality, sustainability, and long-term value. Modern products need complex synthesis and high standards, exceeding commodity chemicals. Innovators want partners with full development capabilities, including route scouting, process optimisation, pilot-scale development, and sustainable scale-up adhering to safety and environmental standards like ZLD. This shift has boosted India's CDMO and CRAMS sectors, making them key global players.

The Dedicated Manufacturing Partnership Model

Many models exist to leverage partner synergy. Dedicated Manufacturing Partnerships are long-term, strategic relationships managed by senior management, not just marketing or procurement, unlike conventional buyer-supplier setups.

1. Manufacturing Partnerships

In the manufacturing partnership model, innovators supply technology, process knowledge, and demand insight. MNCs contribute tech-packs and capital for infrastructure, with partners using existing or custom assets for exclusive, long-term supply. Benefits are lower capital needs, quicker market entry, scalable manufacturing, and enhanced supply security via long-term agreements.

2. Co-Development and New Product Development

This structure leverages partners' strengths to rapidly scale lab innovations into industrial production, with the innovator focusing on discovery and chemistry, while the partner manages synthesis, safety, scale-up, and production. This shortens timelines, increases efficiency, and ensures IP protection and confidentiality.

3. Joint Ventures

Joint ventures involve shared investment, ownership, and governance, creating deeply integrated collaborations to co-create value. They are useful for developing new tech platforms, executing large manufacturing projects with shared risk, and establishing leadership in emerging specialty chemical segments.

4. Backward Integration Partnerships

Partners invest in upstream feedstock to secure supply chain components. These partnerships aim to improve raw material security, reduce costs, boost margins via economies of scale, and increase control over the entire value chain.

5. Strategic Sourcing Partnerships

Long-term sourcing agreements secure vital raw materials and reduce price volatility and disruptions. Unlike standard procurement, they emphasize 'customer stickiness' and results-based performance to ensure long-term supply for tier-one multinationals.

Aarti Industries: A Case Study in Dedicated Manufacturing Partnerships

Aarti Industries (AIL) has grown from a domestic chemical maker into one of India's top speciality chemical firms, backed by strong process chemistry, integrated manufacturing, long customer relationships, and diverse end markets.

The global chemical industry is shifting from low-cost manufacturing to one focused on resilience, innovation, and strategic collaboration. Europe's challenges, rising costs in China, and the need for diversified supply chains are accelerating this change. Increasing demand for complex speciality chemicals highlights the need for process development, scale-up, manufacturing reliability, and sustainability.

Diversified Business Portfolio

AIL offers intermediates for industries like pharmaceuticals, agrochemicals, polymers, oil and gas, and consumer products. By focusing on complex speciality chemistries, it has continuously advanced up the value chain.

R&D and Process Development Capabilities

Driven by R&D investment, AIL's infrastructure covers the whole product lifecycle, from route scouting to commercialization. Advanced labs, pilot plants, and engineering capabilities allow AIL to collaborate with customers from early development to large-scale manufacturing.

Manufacturing and Safety Excellence

Dedicated to safety and operational excellence, AIL utilises advanced risk management and process safety systems to handle complex chemistries. Its flexible network of integrated, multipurpose facilities enables efficient scale-up and rapid transition to commercial manufacturing.

Illustrative Partnership Models at Aarti Industries

Aarti Industries' partnership portfolio demonstrates the breadth of Dedicated Manufacturing Partnership (DMP) structures that are increasingly shaping the speciality chemicals industry.

- **Technology Transfer Partnerships**

  Aarti secured a $1.5 bn, 20-year supply deal with

basic technology transfer, chosen over global competitors despite no prior experience. The deal included $45 million in customer-funded capex, validating Aarti's scale-up and low-risk commercialization.

- **Product Co-development Partnerships**

  AIL scaled a new chemical from lab to commercial production in four years, leading to a 10-year, $125 mn agreement with an $18 mn investment. This shift marked Aarti's move from a production contractor to a strategic innovation partner.

- **Long-Term Supply Partnerships**

  AIL secures key supply pipelines via multi-year agreements with agrochemical innovators, ensuring volume predictability and supply resilience. Its portfolio includes a major alliance valued at over $360 million, demonstrating capacity for high-volume, long-term commitments.

- **Joint Ventures for Growth and Technology**

  Dedicated partnerships now include JV structures. In FY25, Aarti entered a 50:50 JV with UPL on derivatives, with ~$35mn investment leveraging shared technology, manufacturing, and market access. Aarti also has a 49:51 JV with RESL to recycle plastics into pyrolysis oil, supporting circular economy aims. These examples show chemical partnerships now go beyond contract manufacturing to include technology transfer, co-development, supply agreements, strategic JVs, sustainability innovation, and risk sharing.

Sustainability as a Competitive Advantage

As MNCs demand strict value-chain ESG compliance, sustainability is now a prerequisite for global partnerships. AIL integrates ESG into its operations to drive efficiency, earning a top 1 per cent EcoVadis Platinum Rating. Key achievements include 94 per cent waste recovery, 42 per cent water recycling, and 24 per cent renewable energy. These credentials reinforce AIL's position as a preferred, long-term global manufacturing partner.

Conclusion

The global chemical industry is shifting from low-cost manufacturing to one focused on resilience, innovation, and strategic collaboration. Europe's challenges, rising costs in China, and the need for diversified supply chains are accelerating this change. Increasing demand for complex speciality chemicals highlights the need for process development, scale-up, manufacturing reliability, and sustainability.

India benefits from a strong ecosystem, talent, expanding capabilities, and supportive policies. This presents opportunities for domestic manufacturers to become strategic partners beyond traditional contract manufacturing.

China is still the leading chemical hub with 42 per cent market share but faces rising labour costs and stricter environmental rules. Overcapacity has lowered prices and profits, prompting government action. Meanwhile, geopolitical tensions and supply-chain issues are leading multinationals to adopt a 'China Plus One' strategy, diversifying production to enhance resilience, risk mitigation, and flexibility beyond just cost savings.

Dedicated Manufacturing Partnerships offer long-term value through innovation, manufacturing excellence, safety, sustainability, and customer engagement. As speciality chemicals grow more complex and supply chain resilience becomes vital, these partnerships will play a key role in shaping the industry. ■

GUEST COLUMN

Balancing Sustainability and Resilience in a Changing Specialty Chemicals Landscape

Namitesh Roy Choudhury
Vice Chairman and Managing Director
LANXESS India

The specialty chemicals industry is currently at a defining moment. As organizations around the world navigate the dual pressures of climate change and economic uncertainty, the approach toward sustainability is undergoing a strategic recalibration, emphasizes ***Namitesh Roy Choudhury, Vice Chairman and Managing Director, LANXESS India.***

While sustainability remains a cornerstone of long-term strategy, the macroeconomic environment and the current geopolitical tension, particularly in the Middle East, is compelling companies to adopt a more measured, pragmatic approach, balancing environmental ambitions with immediate operational and financial realities.

The instability due to conflicts across the globe and in particular the Strait of Hormuz has severely disrupted global shipping movements, increased freight and insurance costs, and created substantial uncertainty in energy and feedstock supplies. This has led to sustained volatility in crude oil and gas prices, directly impacting the cost structure of chemical manufacturing.

Given the energy-intensive nature of chemical processes, rising input costs are exerting pressure on margins and forcing companies to prioritize cost optimization and operational continuity. The escalating costs across energy, raw materials, and logistics, has led to a noticeable shift towards more affordable, conventional feedstocks and materials. In several cases, manufacturers are temporarily returning to petrochemical-based inputs, as bio-based and recycled alternatives have become less competitive due to inflation and supply constraints.

Customers across downstream sectors are becoming more price-sensitive. With industries such as automotive, construction, and consumer goods under financial strain, demand for premium-priced sustainable products has moderated. Affordability and supply reliability are increasingly outweighing sustainability considerations. There has been a slowdown in adoption of green materials, as persistent overcapacity continues to weigh on margins across the chemical sector.

The current cost environment is also exposing challenges in scaling green technologies like green

hydrogen, electrification, carbon capture, and chemical recycling as it requires high upfront capital investment and long payback periods. Circular economy initiatives also face structural barriers such as inconsistent demand, complex supply chains, and underdeveloped infrastructure, further limiting near-term scalability.

Given the energy-intensive nature of chemical processes, rising input costs are exerting pressure on margins and forcing companies to prioritize cost optimization and operational continuity. The escalating costs across energy, raw materials, and logistics, has led to a noticeable shift towards more affordable, conventional feedstocks and materials.

Supply chain resilience has become a strategic priority now. Companies are diversifying suppliers, regionalizing sourcing, and restructuring logistics networks to mitigate geopolitical risks and ensure continuity of supply. While these measures are essential, they often redirect capital away from sustainability initiatives such as low-carbon upgrades and circular infrastructure.

Despite these short-term pressures, sustainability remains integral to long-term competitiveness. While companies may adjust the pace and prioritize certain initiatives amid market uncertainty, the broader commitment to sustainable transformation remains firmly intact. As conditions stabilize and regulations continue to evolve, sustainable products, circularity, and low-carbon solutions are expected to regain momentum. Meanwhile, organizations will find ways of mitigating the current challenges arising out of the geopolitical situation and re-strategize long term sustainability measures to accommodate such crisis.■

GUEST COLUMN

Continuous Chemistry and Green Manufacturing will Drive the Next Industrial Shift in Specialty Chemicals

Dr. Kamlesh Fondekar
Head - R&D
Godrej Agrovet Limited

The Indian chemicals industry is projected to grow from approximately $220 billion in 2024 to $300 billion by 2028[1], placing increasing pressure on manufacturers to scale production without a corresponding increase in resource intensity. Today, manufacturers are expected to improve productivity while using fewer resources. In this environment, the discussion is moving beyond what is produced and toward how it is produced. ***Dr. Kamlesh Fondekar, Head-R&D, Godrej Agrovet Limited,*** *explains in detail the current scenario.*

Walk through most specialty chemical plants and one thing becomes clear very quickly: efficiency is rarely determined by a single piece of equipment. It is usually the result of hundreds of small decisions made across the process. How much solvent is used. How often a reaction needs correction. How much material is lost during purification. How much energy is consumed moving products from one stage to the next.

The Indian chemicals industry is projected to grow from approximately $220 billion in 2024 to $300 billion by 2028[1], placing increasing pressure on manufacturers to scale production without a corresponding increase in resource intensity.

But today, manufacturers are expected to improve productivity while using fewer resources. Customers are scrutinizing supply chains more closely. Export markets increasingly want evidence of responsible manufacturing practices rather than broad sustainability commitments. In this environment, the discussion is moving beyond what is produced and toward how it is produced.

Why manufacturers are revisiting process design

Batch manufacturing remains the backbone of the specialty chemicals industry and will continue to play an important role. It offers flexibility and works well

for a wide range of products. But it also comes with familiar challenges. Variability between batches, larger process inventories, longer cycle times, and greater dependence on manual intervention are realities that most production teams understand well.

Continuous processing approaches these challenges differently. Instead of producing material in discrete batches, reactions take place within a controlled flow. Smaller reaction volumes make process conditions easier to manage. Temperature control improves. Deviations can be identified earlier. Less hazardous material is present in the system at any given time.

Environmental investments were often evaluated primarily through a compliance lens. Today, manufacturers are looking at them differently. Water reuse reduces dependence on external supply. Solvent recovery lowers raw material demand. Energy-efficient operations reduce exposure to utility price fluctuations.

The benefits are often noticed first on the plant floor rather than in sustainability reports. Better control generally means fewer off-spec batches. Fewer deviations mean less rework. Improved consistency reduces waste before it is generated.

Waste reduction starts long before treatment

When sustainability is discussed in manufacturing, attention often turns immediately to wastewater treatment, emissions control, or resource recovery systems. Those investments are important. But some of the biggest gains are usually found much earlier.

India's industries generate over 62 million tons of hazardous waste[2] annually, underscoring the importance of reducing waste at source rather than relying solely on downstream treatment and disposal systems. A reaction with higher selectivity produces fewer unwanted by-products. A process that generates fewer impurities requires less downstream correction. Reduced solvent consumption lowers both procurement and recovery requirements.

This is one reason continuous chemistry and process intensification are often discussed together. The objective is not simply to increase throughput. It is to remove unnecessary complexity from the process itself.

In some cases, that means combining steps. In others, it means improving reaction efficiency or reducing intermediate handling. The details vary from product to product, but the underlying principle remains the same: resources that never become waste are easier to manage than resources that must be recovered later.

Data is becoming part of the process

Running a continuous process without reliable data is difficult. Operators need visibility into what is happening inside the system at all times. Temperature drift, pressure fluctuations, changes in flow rate, and variations in energy use can become significant if they are not identified early.

This is where automation and digitalization become important. Real-time monitoring allows production teams to respond faster. Advanced control systems help maintain operating conditions within tighter limits. Predictive maintenance tools can identify equipment issues before they affect production. Customers want greater confidence in how products are manufactured, how resources are used, and how quality is maintained throughout production. Digital systems help provide that visibility.

The link between sustainability and resilience

Not long ago, environmental investments were often evaluated primarily through a compliance lens. Today, manufacturers are looking at them differently. Water reuse reduces dependence on external supply. Solvent recovery lowers raw material demand. Energy-efficient operations reduce exposure to utility price fluctuations. Better process control improves yield consistency. These improvements affect environmental performance, but they also strengthen operational resilience.

This has become particularly relevant in recent years. Supply chain disruptions, energy volatility, and

changing regulatory expectations have highlighted the importance of manufacturing systems that can adapt without significant losses in efficiency. In many cases, sustainability initiatives are delivering value because they improve the stability of operations, not simply because they reduce environmental impact.

The benefits of continuous and green manufacturing are increasingly clear. Adoption, however, will vary. Large organizations often have the resources to invest in pilot facilities, advanced automation, and process redesign. Mid-sized manufacturers face a different set of decisions. Capital availability, technical expertise, and implementation risk all play a larger role.

Adoption will not be uniform

The benefits of continuous and green manufacturing are increasingly clear. Adoption, however, will vary. Large organizations often have the resources to invest in pilot facilities, advanced automation, and process redesign. Mid-sized manufacturers face a different set of decisions. Capital availability, technical expertise, and implementation risk all play a larger role.

India's gross expenditure on research and development remains at approximately 0.64% of GDP[3], significantly below levels seen in many advanced manufacturing economies, highlighting the investment challenge involved in scaling new process technologies.

This is where industry collaboration becomes important. Technology providers, engineering firms, research institutions, and manufacturers each bring different capabilities. Partnerships can shorten development timelines and reduce the uncertainty associated with adopting new manufacturing approaches. Shared infrastructure will also matter. Pilot-scale facilities, testing centers, and collaborative development platforms can help make advanced manufacturing technologies accessible beyond the largest companies.

Looking ahead

The specialty chemicals industry is unlikely to abandon batch manufacturing. Nor should it. Different products require different production approaches.

What is changing is the way manufacturers think about efficiency. Resource consumption, waste generation, process safety, digital visibility, and operational reliability are increasingly being viewed as connected issues rather than separate ones.

Continuous chemistry sits at the intersection of many of these discussions. Its value lies in helping manufacturers build processes that are more predictable, more resource-efficient, and easier to scale. ■

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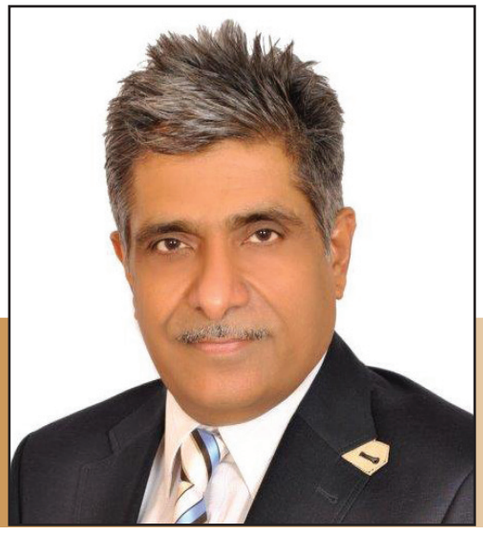
India as the Next Growth Engine for Global Aroma Chemicals Industry



Mahesh P Babani
Chairman & Managing Director
Privi Speciality Chemicals Ltd

For decades, India occupied a familiar place in the global aroma chemicals value chain: cost-efficient, manufacturing-oriented, and largely associated with scale rather than sophistication. The country supplied volume, but rarely shaped strategic conversations around innovation, supply chain resilience or speciality chemistry. That perception is beginning to change. Today, India is playing a deliberate role in reshaping how the global flavour and fragrance industry thinks about supply-chain resilience, speciality manufacturing and long-term sourcing partnerships, emphasizes ***Mahesh P. Babani, Chairman & Managing Director, Privi Speciality Chemicals Ltd.***

A combination of supply-chain realignment, rising complexity in fragrance manufacturing and increasing demand for sustainable sourcing is steadily repositioning India from a low-cost production base to a strategically important manufacturing hub for the global flavour and fragrance industry. The timing of this shift is significant.

The global aroma chemicals market, estimated at roughly USD 6.1 billion in 2024, is projected to approach USD 9.9 billion by 2033, growing at a CAGR of nearly 5.7 per cent. This expansion is attributed to rising demand in the personal care, home care, and fine fragrance end-use segments, especially in the high-end and speciality fragrance categories.

Why Manufacturing Integration is Becoming Critical

As global perfume companies look for greater resilience in their procurement policies, manufacturing integration and supply chain reliability are emerging as vital competitive differentiators in the aroma chemicals space. Businesses that possess greater backward integration, manufacturing proficiency, and strong supply chain linkages have the capability to weather

disruptions and sustain high levels of production efficiency.

Today, more global customers assess manufacturing partners not just on their cost competitiveness, but also on their production reliability, traceability, regulatory compliance, and technological know-how. This is fuelling rapid developments in integrated systems, manufacturing excellence, and speciality chemical skills within India's aroma chemicals sector.

Over the last few years, supply chain disruptions, geopolitical tensions, rising compliance costs in Europe, and concentration risks around China have forced multinational fragrance companies to rethink sourcing strategies. Increasingly, global players are looking to diversify manufacturing footprints across geographies that offer not just cost competitiveness, but process reliability, supply chain stability, regulatory compliance and scalable technical capability.

India is well-positioned to meet this mandate. Its aroma chemicals sector offers a combination of integrated manufacturing operations, a growing pool of technically qualified personnel, improving alignment with international quality standards and a regulatory environment that is progressively converging with global best practices.

The shift is also motivating Indian companies to develop facilities for customized synthesis, use innovative process technologies, and form strategic alliances with international fragrance companies.

The Shift from Scale to Capability

What is equally notable is the increasing complexity of manufacturing now being undertaken in India's aroma chemicals sector. Facilities are no longer limited to basic extraction or commoditised chemistry. Advanced processes are now part of mainstream production environments in several large-scale Indian manufacturing operations. This matters because complexity changes the economics of the industry.

Higher-value fragrance ingredients require tighter process controls, greater technical expertise and stronger regulatory compliance capabilities. They also create more durable customer relationships and structurally higher margins compared to commodity-oriented manufacturing.

Increasing backward integration, manufacturing efficiency and value-added product mix are now pushing profitability significantly higher, reflecting a shift towards more structurally resilient business models.

Global Validation is Becoming More Visible

One of the clearest indicators of India's changing position is the increasing willingness of global fragrance and FMCG companies to anchor speciality manufacturing partnerships and sourcing relationships in the country. This shift is unfolding against a broader global backdrop.

Over the last few years, supply-chain disruptions, geopolitical tensions, rising compliance costs in Europe, and concentration risks around China have forced multinational fragrance companies to rethink sourcing strategies. Increasingly, global players are looking to diversify manufacturing footprints across geographies that offer not just cost competitiveness, but process reliability, supply chain stability, regulatory compliance and scalable technical capability.

One more significant change that needs to be highlighted here is the growing focus on establishing strategic alliances in the global aroma chemicals industry. In other words, it can be said that fragrance and FMCG companies operating across the globe do not only take into consideration the cost benefit of the supplier; at the same time, they also evaluate its capability of providing products of consistent quality along with working on the technical cooperation and supply continuity.

All this motivates Indian producers to develop their competencies in the field of application development, quality system management and customized manufacturing according to the needs of the

international market.

This is particularly relevant as the global flavour and fragrance industry becomes more innovation led. Fine fragrance and premium personal care segments are expected to grow faster than broader FMCG categories over the coming decade, increasing demand for differentiated aroma molecules and speciality ingredients.

India's emergence within this landscape suggests that global companies are beginning to view the country not merely as an outsourcing destination, but as a long-term manufacturing, innovation and supply-chain partner. The ability of Indian manufacturers to combine integrated operations, speciality chemistry capabilities, manufacturing depth and improving sustainability standards is steadily strengthening their relevance within global fragrance supply chains.

The rising importance of India is also bolstered by its increasingly sophisticated speciality chemicals industry, presence of qualified technical personnel, and convergence with international standards in production and quality management. Collectively, these trends are enabling the nation to establish itself as a more reliable source of fragrances for foreign manufacturers.

Sustainability: Moving to Core of Competitive Advantage

Another factor accelerating this transition is sustainability. Regulatory frameworks across Europe and other developed markets are tightening around ingredient traceability, REACH compliance and ESG disclosures across chemical supply chains. As a result, sustainability is increasingly becoming a procurement requirement rather than a branding exercise.

The trend towards investment in process innovations and resource optimisation is becoming more common among manufacturers to adapt to the changing sustainability demands.

At the same time, several Indian manufacturers are strengthening sustainability credentials through renewable energy adoption, process innovation and globally recognised ESG frameworks, signalling that environmental performance is becoming integrated into long-term competitiveness.

Domestic Market: A Strategic Advantage

What gives India's aroma chemicals story a dimension that few other manufacturing geographies can replicate is the scale and momentum of its domestic market. Rising disposable incomes, premiumisation across FMCG categories and growing consumption in personal care, home care and fine fragrance are creating a large and increasingly sophisticated domestic fragrance market. This gives Indian manufacturers a structural advantage that many export-only chemical hubs do not possess: the ability to balance global exports with a growing home market. That dual-demand model improves capacity utilisation, supports investment into R&D and process innovation, and reduces dependence on external demand cycles alone.

A Different Industry Positioning

The broader implication is increasingly difficult to ignore. India is no longer merely participating in the global aroma chemicals market as a low-cost manufacturing destination. It is steadily emerging as a strategic node within the global fragrance value chain, combining feedstock flexibility, manufacturing depth, speciality chemistry capabilities and growing sustainability alignment.

The next phase of growth in the global aroma chemicals industry is unlikely to be shaped only by scale. It will increasingly be defined by resilience, integration, technical capability and supply-chain reliability. That is exactly the place where India's positioning is gaining its strength at the fastest pace. ■

GUEST COLUMN

The Degree That Decides the Batch

Akash Agarwal
CEO
Crystal Group
(Crystal Logistic Cool Chain Pvt. Ltd.)

In a specialty chemicals plant, value is created in milligrams and lost in degrees. The molecule may be perfect on the day it leaves the reactor — but whether it is still perfect when it reaches the customer often depends on a variable that few supply chains actively manage: temperature. ***Akash Agarwal, CEO, Crystal Group (Crystal Logistic Cool Chain Pvt. Ltd.)****, explains in detail why India's specialty chemicals sector can no longer treat temperature as an afterthought.*

Specialty chemicals are, by definition, products sold for what they do rather than what they are. A performance additive, a high-purity intermediate, an electronic-grade solvent or a custom catalyst commands its premium because of a tightly defined set of properties — purity, activity, particle size, viscosity, colour, stability. Almost every one of those properties is temperature-sensitive. And yet, while the industry invests heavily in reaction engineering, process control and quality systems inside the plant, the moment a product leaves the gate it frequently enters an uncontrolled thermal environment: an ambient truck, a sun-baked warehouse, a container parked on a port apron at 45°C.

This is the cold chain blind spot in specialty chemicals. It rarely shows up as a dramatic failure. It shows up as a slow erosion of value — a slightly off-spec consignment here, a shortened shelf life there, a rejected lot that nobody can fully explain. For an industry built on precision, that is an expensive place to be imprecise.

What Actually Needs the Cold in Specialty Chemicals

The phrase 'cold chain' still conjures images of frozen food and vaccines. In the specialty chemicals world, the requirement is broader and more nuanced — it is about controlled temperature, not merely cold. A surprising share of the portfolio carries a thermal specification, including:

Initiators and reactive intermediates — Peroxides, azo compounds and other free-radical sources that must be kept cold to suppress premature decomposition and exotherm risk.

Bio-based and active ingredients — Enzymes, biocatalysts and fermentation-derived products that lose activity rapidly above their storage window.

Flavours and fragrances — Fragrances, flavours and essential oils where heat drives off volatiles and dulls the very profile the customer is paying for.

Electronic chemicals — Photoresists, high-purity solvents and dopants where a few degrees can shift crystallisation, particle size or trace-level purity.

Adhesives, coatings and additives — Resins, hardeners, UV-curable systems and certain pigments that thicken, gel or separate when temperature drifts.

Agrochemical formulations — Some pesticide and herbicide formulations that crystallise or phase-separate in the cold and degrade in the heat, needing a defined corridor in both directions.

The common thread is that the customer is buying a specification, not just a substance. When temperature pushes the product outside that specification, the chemistry may still be "there" — but the value is not.

The customer is buying a specification, not a substance. Temperature is what stands between the two.

The Hidden Cost of Thermal Neglect

Consider a high-value intermediate manufactured in Gujarat and shipped to a formulator near Hyderabad in peak summer. The material has a recommended storage range of 2–15°C. It travels in a standard dry container. Over three days, the in-container temperature climbs past 50°C during the afternoons. There is no alarm, no visible damage — the drums look identical at both ends. But the impurity profile has shifted, the assay has slipped two percentage points, and the receiving plant's QC rejects the lot. A six-figure consignment becomes a dispute, a return, and a delayed downstream production run.

Multiply that scenario across an industry and the cost takes several forms. There is direct product loss from out-of-spec or degraded material. There is the working-capital cost of rejected and returned lots, and the reputational cost of inconsistent quality. There is a safety dimension too: reactive chemicals that should be kept cold can become hazardous when they are not, turning a logistics lapse into an incident. And there is the quiet erosion of shelf life — every excursion spends part of the product's stability budget, so that material technically "in date" may already be compromised by the time it is used.

Reefer in chemical industry.

None of this appears cleanly on a balance sheet. It hides inside quality-rejection numbers, customer-complaint logs and yield variances that get attributed to the process rather than the journey. That is precisely why it persists.

India's Industrial Cold Chain Gap

India has made real progress in cold chain — but almost entirely on the food and pharmaceutical side. Reefer fleets, temperature-controlled warehouses and last-mile capability have grown impressively for perishables and vaccines. Industrial and specialty chemicals, however, sit in a strange middle ground. They are not perishable food, so they fall outside the agri-logistics ecosystem. They are not always classified as pharma, so they miss the regulatory push that built GDP-grade pharma cold chains. The result is a capability gap precisely where a fast-growing, high-value sector needs it most.

India built a cold chain for food and medicine. Specialty chemicals fell through the gap in between.

This matters because the Indian specialty chemicals story is one of the most compelling in global manufacturing. Driven by the China-plus-one shift, a maturing CDMO and custom-synthesis base, and rising domestic demand, the sector is expanding at double-digit rates. More high-value, temperature-sensitive molecules are being made and moved every year — yet the thermal infrastructure that should accompany them has not kept pace.

In specialty chemicals, the difference between premium and reject can be a single degree.

Modular Cold Chain: A Practical Answer

The good news is that closing the gap does not require every plant to build heavy, fixed cold-storage infrastructure. The more sensible path — and the one that fits the capital discipline of most chemical operators — is modular, deployable temperature control that can be sized to the actual need. Three building blocks cover most of the requirement:

- **Reefer containers** — Deliver controlled-temperature transport from plant to port to customer, holding anywhere from chilled to deep-frozen set-points, with data logging that turns the journey from a black box into a verifiable record.
- **Blast freezers** — Bring material down to -40 degree temperature quickly and safely, which matters for reactive intermediates and for products that need to be stabilised before storage or transit.
- **Super freezers** — Provide on-site buffer capacity so incoming and outgoing temperature-sensitive stock is held within spec rather than left on an ambient dock.

Because these solutions are modular, a specialty chemicals operator can scale capacity up for a seasonal import or a new product line and scale it back when demand changes — an asset-light approach that treats thermal management as a flexible operating capability rather than a fixed capital burden. Crucially, when temperature data travels with the consignment, quality teams on both ends can prove compliance, settle disputes quickly and protect the brand.

From Afterthought to Specification

The shift that the sector needs is more cultural than technical. The technology is proven, the equipment is available, and the economics work — the cost of getting thermal management right is a small fraction of the cost of getting it wrong. What is missing is intent: the habit of treating temperature as a defined part of the product specification rather than an operational afterthought.

For specialty chemicals manufacturers, the practical asks are straightforward. Put a temperature specification on the product, not just on the certificate of analysis. Make thermal capability a real criterion when selecting logistics partners. Plan plant-side storage for temperature-sensitive inputs and finished goods. And insist on temperature data as a standard deliverable with every sensitive consignment, the same way assay and purity already are.

As India cements its position as a global specialty chemicals hub, the molecules will only get more valuable and more sensitive. The companies that build temperature control into how they make, store and move those molecules will protect their margins, their safety record and their reputation for consistency. In a business where the difference between premium and reject can be a single degree, that is not a luxury — it is the specification. ■

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Suraj Limited: Dedicated towards Technical Excellence & Quality Products

Suraj Limited, is an ISO-9001:2015, 14001:2015, OHS AS 45001:2018 certified company, PED approved and Government Recognized Export House and one of the world's leading producers and exporters of stainless steel, alloy steel, carbon steel seamless pipes, tubes, fittings and flanges. With over three decades of expertise, we serve critical industries including Oil & Gas, Petrochemicals, Power, Nuclear, Defense, Fertilizers, and Water Treatment across 60+ countries.

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Suraj Limited operates from two state-of-the-art plants in Gujarat, India:

- **Thol Plant:** Dedicated to seamless pipes, tubes, and fittings with hot extrusion, cold pilgering, and finishing facilities.
- **Chandarda Plant:** Specialized in carbon and alloy steel forged fittings and flanges with advanced forging, heat treatment, and machining lines.

Our total installed capacity exceeds 24,000 MT per annum.

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We have our own in-house testing laboratory with modern testing equipment to carry out all mandatory as well as optional tests on the products. Complex tests for which we do not have in-house facilities will be conducted at an external third party approved test house. Products will also be supplied under third party inspection where customer demands.

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- Our manufacturing is PED 2014/68/EU approved, and we hold product approvals from IBR, EIL, ONGC, BHEL, NTPC, and major global EPCs.
- We are also approved by international inspection agencies like Bureau Veritas, DNV, TUV, Lloyd's, and SGS.

Commitment

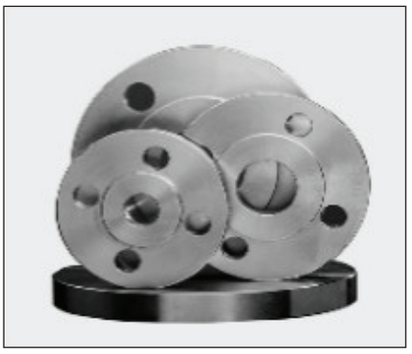
At Suraj Limited, we believe every customer has unique needs. Our technical and commercial teams work closely with clients to offer customized solutions, reliable delivery, and dedicated after-sales support.

Key Highlights

- **Gujarat-based Suraj Limited is one of the world's leading producers and exporters of stainless steel, alloy steel, carbon steel seamless pipes, tubes, fittings and flanges.**
- **SO-9001:2015, 14001:2015, OHS AS 45001:2018 certified company.**
- **PED approved and Government Recognized Export House.**
- **Operates from two state-of-the-art plants in Gujarat.**
- **Company's total installed capacity exceeds 24,000 MT per annum.**


Seamless Hot Finish Mother Pipe


Stainless Steel Seamless Heat Exchanger U-Tubes


Stainless Steel Flanges


Stainless Steel Seamless Buttweld Fittings


Stainless Steel Seamless Heat Exchanger Tubes


Stainless Steel Forged Rings


Stainless Steel Seamless Pipes

Product Range

- **Stainless Steel Seamless Pipes:** 1/8 NPS to 6 NPS
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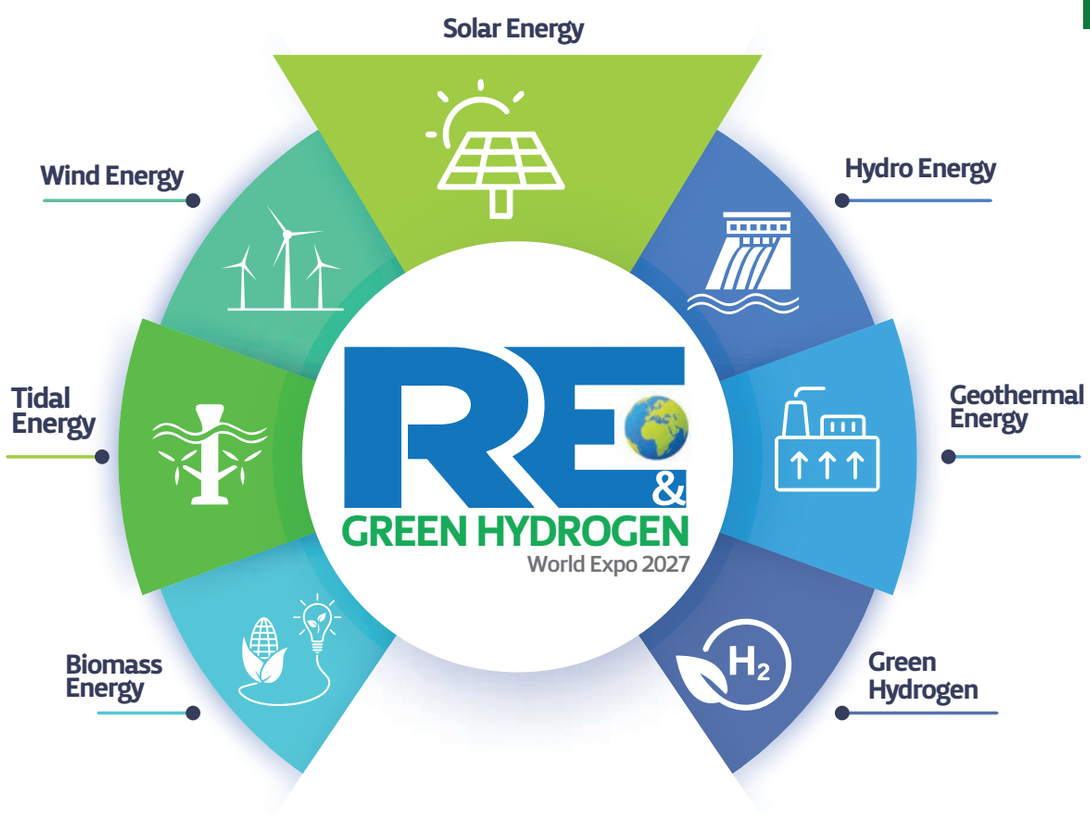

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R.N.I. No. 11403/1966 Date of Publication: 29th of every month. Postal Registration No: MCS/095/2023-25
Posted at Patrika Channel Sorting Office, Mumbai 400001, on 30th of every month. Total Pages No.: 54

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