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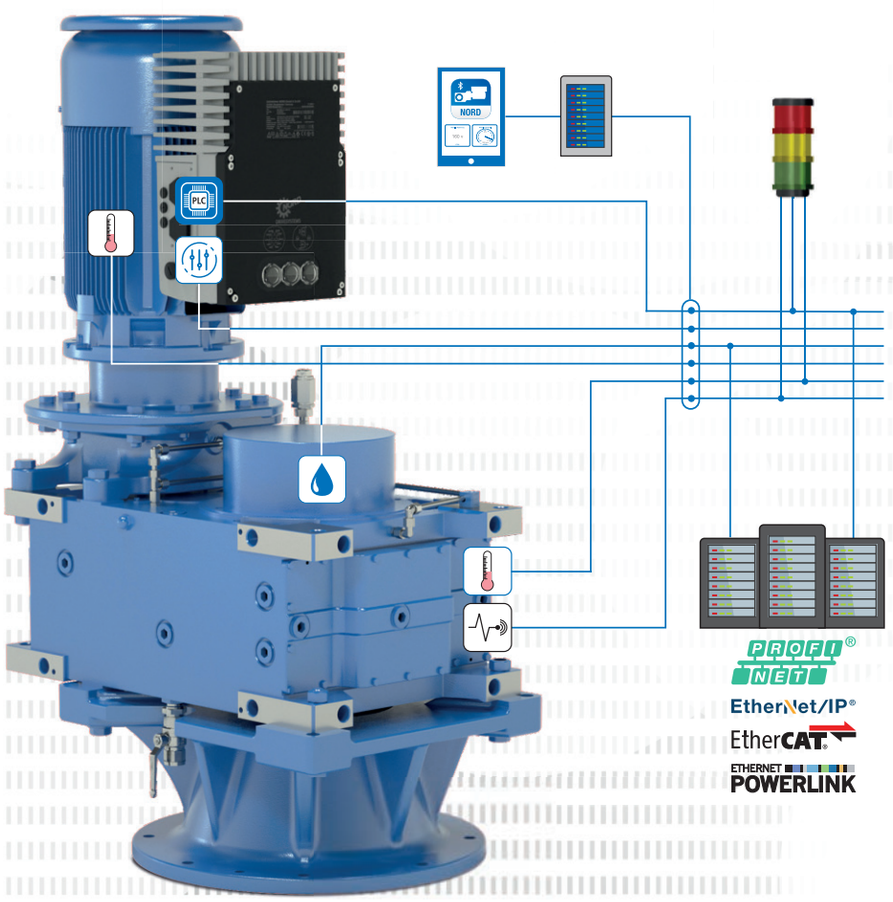

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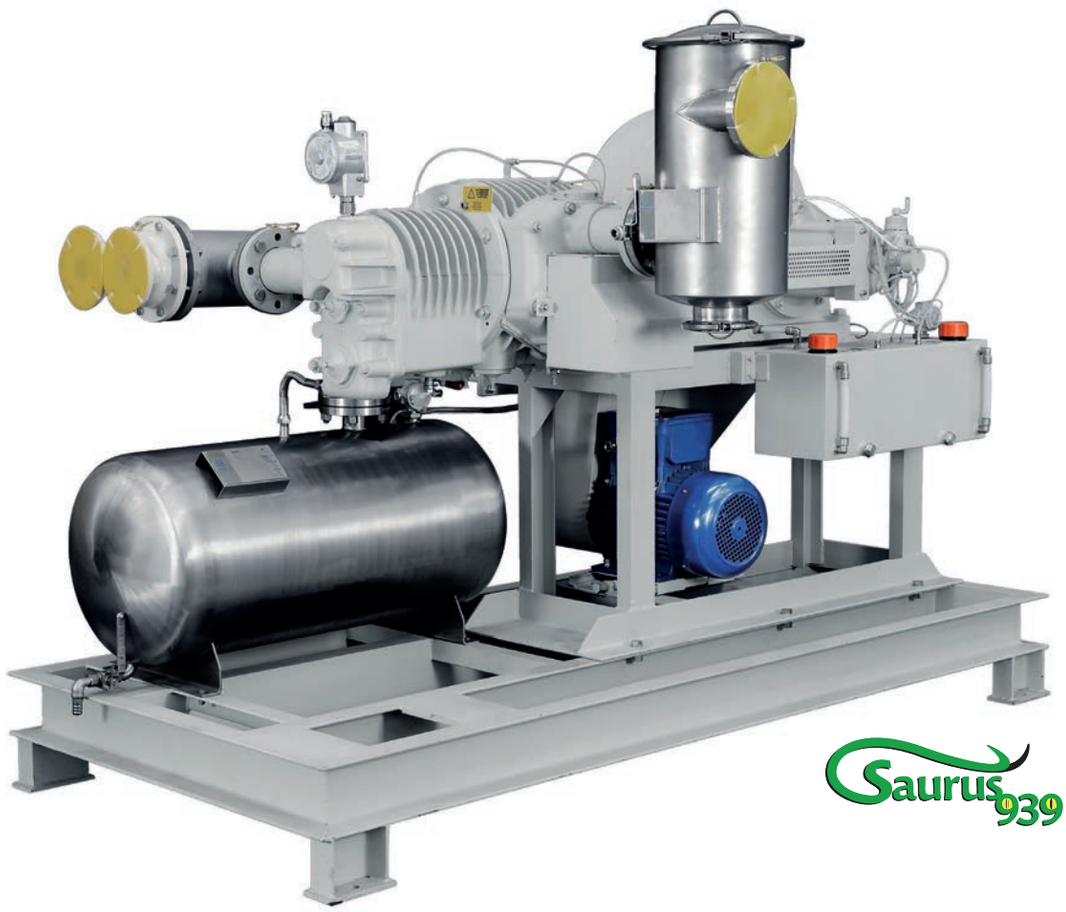

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'Manthan Shivir' focuses on discussions about chemical sector's future

New Delhi, India: The Department of Chemicals & Petrochemicals organised a one day "Manthan Shivir" in New Delhi recently, chaired by Jagat Prakash Nadda, Union Minister for Health & Family Welfare, and Chemicals & Fertilizers, Government of India. The one day event focused on discussions on fostering long-term development of the Indian chemical and petrochemical sector.

During the day discussions were held which were centred on 6 thematic areas, viz. "Infrastructure Development; Sustainability, Recycling & Circular Economy; Trade Remedial Measures; Boosting Manufacturing Towards Viksit Bharat; Skilled Workforce & Training; and Road Map for Future Ready Plastic Industry".

The recommendations emerging from discussions on all the thematic areas were presented before the Union Minister, under whose strategic insight this initiative was implemented. Nadda acknowledged that the Manthan conference is a constructive platform for engaging in thoughtful and comprehensive discussions about the sector's future.

He congratulated the Department for organizing the Manthan Shivir and choosing topics which are of contemporary relevance to the sector. He encouraged the participants to think beyond routine administrative tasks and motivated them to devote time regularly on thinking innovative, out of the box ideas and solutions.

While acknowledging the challenges that remain, Nadda emphasized the collective commitment to achieving long-term, sustainable growth in the chemical sector and expressed confidence in the fact that with the right approach, India can build a more resilient and self-reliant industrial ecosystem. Addressing the meeting Ms. Nivedita Shukla Verma, Secretary, Department of Chemicals & Petrochemical, alluded to the critical importance of India's chemical sector, pointing out that the industry contributes about 1.4 per cent to GDP and accounts for almost 9 per cent of gross value addition in manufacturing. She noted that while considerable progress has been made in terms of infrastructure development, there is need for more concerted efforts to support the development of the sector in view of ever changing geopolitical realities as well as the vision of the Government for an Atmanirbhar Bharat.

India highlights BioE3 policy at Mission Innovation Annual Gathering 2025

New Delhi, India: The Department of Biotechnology (DBT), Government of India - co-leads the Mission Integrated Biorefinery jointly with the Netherlands as part of Mission Innovation (MI) 2.0. The Mission Innovation Annual Gathering-2025, a multilateral platform accelerating clean energy innovation, held at Seoul, South Korea during 9-11 April 2025 brought together global leaders in clean energy technology. The term "Mission Innovation" was coined by Prime Minister Shri Narendra Modi during COP21, in collaboration with former French President François Hollande. India continues to play an active role under the Mission Innovation initiative.

At the Annual Gathering held in Seoul, the DBT being an integral member of the Indian delegation, participated in discussions on collaborative opportunities among diverse MI missions and platforms. The focus has been to advance the biorefinery approach for fuels, chemicals, and materials. During the event, the DBT presented BioE3 (Biotechnology for Environment, Energy, and

IOCL appoints Suman Kumar as Director (Planning & Business Development)

Suman Kumar has been appointed on the Board of Indian Oil as Director (Planning & Business Development) of the company with effect from 26th February 2025. Suman Kumar, aged 56 years, is a Mechanical Engineer from MIT Muzaffarpur. He has completed MBA from a leading Indian university, Advance Management Programme and various specialized courses in Business Development. He has more than 3 decades of rich experience in IndianOil across various functions like LPG Operations, Sales, Energy conservation, Carbon emission & mitigation etc. of which more than 14 years has been in Business Development and Strategic Planning. Before his elevation as Director (Planning & Business Development), Kumar was heading the Exploration & Production (E&P) vertical, which has assets in India as well as 9 overseas countries.

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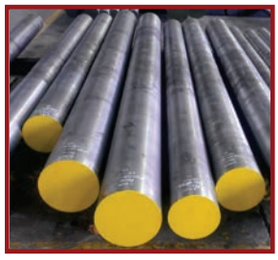

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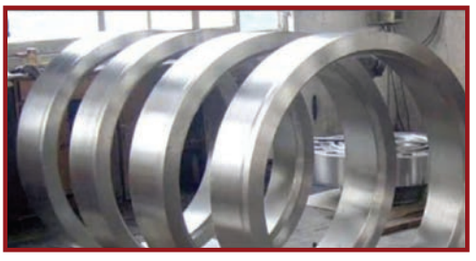

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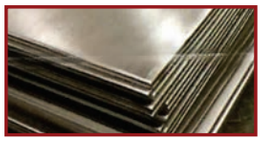

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Economy) Policy and demonstrated its pivotal role in addressing climate challenges and aligning national priorities under the Integrated Biorefinery Mission were extensively discussed at roundtables and reviewed by Mission Innovation members as well as the Technical Advisory Groups associated with the Missions.

The participants highlighted how the BioE3 Policy promotes sustainable and low-carbon manufacturing of fuels, chemicals, and materials. The Policy is designed to develop enabling technologies that foster an innovation-driven manufacturing ecosystem for a low-carbon future. Further, India's efforts in integrating Carbon Capture, Utilization, and Bioenergy (CCUB) for the biomanufacturing of fuels, chemicals, and materials were shared with the MI community through roundtable discussions.

Deliberations were also focused on opportunities for research, development, and demonstration (RD&D) using biomass-based biomanufacturing approaches. The DBT also participated in focused sessions on Biotechnology and Biomanufacturing priorities during visits to clean energy facilities, preceding meetings at Hanyang University and the Korea Institute of Science and Technology, coordinated by the Indian Embassy in Seoul. It was observed that the Bioinnovations for fuels, chemicals, and materials are the opportunities for Mission Innovation Member countries to accelerate their decarbonization goals.

Godrej Chemicals Business to expand product offerings to the Food & Beverages Industry

Vishal Sharma, Executive Director and Chief Executive Officer, Godrej Industries (Chemicals)

Mumbai, India: Godrej Industries' Chemicals Business has announced the completion of a business transfer with Savannah Surfactants Limited, with the acquisition of their Food Additives Business. As a leading player in Oleochemicals, Surfactants, Specialities and Biotech sectors, this transaction will help the company expand its product offerings to the Food & Beverages Industry globally.

Vishal Sharma, Executive Director and Chief Executive Officer, Godrej Industries (Chemicals), said, "We are glad to have completed this transaction at the start of the fiscal year. The Savannah business will be part of our Speciality chemicals sector. The addition of this Food Additives Business will expand our speciality offerings and build a larger speciality business going forward."

Located at Goa, Savannah Surfactants Limited has a manufacturing capacity of 5,200 MTPA of finished products.

Asian Paints appoints Ashish Choksi as Additional & Non-Executive Director

The Board of Directors of Asian Paints at their meeting held recently, based on the recommendations of the Nomination and Remuneration Committee, have approved the appointment of Ashish Choksi as an Additional and Non-Executive Director on the Board of the company, with effect from 1st April 2025, subject to the approval of the shareholders of the company.

Ashish Choksi is the son of late Ashwin Choksi, erstwhile Chairman of the company. Ashish holds Degree of Bachelor of Art in Economics from University of Michigan, Ann Arbor, USA. He commenced his career with Asian Paints Limited in 1992. He worked as the Supply Chain Executive of the then Industrial Paints Division of the company wherein he was in-charge of the Original Equipment Manufacturer (OEM) - customers paints requirements.

Pidilite Industries' standalone Q3 EBITDA margins stand at 24.3%

Mumbai, India: Pidilite Industries Limited, India's leading manufacturer of adhesives, sealants and construction chemicals has announced its financial results for the quarter and nine months ended December 31, 2024. The current quarter's revenue growth of 9.3 per cent was aided by Underlying Volume Growth (UVG) of 9.7 per cent across categories and geographies. Consumer and Bazaar (C&B) UVG was 7.3 per cent, while Business to Business (B2B) maintained growth momentum with UVG of 21.7 per cent.

Gross Margins improved by 100 bps year on year, primarily due to benign input prices. For nine months of the current financial year, UVG was 9.2 per cent with C&B UVG of 7.0 per cent and B2B UVG of 20.2 per cent. Gross Margins improved by 284 bps over previous year, on account of lower input costs. EBITDA Margins were 24.5 per cent, compared to 23.7 per cent in previous year. Innovation across C&B and B2B segment continued to be a significant contributor to the overall revenues of the company.

Domestic subsidiaries delivered double digit revenue growth with improvement in EBITDA margins. Owing to global economic uncertainty, inflation and political instability in some countries, International subsidiaries (excluding Pidilite USA and Pulvitec Brazil) reported modest sales growth.

Commenting on the results, Bharat Puri, Managing Director, Pidilite Industries Ltd, said, "Looking ahead, we remain cautiously optimistic on improved demand conditions as a result of the good monsoon and increased construction activities."

GNFC achieves reduction in greenhouse gas emissions with EnviCat N_2O-S catalyst

Gujarat Narmada Valley Fertilizers & Chemicals Limited facility in Gujarat, India

Bharuch, Gujarat: Gujarat Narmada Valley Fertilizers & Chemicals Limited (GNFC) has announced a major achievement in its sustainability journey with the successful installation of Clariant's EnviCat N_2O-S catalyst at its nitric acid plant. The EnviCat N_2O-S

DFPCL appoints Prikshit Agarwal as President – Strategy

Deepak Fertilisers & Petrochemicals Corporation Limited (DFPCL) has appointed Prikshit Agarwal as President – Strategy of the company with effect from 24th February, 2025. Agarwal has done his Master of Business Administration from Saïd Business School, University of Oxford, PG Diploma in Management from Indian Institute of Management (IIM) Kozhikode and Bachelor of Science (Physics) from the University of Delhi. He has worked with multinational as well as Indian companies and brings with him rich experience in the fields of corporate strategy, business development, mergers and acquisitions, solving complex problems, facilitation of long-term strategy, strategic due diligence, supply chain, investment strategy, commercialization strategy, etc.

catalyst, has demonstrated exceptional performance, reducing N_2O emissions by approximately 44,000 tons per month of CO_2 equivalent (CO_2e). The projected annual CO_2e reduction from this initiative is estimated to be around 520,000 metric tons, with further improvements anticipated after the next scheduled maintenance shutdown.

Epigral's CPCV resin and compound bag NSF certification

Ahmedabad, Gujarat: Epigral Ltd, India's leading integrated chemical manufacturer has received the international acclaimed NSF certification for CPVC resin and compounds. This significant achievement underscores the high safety standards of Epigral's CPVC resin and compounds, particularly in their application for pipe manufacturing intended for drinking water.

NSF-certified products hold immense importance as they offer a robust guarantee of safety, quality, and adherence to stringent public health standards. This certification is crucial in safeguarding consumers, especially in a country that is acutely aware of food safety issues. Maulik Patel, Chairman and Managing Director of Epigral, expressed gratitude about this milestone, "We are thrilled to receive international accreditation, which will empower our customers to produce superior CPVC pipes that are safe for drinking water."

Recently the company also announced plans to double its production capacity for CPVC resin to an impressive 1,50,000 TPA by FY2027. Additionally, Epigral commissioned a state-of-the-art Chlorotoluene value chain plant at its Dahej Complex in Gujarat. The new facility will supply intermediates for pharmaceutical and agrochemical industries.

Galaxy Surfactants to achieve 50% recycled plastics in packaging by 2026

Mumbai, India: Galaxy Surfactants Ltd., leading performance and specialty chemicals company, is making significant progress in sustainability by incorporating recycled plastics in its industrial packaging materials. The company has set ambitious goal – 50 per cent Recycled Plastics in Packaging by 2026. This is part of Galaxy's broader circular economy initiative, designed to reduce plastic, recycle plastic, conserve environmental resources, and promote sustainable practices throughout the industry.

Introducing Post Consumer Resin (PCR) in big size industrial packaging is a technological challenge. Galaxy has worked with supply partners and devised a novel technique to address contamination problems at the same time making the packaging sustainable.

Galaxy's shift towards sustainable packaging solution has resulted in a notable reduction & reuse of over 37,000 Kg plastic, contributing to a decrease of 113,067, Kg CO_2e in its carbon footprint in last 3 years. Avinash Nandanwar, Head of Sourcing and Sustainability at Galaxy Surfactants Ltd, stated, "Our commitment to integrating recycled plastics into our packaging is a significant step towards building a more sustainable future."

Aramco completes acquisition of 50% stake in BHIG Company

Dhahran, Saudi Arabia: Aramco, one of the world's leading integrated energy and chemicals companies, and Air Products Qudra (APQ) have announced that Aramco has completed the acquisition of a 50 per cent equity interest in the Jubail-based Blue Hydrogen

Shalimar Paints appoints Kuldip Raina as MD & CEO

Shalimar Paints has announced the appointment of Kuldip Raina as Managing Director and Chief Executive Officer (MD & CEO) of the company, for a period of 3 years effective from April 10, 2025 to April 09, 2028, subject to approval of the shareholders. Raina joined Shalimar Paints Limited in May 2022. With over three decades of leadership experience across industries like Paints, FMCG, consumer products and organized retail, Raina is a visionary business leader known for driving transformational growth. His expertise spans profit centre operations, strategic business planning and high-impact sales and marketing initiatives. He has a proven track record of revitalizing brands, optimizing operations and spearheading market expansion through innovative product strategies and strong distribution networks.

Industrial Gases Company (BHIG). The agreement brings together experts in their respective fields with the aim of providing the Jubail Industrial City area with hydrogen, including lower-carbon hydrogen, at scale.

BHIG targets the production of hydrogen, including lower-carbon hydrogen from natural gas, also referred to as "blue hydrogen", through the capture and storage of carbon dioxide. BHIG is expected to commence commercial operations to produce blue hydrogen in coordination with Aramco's carbon capture and storage (CCS) activities in Jubail.

Ashraf Al Ghazzawi, Aramco Executive Vice President of Strategy & Corporate Development, said, "Aramco's investment in BHIG is expected to contribute to the development of a hydrogen network in the Kingdom of Saudi Arabia's Eastern Province. This network, along with our CCS hub in Jubail, can help us capitalize on emerging opportunities both domestically and globally to reduce carbon emissions, support growth, and diversify our energy portfolio."

Ahmed Hababou, Air Products Qudra Chairman, said, "This joint venture is another example of the steps Aramco and Air Products Qudra are taking to contribute to the development of a robust hydrogen network in the Kingdom's Eastern Province, serving the refining, chemical, and petrochemical industries."

Mohammad Abunayyan, Air Products Qudra Vice-Chairman, said, "We are proud of this partnership with Aramco and pleased to see one of the world's leading integrated energy and chemicals companies and the world's leading hydrogen supplier conclude this strategic partnership focused on generating lower-carbon intensity energy solutions guided by the Kingdom's Vision 2030."

Covestro publishes energy efficiency target

Covestro Plant at Dormagen

Dormagen, Germany: Covestro, leading producer of advanced and high-performance polymers in India and around the world, is pushing ahead with its focus on climate neutrality and the circular economy. By 2030, the company wants to use 20 per cent less energy to produce one ton of product than in 2020.

The energy efficiency target contributes to Covestro's ambitious plan to achieve climate-neutral production by 2035. It is to be achieved primarily thanks to more efficient processes and innovative technologies. For example, Covestro has commissioned a modern reactor at its Dormagen site that uses waste heat from production processes to generate steam for further manufacturing steps. CO_2 emissions can thus be reduced by up to 22,000 tons per year.

In 2024, for example, the company signed a contract with bp for electricity from solar power for the site in Tarragona, Spain, bringing the share of electricity from renewable energy sources at the site to 30 per cent.

"We are on the right track and I am confident that we will achieve our sustainability goals," said Dr. Thorsten Dreier, Chief Technology Officer of Covestro. ■

Markus Bold is CEO at 'hte'

'the' – the high throughput experimentation company – has announced that Markus Bold will succeed Wolfram Stichert as CEO. After 25 successful years at hte, including 12 years as CEO, Wolfram Stichert will pass the leadership of the company to Markus Bold. The official handover will take place on April 1, 2025.

Markus Bold brings extensive experience to the position of CEO at hte. With a PhD in chemistry and expertise in research, controlling, strategy, innovation management, and business development, he has worked in numerous areas of the chemical industry. As the founder and managing director of Chemovator, the business incubator of BASF, he has successfully invested in start-ups and supported their further development.

thyssenkrupp Uhde secures contract for GNFC's new nitric acid plant

Executives from thyssenkrupp Uhde and GNFC during the signing of the agreement.

Bharuch, Gujarat: thyssenkrupp Uhde, a major chemical technology solution provider, has been awarded a contract by Gujarat Narmada Valley Fertilizers & Chemicals Ltd. (GNFC) for the construction of a Weak Nitric Acid (WNA - III) plant in Bharuch, Gujarat, India. The scope of work includes license, basic engineering, detailed engineering, procurement, construction, commissioning, and start-up services. Based on advanced thyssenkrupp Uhde technology, the design puts a focus on operational efficiency, safety, and sustainability. The plant will have a capacity of 600 metric tons per day (MTPD) of weak nitric acid. As one of the India's largest nitric acid facilities, the new plant will be equipped with Uhde's highly effective and proven EnviNOx® technology to reduce greenhouse gas emissions by eliminating nitrogen oxides from nitric acid production.

The WNA - I as well as WNA - II plants were also licensed by thyssenkrupp Uhde. Dr. T. Natarajan, IAS, Managing Director, Gujarat Narmada Valley Fertilizers & Chemicals Ltd.: "We are delighted to further strengthen our market presence for Weak Nitric Acid in India by installation of new plant based on thyssenkrupp Uhde technology. At present, we are operating two nitric acid plants licensed by thyssenkrupp Uhde. The third plant will enhance the capacity and fulfill the downstream requirement to support 'Make in India Campaign' with commitment to environment conservations."

The project will be carried out by thyssenkrupp Uhde's local subsidiary in India, which is a leading EPC and engineering consultancy offering solutions across different sectors such as petrochemical and refinery, fertilizers, cryogenic storages and much more.

BPCL to launch world's first hydrogen-powered VTOL aviation ecosystem

Kochi, Kerala: Bharat Petroleum Corporation Limited (BPCL) has entered into a quadripartite Memorandum of Understanding (MoU) with BluJ Aerospace, the Agency for New and Renewable Energy Research and Technology (ANERT), Government of Kerala, and Cochin International Airport Limited (CIAL) to develop the first hydrogen-fueled Vertical Take-off and Landing (VTOL) aircraft ecosystem globally.

BPCL will establish hydrogen refuelling infrastructure for VTOL aircraft developed by BluJ Aerospace via its forthcoming Hydrogen Refueling Stations (HRS) in Kochi and Trivandrum. Furthermore, BPCL will engage in R&D endeavours focused on designing and developing an indigenous Proton Exchange Membrane (PEM) hydrogen fuel cell characterized by high power density to facilitate vertical lift-off, thereby advancing India's hydrogen technology capabilities.

BPCL's upcoming HRS in Kochi and Trivandrum will be strategically positioned to facilitate research and pilot projects within Kerala's Hydrogen Valley Program. These stations will be essential in promoting commercial hydrogen applications and encouraging the wider uptake of hydrogen-powered transportation solutions.

In another major development, BPCL is setting up Compressed Biogas (CBG) plant at Yamunanagar in Haryana. The project involves an investment of ₹90 crore and is designed to have an annual capacity of over 2,600 tonnes of CBG. It is scheduled for completion by May 2027. This plant will utilize waste/biomass sources like municipal solid waste and cattle dung, to produce CBG through anaerobic decomposition.

ONGC-NTPC Green acquires 100% stake in Ayana Renewable Power

Mumbai, India: ONGC NTPC Green Private Limited (ONGPL), a 50:50 joint venture company of NTPC Green Energy Limited and ONGC Green Limited, has completed acquisition of 100 per cent equity stake in Ayana Renewable Power Private Limited.

Ayana Renewable Power Private Limited (Ayana), is private limited company incorporated on 1st March 2017 under the Companies Act, 2013 by British International Investment. It is backed by marquee, sovereign-linked

institutional investors including NIIF (51 per cent), BII (32 per cent), and GGEF (17 per cent). Turnover of Ayana in FY'24 was ₹856.4 crore.

Ayana, a leading renewable energy platform, has capacity of approx. 4112 MW (2123 MW of operational and 1989 MW under-construction assets), strategically located across resource-rich states. Its portfolio is backed by high-credit-rated off-takers such as SECI, NTPC, GUVNL, and Indian Railways.

Through this acquisition via ONGPL, NTPC Green Energy Limited (NGEL) will expand its capacity in the renewable energy sector to meet its objective of 60 GW of renewable capacity by 2032.

Ayana will be a wholly owned subsidiary of ONGPL, which is a 50:50 Joint Venture of NGEL and ONGC Green Limited.

Total Cost of Acquisition is ₹6,248.50 crore @ ₹ 23.22 per share; (NGEL's share in the above cost is ₹3124.25 crore i.e. 50 per cent which was funded as equity contribution.

BHEL signs TTA with BARC for Mixed-Matrix Membrane Diaphragm

Executives from BHEL and BARC during the signing of the technology transfer agreement.

Mumbai, India: Bharat Heavy Electricals Limited (BHEL) has announced that it has signed a 'Technology Transfer Agreement' (TTA) with Bhabha Atomic Research Centre (BARC) in the area of electrolyser systems for hydrogen production. The TTA is for Mixed-Matrix Membrane Diaphragm for separator applications in electrochemical cells.

The Mixed-Matrix Membrane Diaphragm technology developed by BARC is an effective replacement of asbestos diaphragm material used in electrolyser systems. Further, this diaphragm will be a low-cost import substitute for Zirfon which is used in water electrolysers.

The Mixed-Matrix Membrane Diaphragm technology acquired from BARC is expected to help BHEL to achieve complete indigenous development of alkaline electrolyser systems. This is also a step further in BHEL's contribution to the 'National Green Hydrogen Mission' and contribute to the Government's 'Make in India' initiative.

Reliance breaks ground on first of 500 CBG plants in Andhra Pradesh

Kanigiri, Andhra Pradesh: Andhra Pradesh IT & Electronics Minister, Chairman of the Group of Ministers on Job Creation, Nara Lokesh laid the foundation stone of the first Reliance Compressed Bio-Gas (CBG) plant at Kanigiri in Prakasam district in Andhra Pradesh (AP).

The new project is being developed with a capital investment of ₹139 crores and is the first in a series of 500 projects involving a total capital outlay of ₹65,000 crores for AP. The plant will be developed with innovative technology and utilise Napier grass that would be developed on barren and waste lands to produce bio-gas. Reliance has embarked on a bold journey to establish integrated CBG hubs across Andhra Pradesh. Around 500,000 acres of barren and waste lands in Prakasam, Anantapur, Chittoor, and Kadapa will be utilised for this purpose. Once all the plants are fully operational, they will produce 40 lakh tonne of green, clean CBG and 1.1 million metric tonnes of organic fertiliser annually. This initiative is expected to create 250,000 jobs for rural youth.

Shivtek Spechemi to build 2 new specialty chemical plants

Gurugram, Haryana: Shivtek Spechemi Industries Ltd, leading speciality chemicals manufacturer and flagship company of the Shiva Group of Industries, has announced strategic expansion plans of investing ₹650 crores to establish new state-of-the-art chemical manufacturing units in Gujarat and Rajasthan.

The upcoming Gujarat facility will be strategically located near the Hazira port, offering cost-effective logistics and seamless connectivity to both domestic and international markets. Meanwhile, the Rajasthan plant has been chosen for its robust industrial infrastructure and advantageous proximity to northern distribution hubs. Together, these new facilities will significantly augment Shivtek Spechemi's manufacturing capabilities to up to 6,50,000 MTPA, enhancing the company's

current total production capacity of 1,50,000 metric tons per annum (MTPA).

Construction of the new plants is set to begin in 2026, with production expected to commence between 2028 and 2029. The new plants are expected to span across 100 acres area and generate over 500+ jobs in a span of 3 years.

Dr. Amitt Nenwani, Managing Director, Shivtek Spechemi Industries Ltd, said, "This investment will mark a pivotal step in Shivtek Spechemi's growth journey as we align ourselves with India's ambition to become a global manufacturing hub for specialty chemicals."

Waaree Energies sets up 5.4 GW solar cell gigafactory unit in Gujarat

Chikhli, Gujarat: Waaree Energies Ltd., leading clean energy transition company, inaugurated its advanced 5.4 GW solar cell gigafactory facility in Chikhli, Gujarat. The ceremony was graced by Honourable Chief Minister of Gujarat, Shri Bhupendrabhai Patel and Shri Pralhad Joshi, Honourable Minister of New and Renewable Energy; among others. The facility is spread across 150 acres, with a built-up area of 101 acres.

Shri Pralhad Joshi, Honorable Minister of New and Renewable Energy stated, "The launch of one of largest solar cell facility embodies the spirit of Atmanirbhar Bharat and stands as a tribute to India's growing prowess in the global renewable energy landscape. Waaree's commitment to indigenous manufacturing aligns perfectly with our national vision of establishing India as a global manufacturing hub for clean energy technologies."

Hitesh Doshi, Chairman & Managing Director, Waaree Energies Ltd., stated, "Today, with the launch of our 5.4 GW solar cell gigafactory in Chikhli, Waaree is laying the foundational cornerstone of India's energy independence and technological renaissance."

The Chikhli facility, equipped with world-class high-efficiency solar cell technology. Beyond production capabilities, the facility aligns with India's broader decarbonisation goals by ensuring a cleaner, greener, and more self-reliant energy future.

KEC International wins new orders worth ₹1,267 crores

Mumbai, India: KEC International Ltd., a global infrastructure EPC major, an RPG Group Company, has secured new orders of ₹1,267 crores across its various businesses: Transmission & Distribution (T&D): The business has secured NOAs/Comfort letter for T&D projects in India and Americas including 800 kV HVDC and 765 kV transmission line orders, from Power Grid Corporation of India Limited (PGCIL) and supply of towers, hardware and poles in Americas.

In Cables segment, the business has secured orders for supply of various types of cables and conductors in India and overseas. Vimal Kejriwal, MD & CEO, KEC International Ltd. said, "We are delighted with the substantial orders secured in our T&D business, particularly in the prestigious HVDC and 765 kV segments from PGCIL for green energy evacuation. These wins have further strengthened our T&D order book in India. With these new orders, our YTD order intake stands at over ₹23,300 crores, a growth of 35 per cent vis-à-vis last year."

ABB India delivers integrated digital technology for IOCL's pipeline network

Bengaluru, India: ABB India Ltd has successfully delivered an integrated scope of advanced automation and digital solutions for Indian Oil Corporation Ltd.'s (IndianOil) countrywide oil and gas pipeline network. Spanning over 20,000 kilometers across multiple states in India, the network is vital to supporting the country's energy needs, transporting 125 million metric tons of oil and 49 million metric standard cubic meters of gas annually. ABB's solutions will be at the core of supporting IndianOil's Centralized Pipeline Information Management System (CPIMS). The project involved the design, engineering, supply and commissioning of the ABB Ability™ SCADAvantage digital platform,

which features robust cyber security and disaster recovery systems hosted on the cloud. The scope also included digital solutions for centralized management of IndianOil's pipelines across the country. Additionally, ABB is providing a 10-year ABB Care contract to ensure all existing pipelines are unified under CPIMS and to provide long-term service support for IndianOil's pipeline infrastructure.

"CPIMS has been envisioned to address the complexities associated with the maintenance and operation of the cross-country pipeline network. By leveraging cutting edge technology, this project aims to eliminate manual operations and enhance the efficiency, productivity, and availability of the pipeline network," said Senthil Kumar N, Director (Pipelines), IndianOil. ABB was awarded the CPIMS project contract in February 2024. Within one year, ABB designed and delivered its integrated solutions for managing the pipeline network, which is under commissioning.

JSW Steel, JFE Steel JV complete 100% acquisition in thyssenkrupp Electrical Steel India

Mumbai, India: Jsquare Electrical Steel Nashik Private Limited, a wholly owned subsidiary of JSW JFE Electrical Steel Private Limited ('J2ES'), which is a 50:50 joint venture between JSW Steel Limited and JFE Steel Corporation, has completed the acquisition of 100 per cent equity interest in thyssenkrupp Electrical Steel India Private Limited (tkES India) and the associated technology package from the thyssenkrupp group has been licensed/transferred to the company.

The total purchase consideration for the transaction (including closing adjustments) is ₹4,158.6 crore. tkES India is one of the first manufacturers of Grain-Oriented Electrical Steel ('GOES') in India with its facility located in Nashik, Maharashtra. The acquisition provides the company with access to cutting-edge technology thereby aligning with its strategy of enhancing its value-added portfolio. In February 2024, JFE Steel and JSW established J2ES, with the aim of setting up an integrated greenfield project for manufacturing GOES in India by 2027. Now, through this acquisition, J2ES has been able to achieve instant market access and can promptly establish an integrated system from manufacturing to sales of GOES in India.

Matix to set up Iso-propyl alcohol manufacturing plant

Panagarh, West Bengal: Matix Fertilisers and Chemicals, specializing in high-quality crop nutrient products and farm advisory services, has announced plans to set up Iso-propyl alcohol (IPA) manufacturing plant with an annual capacity of 50 ktpa. The plant will be built within Matix's existing industrial complex at Panagarh Industrial Park, West Bengal.

IPA is a critical chemical widely used in pharmaceuticals and personal care products. To ensure supply chain efficiency, Matix has signed a memorandum of understanding with AdPlus Chemicals and Polymers, a step-down subsidiary of Haldia Petrochemicals. This partnership will enable a reliable domestic supply of acetone, a crucial raw material for IPA production.

The plant is scheduled for commissioning by FY2027.

Sembcorp, BPCL to explore RE, green hydrogen projects

Executives from Sembcorp Green Hydrogen India and Bharat Petroleum Corporation Limited during the signing of the joint venture agreement to explore renewable energy and green hydrogen projects across India.

Mumbai, India: Sembcorp Green Hydrogen India Private Limited (SGHIPL), a wholly-owned subsidiary of Sembcorp Industries (Sembcorp) has entered into a joint venture (JV) agreement with Bharat Petroleum Corporation Limited (BPCL) to explore renewable energy and green hydrogen projects across India. This strategic partnership aims to support India's energy transition and development goals.

The JV will explore renewable energy projects and green hydrogen production. It will also consider projects in green ammonia production and bunkering, emissions reduction for port operations and other emerging green fuel technologies. The potential projects will leverage Sembcorp's renewables experience and BPCL's expertise in the petroleum sector and infrastructure.

G. Krishnakumar, Chairman & Managing Director, BPCL, said, "We will leverage our combined aspirations, expertise and resources, to jointly explore the development of innovation-led, best-in-class renewable energy and green hydrogen solutions for supporting India's ambitious climate goals and our own aspiration to achieve net-zero emissions by 2040 in Scope 1 and 2."

BASF starts up first plant for recycled polyamide 6

New loopamid® plant: Integrated into the polyamide-6 facility at the Caojing site in Shanghai.

Ludwigshafen, Germany/Shanghai, China: BASF has announced the start-up of the world's first commercial loopamid® plant. The production facility at the Caojing site in Shanghai, China, has an annual capacity of 500 metric tons and marks an important step in the supply of sustainable products for the textile industry.

loopamid is a recycled polyamide 6 that is entirely based on textile waste. The new production facility supports the growing demand for sustainable polyamide 6 fibers in the textile industry.

The plant as well as the quantities of loopamid produced are certified according to the Global Recycled Standard (GRS). This certification guarantees to consumers and textile manufacturers that loopamid is made from recycled materials and that the production processes comply with specific environmental and social criteria. In addition, first yarn manufacturers are successfully using loopamid.

To produce loopamid in its new plant, BASF currently utilizes industrial textile waste from textile manufacturing and will gradually increase the share of post-consumer waste. This feedstock includes cutting scraps, defective cuts, offcuts and other production textile waste from the textile industry. These materials are collected and provided to BASF by customers and partners. End-of-life garments made from polyamide 6 and other textile products can also be utilized for the production of loopamid. All these waste materials are challenging to recycle because they typically consist of a mixture of different fibers and materials as well as dyes and additives.

LANXESS completes sale of Urethane Systems biz

Mumbai, India: Specialty chemicals company LANXESS has completed the sale of its Urethane Systems business to Japanese UBE Corporation on April 1, 2025. UBE is a global manufacturer of chemical products and listed at the Tokyo Stock Exchange.

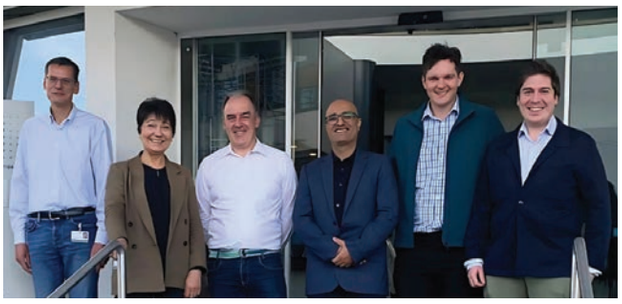
All relevant antitrust authorities had granted the necessary approvals for the transaction, which was announced in October 2024. With completion of this transaction, LANXESS has received gross cash proceeds of approximately €500 million. The enterprise value amounts to €460 million.

LANXESS intends to use the proceeds to redeem its €500 million benchmark bond which matures in May 2025. The leverage ratio (net financial debt / EBITDA pre) will be reduced to ~3x.

"With this sale, we conclude our portfolio transformation and at the same time achieve a substantial further

reduction of net financial debt," said Matthias Zachert, Chairman of the Board of Management of LANXESS AG.

Mining3, LETA partner with hte to advance methane abatement technology



(L-R) Andreas Sundermann, Olga Gerlach, Stefan Altwasser, Adrian Seyfaee, Alex Teakle and Riccardo Conti

Brisbane and Heidelberg, Australia: Mining3 and Low Emission Technology Australia (LETA) have announced a partnership with hte GmbH to accelerate the development of catalytic technology to reduce methane emissions from Australian mine sites. The partnership is part of the CATCH4: Catalytic Oxidation of Methane Program funded by LETA, a not-for-profit investment fund that accelerates the development and large-scale deployment of technology solutions to reduce and remove greenhouse gas emissions from critical industries.

Methane, a greenhouse gas with a global warming potential 28 times greater than carbon dioxide, is a major contributor to climate change. Addressing methane emissions from mining is critical to reducing the industry's environmental footprint. Through this initiative, the CATCH4 Project will explore the potential of catalytic oxidation technology as an effective solution for methane abatement.

Phase 1, (CAT-Op) of the CATCH4 project aims to evaluate promising catalysts through comprehensive testing protocols. This approach aims to provide valuable insights into catalyst performance under various conditions, supporting informed decision-making for future commercialisation efforts. In parallel to testing, Phase one will also assess and suggest a commercialisation roadmap including suitable pilot designs for next phases.

hte GmbH will conduct comprehensive assessments of various catalysts to get insights to their operational envelopes. Leveraging its advanced high throughput experimentation capabilities, hte will map out the conditions under which catalysts will meet the required performance which will inform their current readiness stage for large-scale deployment in Australian coal mines and worldwide. These tests, scheduled for the first half of this year, will provide crucial data to inform the design of pilot programs in subsequent project phases. This partnership is a significant step forward in advancing sustainable mining practices and contributing to Australia's net-zero ambitions.

Aramco, Sinopec & Yasref plan major petrochemical expansion

Executives during the signing of a Venture Framework Agreement (VFA) for planned petrochemical expansion

Dhahran, Saudi Arabia: Aramco, one of the world's leading integrated energy and chemicals companies, China Petroleum & Chemical Corporation (Sinopec), and Yanbu Aramco Sinopec Refining Company (Yasref) have announced the signing of a Venture Framework Agreement (VFA) intended to pave the way for a major petrochemical expansion at Yasref, in Yanbu, on the west coast of Saudi Arabia.

Coinciding with Yasref's 10th anniversary, the agreement seeks to advance engineering studies for the development of a fully-integrated petrochemical complex at Yasref, a joint venture owned by Aramco (62.5 per cent) and Sinopec (37.5 per cent). The project aims to maximize operational synergies and create additional value through introducing a state-of-the-art petrochemical unit, a large-scale mixed feed steam cracker with a 1.8 million tons per year capacity, and a 1.5 million tons per year aromatics complex with associated downstream derivatives integrated into the existing Yasref complex.

Bureau Veritas grants AiP to MARIC for 155,000m³ ultra large ethane carrier

(Right) Alex Gregg-Smith, Senior Vice President, Asia Pacific (APA), Bureau Veritas Marine & Offshore, with Zhu Jianzhang, Vice President of MARIC.

Paris La Défense, France: Bureau Veritas Marine & Offshore (BV) has awarded Approval in Principle (AiP) to the Marine Design and Research Institute of China (MARIC) for its new 155,000m³ Ultra Large Ethane Carrier (ULEC) design.

The vessel, measuring approximately 274 meters in length and 42 meters in breadth, is designed as a single-propeller liquefied ethane carrier powered by a MAN ME-GIE ethane dual-fuel main engine, supporting worldwide ethane transportation. The design is compatible with both Type B cargo tanks and GTT Mark III membrane tanks, offering a lower boil-off rate (BOR), reduced unloading residue, and higher cargo capacity utilization. It is also capable of transporting ethylene, propylene, and LPG.

Optimized for fuel efficiency, the vessel features advanced hull lines, propellers, and rudders, along with energy-saving devices such as propeller cap fins, a pre-swirl duct, and a shaft generator. Additionally, MARIC's Smart Ship Solution is integrated, including a Smart Navigation System (SNS), an Energy Efficiency Management System (EEMS), and a Machinery Health Management System (MHMS), enhancing safety, operational efficiency and sustainability.

JSW Steel Italy SRL to relaunch Piombino steel hub

Piombino (Italy) & Mumbai (India): JSW Steel Italy SRL has signed a Memorandum of Understanding (MoU) with the Ministry of Industry and Made in Italy, the Tuscany Region, the Municipality of Piombino to commence and relaunch the Steelworks site of Piombino. Apart from doubling the current rail making capacity from 300,000 tonnes to 600,000 tonnes per annum, the investments at Piombino are aimed at making the Rail Mill more efficient, most modern, technologically advanced and best in class. The investments of Euro 143 Mn. in modernising the rail mill at Piombino, is expected to make the Piombino Rail mill, most modern, technologically advanced and best in class Rail mill in Europe.

The project envisages setting up of tandem mill, head hardening facility and increase the length of rails from 108 to 120 meters. The MoU sets the conditions for efficient and sustainable state support for the production of rails. It is part of broader project to kickstart economic development of the region which also includes the restarting of the production of steel products to safeguard employment and reduce the import of steel products into Italy. Sajjan Jindal, Chairman of JSW Group said, "The Italian steel industry is undergoing a transformative stage. JSW Steel Italy's investments to modernise the Piombino Steelworks site reiterates our commitment to partner the Italian Government's effort in the growth and economic development of the region. This project will safeguard the aspiration towards the development of Piombino as steel hub and will step up domestic production which will result in reduction of imports of steel products in Italy." ■

GUEST COLUMN

Sustainable Chemicals: The Way Ahead

Dinesh Mandana
Executive Vice President and Business Unit Head - Chemicals
Thermax

As the world paces towards the 2030 climate goal and targets to achieve net-zero emission loom large, one sector finds itself at the intersection of opportunity and obligation – the chemical industry. Long maligned for its environmental footprint it now holds the key to sustainable industrial transformation. In particular, the Indian Chemical Industry, one of the fastest growing globally has a unique opportunity to lead this transition, not only for the sake of planetary health, but also for future-proofing its own economic prosperity

We are standing at an inflection point. The global chemical industry accounts for about 5 per cent of greenhouse gas emissions, according to the World Economic Forum. In India the sector is valued at USD220 billion, contributing nearly 10 per cent of the manufacturing GVA and supporting over 2 million jobs. Yet, for decades the industry has relied heavily on fossil-based feedstocks, energy intensive processes, and linear take make dispose models.

That paradigm is no longer viable. Not for the environment, and increasingly not for the business either. In a carbon constrained world, stakeholders, from regulators to investors to consumers are demanding more. ESG metrics are reshaping investment patterns. Brands that fail to embrace sustainability risk reputational damage and financial loss. The message is clear – the license to operate now hinges on the license to sustain.

Green Chemistry isn't a Choice – It's a Strategic Necessity

Sustainable chemicals are not just an option anymore; they are becoming the backbone of a new industrial

order. These are substances designed, produced, and consumed in ways that reduce or eliminate negative environmental and human health impacts. Think bio-based plastics, recyclable polymers, non-toxic solvents, and low-emission manufacturing processes.

In India, the growth trajectory of green chemicals is unmistakable. Specialty chemicals with sustainable applications are expected to lead the next wave of exports. Demand for alternatives like green solvents and biodegradable surfactants is rapidly increasing, particularly from global markets looking to derisk supply chains from China.

But this transition isn't just about compliance or meeting customer expectations, it's a growth engine. According to PwC India, companies integrating green chemistry and renewable feedstocks are already seeing gains in operational efficiency, cost reduction, and investor confidence.

Innovation from Lab to Market

Sustainability isn't just a goal, it's a massive innovation opportunity. Indian startups and corporates alike are demonstrating that it's possible to merge profitability with purpose.

On the packaging front, innovations such as seaweed-based materials and cellulose alternatives are reshaping packaging norms, aligning with circular economy principles and drastically reducing plastic dependence.

India has an infrastructure industry that is pioneering chemical recycling, hydrogen-powered furnaces, and furnace electrification; technologies that can decarbonize even hard-to-abate segments of chemical manufacturing.

These efforts are not isolated. According to the Fortune India report, India is witnessing a strategic pivot from bulk commodity chemicals to high-value, environmentally benign specialty chemicals, driven by R&D, digitization, and stakeholder activism.

Barriers on the Path to Green

Yet, the path to sustainability is fraught with challenges. High capital costs, technological immaturity, and lack of skilled manpower remain serious roadblocks. According to Invest India, over 40 per cent of chemical Micro Small and Medium Enterprises (MSMEs) struggle to integrate sustainability due to financial constraints and infrastructural gaps.

Scaling cutting-edge solutions like chemical recycling or bio-based synthesis demand more than pilot-scale enthusiasm. It needs long-term investments, robust policy frameworks, and cross-industry collaboration.

And then there's the awareness problem. In India, sustainable products often fail to reach scale not because they lack merit, but because consumers are either unaware or unconvinced of their benefits. Bridging this perception gap requires aggressive, transparent marketing and standardized eco-labeling that communicates value and impact.

Policy & Incentives

One area where India is stepping up is policy innovation. The government's Production-Linked Incentive (PLI) scheme for chemicals, combined with FDI-friendly policies has made the country a magnet for green chemistry investments. The Energy Alternatives India (EAI) Green Chemicals report notes that global investors are looking at India not just as a manufacturing base, but as an innovation hub.

Further, frameworks like the European Union's (EU) Safe and Sustainable by Design initiative are inspiring Indian policymakers to explore similar standards. Industry bodies like the Indian Chemical Council (ICC), with programs such as Responsible Care and Nicer Globe, are promoting Environmental Social and Governance (ESG) adoption, safety protocols, and carbon management across chemical clusters.

Still, what is needed is a bolder push on fiscal incentives, green bonds, carbon credits, Research and Development (R&D) tax breaks that de-risk innovation and accelerate technology adoption. We need a National Mission for Green Chemicals, on the lines of India's hydrogen and solar missions.

The Business Case for Sustainability

It is tempting to see sustainability as an ethical imperative. But it is also just smart business.

Green technologies often pay off in the long run. Energy-efficient plants reduce operating costs. Circular supply chains minimize raw material dependency. And sustainable branding opens premium pricing opportunities, especially in Western markets.

Let us not forget that investors are watching. ESG funds are growing at record pace, and climate-conscious capital is flowing to companies with low-emission roadmaps. PwC estimates that by 2026, over 50 per cent of institutional investors in India will consider ESG factors core to investment decisions.

The chemical industry must therefore stop viewing sustainability as a checkbox and start treating it as a competitive moat.

Call for Collaboration

The chemical industry doesn't operate in a vacuum. Transitioning to sustainable models will require cross-sectoral collaboration, including partnerships with energy providers, logistics companies, agribusinesses, and tech startups.

The Low-Carbon Emitting Technologies (LCET) initiative is a step in the right direction bringing together public and private players to build industrial-scale solutions in biomass valorisation, electrification, and process optimisation.

In India, clusters like industrial plants must be transformed into green hubs with shared infrastructure for effluent treatment, renewable energy, and waste heat recovery. Collaboration must also extend to academia and research institutes to accelerate the commercialisation of lab-stage green chemistry.

Opportunity for India

India's chemical sector is undergoing a metamorphosis. From a legacy of pollution-heavy production, it is now aiming for a future driven by innovation, integrity, and incentives. The market is poised to grow to USD1 trillion by 2040, according to ICC and PwC. If India gets this transition right, it won't just be a beneficiary — it will be a global benchmark.

To succeed, India must prioritize:

- Policy harmonisation between state and central governments
- Incentivising clean technology startups
- Strengthening ESG disclosures and traceability
- Reforming hazardous chemical waste rules
- Skilling the workforce in green manufacturing

For India's chemical industry to thrive in a net-zero future, sustainability must be woven into its very fabric — not tacked on as a compliance measure. This calls for critical thinking, sustainable design, and a bold reimagination of how value is created and delivered.

Yes, the transition will demand investment, innovation, and resolve. But the payoff, a cleaner environment, economic resilience, and a seat at the global sustainability table is too significant to ignore.

India is poised to lead, and sustainable chemicals is one of the ways to push ahead. ■

The Rise of Sustainable Chemicals in the Agrochemical Market

Amit Gupta
CEO & Promoter
Agrifields DMCC, Dubai

Sustainable chemicals, a new generation of agro-inputs, that promise to nourish the soil, protect the environment and empower farmers to grow smarter not harder. This article explores how these innovative and eco-friendly solutions are redefining the agrochemical industry, one farm at a time.

On a crisp winter morning in the heart of Maharashtra, 54-year-old farmer Shankar Pawar walked through his cotton field with a frown. The soil once rich and loamy now felt dry and lifeless. Despite using expensive chemical fertilizers and pesticides his yield had dropped and pests seemed more resilient than ever. He sighed recalling how his father once farmed these same lands using cow dung and neem leaves and yet the crops seemed healthier back then.

It was not just nostalgia. Shankar's story mirrors a growing reality across the globe. The conventional agrochemicals have reached a point of diminishing returns. The quick-fix approach of synthetic chemicals has come at the cost of soil health, biodiversity and long-term sustainability.

Enter sustainable chemicals, a new generation of agro-inputs that promise to nourish the soil, protect the environment and empower farmers like Shankar to grow smarter not harder. This article explores how these innovative and eco-friendly solutions are redefining the agrochemical industry, one farm at a time.

That is where sustainable agrochemicals come into the picture. You might have heard of them being called eco-friendly or bio-based agrochemicals, but basically they are tools like biopesticides, biofertilizers and biostimulants that help farmers grow healthy crops without harming the environment. Unlike the older chemical-heavy stuff that often leave behind toxic residues and mess with ecosystems, these newer solutions are all about balance. They work with nature not against it, boosting productivity while protecting the soil, water and all the creatures that call the farm home. It is a smarter, cleaner way to farm and it is catching on fast.

Di-ammonium Phosphate at loading jetty at China

Global Sustainable Agrochemicals Market (2024, 2030)

According to a market survey, the global sustainable agrochemicals market is projected to expand at a robust Compound Annual Growth Rate (CAGR) of approximately 9.02 per cent during the forecast period from 2024 to 2030. This growth is being fueled by a fundamental shift in global agricultural practices as sustainability and environmental stewardship take center stage. Farmers and agribusinesses are increasingly embracing eco-friendly alternatives in response to heightened awareness about the long-term impact of traditional chemicals on ecosystems and food safety.

Rising consumer demand for sustainably grown food is pushing the agriculture sector to adopt greener inputs including bio-based agrochemicals such as biopesticides and biofertilizers. These alternatives help reduce soil and water contamination, minimize harm to beneficial organisms and support biodiversity, making them an attractive choice for both producers and policymakers.

Additionally, stricter environmental regulations across countries are reinforcing this trend by encouraging the use of sustainable products over conventional ones. Together these forces are accelerating the adoption of bio-based agrochemicals and expanding their market footprint globally.

Key Drivers of Sustainable Chemicals in Agrochemical Industry

The push toward sustainable chemicals in the agrochemical industry is being driven by a range of interconnected factors. Environmental concerns are at the forefront as conventional agrochemicals contribute to soil degradation, water contamination and biodiversity loss. This has prompted stricter regulations worldwide with many governments offering fast-track approvals and incentives for bio-based products like biopesticides and biofertilizers. Additionally, the rise in consumer demand for organic and chemical-free food is influencing agricultural practices encouraging farmers to adopt safer and more sustainable inputs.

Technological advancements are also accelerating this shift. Innovations in biotechnology and nanotechnology have led to more targeted and efficient agrochemical solutions while AI and data-driven tools are helping farmers optimize input use with minimal environmental impact. Sustainable chemicals also enhance soil health by promoting microbial activity and nutrient cycling ensuring long-term productivity. With increased awareness among farmers, support from NGOs and financial institutions and a collective push for climate-resilient farming the momentum behind sustainable agrochemicals is only expected to grow stronger. The prohibition on chemical pesticides and awareness programmes by the government are the prominent factors expected to drive the sustainable agrochemicals market during 2024-2030.

The global agrochemicals market is going through a major shake-up and it is not just business as usual anymore. A mix of big-picture challenges like climate change, stricter regulations and the rise of cutting-edge technologies is changing how the industry operates. Agrochemical companies are stepping up tapping into biotech and AI to create smarter, more sustainable solutions that do more with less.

Di-ammonium Phosphate at warehouse

Think resilient crops that can weather tough conditions and AI tools that help farmers apply the right inputs at the right time with pinpoint accuracy. This new wave of innovation is making agriculture more efficient and eco-friendly, cutting down on waste and environmental impact. For anyone in the agrochemical space staying ahead means more than just keeping up, it is about being ready for what is next. Whether it is leveraging technology, anticipating market shifts or championing sustainability the future belongs to those who lead the change.

Rising Demand for Organic Foods Driving Sustainable Agrochemical Adoption

A notable shift in consumer preferences is reshaping the global food landscape with organic products becoming increasingly mainstream. Millions of consumers are now consciously choosing organic food options prompting food and beverage companies to not only expand their organic product lines but also incorporate sustainable practices across their supply chains to align with this evolving demand.

This surge in organic consumption has naturally fueled interest in bio-based agrochemicals, eco-friendly inputs that support green farming. These sustainable alternatives are gaining momentum as essential tools in meeting the rising demand for clean, responsibly grown produce. As the appetite for organic food continues to grow, bio-based agrochemicals are poised to play a critical role in advancing sustainable agriculture, promoting environmental stewardship and driving innovation within the sector. Their increasing adoption marks a pivotal step towards building a more resilient and eco-conscious food production system.

Tech-Driven Transformation Unlocks Growth Potential

The global sustainable agrochemicals market is poised for significant growth as the agriculture sector embraces cutting-edge technologies to meet environmental and social responsibilities. Precision agriculture is leading this transformation empowering farmers to enhance resource efficiency through tools like GPS-guided tractors, drones and soil sensors. These innovations allow for targeted application of agrochemicals, reducing waste and improving crop productivity.

Meanwhile, advancements in Artificial Intelligence (AI) and Machine Learning (ML) are revolutionizing how agrochemical products are developed. Companies are leveraging AI to analyze large agricultural datasets, fast-track research and development and create tailored, eco-friendly solutions. This not only accelerates product launches but also enhances brand credibility and boosts sales. By harnessing these technologies, players in the sustainable agrochemical space are well-positioned to meet growing agricultural demands, reduce environmental impact and ensure the future of food security. As innovation continues to drive the industry forward new opportunities will emerge, fueling the global momentum toward a greener, smarter agricultural future.

Key Industry Shifts Driving Sustainable Agrochemical Innovation

Recent key developments in the agrochemical industry highlight a transformative shift towards sustainability and innovation. Enhanced collaboration between biotech and agrochemical companies is driving the creation of climate-resilient crops and significantly reducing the reliance on synthetic pesticides. This cross-sector synergy is not only accelerating research

Fertiliser Di-ammonium Phosphate

and development but also improving agricultural efficiency. Regulatory frameworks are also evolving with more streamlined approval processes for biotech-integrated agrochemical solutions, potentially reducing market entry timelines by up to 30 per cent. Most notably, these advancements are contributing to a substantial environmental impact with chemical pesticide use dropping by as much as 40 per cent, reinforcing the global push for more sustainable farming practices.

Challenges

Despite their growing popularity, sustainable chemicals in the agrochemical industry face several challenges. High costs of research, development and production often make these eco-friendly alternatives less accessible especially to small and marginal farmers. Limited awareness, lack of technical training and inconsistent performance under different environmental conditions can further slow adoption. Regulatory complexities and the absence of uniform global standards also add to the barriers making market penetration uneven and slower than expected.

To overcome these challenges, a multi-pronged approach is needed. Increased government support through subsidies, incentives and research grants can make sustainable chemicals more affordable. Awareness campaigns and farmer training programs can improve understanding and proper usage. Developing localized solutions that account for regional agricultural conditions will enhance effectiveness. Additionally, creating harmonized regulatory frameworks and fostering public-private partnerships can accelerate innovation, reduce approval time and scale up the use of sustainable agrochemicals in a practical and impactful way.

As the global agrochemical industry undergoes a seismic shift the rise of sustainable chemicals represents both a challenge and a remarkable opportunity. Farmers like Shankar Pawar, once reliant on synthetic inputs are now standing at the cusp of a new agricultural era, one defined by balance, innovation and resilience. Sustainable agrochemicals backed by powerful technologies and changing consumer demands are no longer fringe solutions, they are fast becoming central to how we grow our food, care for our environment and secure the future of farming.

The path forward will require collaboration among farmers, innovators, policymakers and corporations. Addressing the hurdles of cost, accessibility and regulation with smart policy and inclusive support systems can unlock the full potential of bio-based agrochemicals. As we look ahead it is clear that the future of agriculture lies not in fighting nature but in working with it, sustainably, intelligently and equitably. The shift is underway and those who embrace it now will help cultivate a healthier planet and a more resilient food system for generations to come. ■

"The Giga factory in Bangalore is planned to be set up in two phases"

Ashu Shinghal
Managing Director
Mahanagar Gas Limited

The Government of India is promoting the use of LNG to reduce pollution from its trucking industry which are responsible for one third of transport related CO_2 emissions. CO_2 emissions from trucks are estimated to reach 800 million tons by 2050 with current trajectory, out of which Heavy Duty Trucks will account for over 50 per cent of these emissions. Mahanagar Gas Limited, one of the India's leading natural gas distribution companies, has taken various steps towards India's Net Zero commitment. In an email interview with *Reshmi Menon*, **Ashu Shinghal, Managing Director, Mahanagar Gas Limited,** talks about the various measures undertaken and also reveals expansion and growth plans.

How would you describe the journey of India in pursuance of its transition to green energy?

India is actively striving to achieve net-zero emissions by 2070 and is taking significant strides towards this goal through various initiatives. The government's ambitious target of achieving 500 GW of non-fossil fuel-based energy capacity and 5 MMT of green hydrogen production by 2030 underscores India's commitment to combating climate change. India has made significant progress in its renewable energy journey with more than 200 GW (including large hydro and nuclear) of installed non fossil fuel energy capacity by Nov 2024. Additionally, the country's focus on promoting green mobility through incentive schemes is a crucial step towards a sustainable future. India's journey in energy transition is not only contributing to mitigate the climate change but also generating employment opportunities and boosting the economy. However, with India's growing energy demand, we need a balanced energy mix, incorporating both renewable and conventional energy sources to ensure energy security.

Mahanagar Gas Limited City Gas Station

What according to you are the main challenges in building a sustainable and resilient LNG infrastructure?

The Government of India is promoting the use of LNG to reduce pollution from its trucking industry which are responsible for one third of transport related CO_2 emissions. CO_2 emissions from trucks are estimated to reach 800 million tons by 2050 with current trajectory, out of which Heavy Duty Trucks (HDT) will account for over 50 per cent of these emissions. In this direction, the Oil Ministry plans to encourage the conversion of a third of existing long-haul trucks to LNG from diesel and mandate that a third of new trucks run on LNG according to a draft policy. To achieve this target, the following are key challenges for a sustainable and resilient LNG infrastructure:

- OEM's readiness to produce and sell LNG vehicles at competitive prices to ensure a reasonable Total Cost of Ownership (TCO) for transporters and logistics companies to make the switch from diesel to LNG.
- Lending facility at competitive rates by banks and financing companies
- Inconsistent state-level taxes on LNG fuel which creates pricing disparities and hinders market growth.
- Slow regulatory approvals for LNG fueling stations leading to delayed development of LNG infrastructure.

What are the various measures being taken by MGL towards India's commitment to attain the goal of Net Zero by 2070?

We, at MGL have taken various steps towards India's Net Zero commitment, some of them are as under:

- Roof Top Rainwater Harvesting System at our City Gate Stations to significantly mitigate water scarcity challenges in the region.
- Sustainable water management through the implementation of two Sewage Treatment Plants (STPs) at CGS Savroli and CGS Taloja each having installed capacity of 5 Kilo Liters per Day (KLD). Installation of Sewage Treatment Plant at two additional CGS (Mahape & Ambernath) is also being planned.
- Installed Wind Power turbine of 5KW at CGS Taloja.
- More than 90 per cent employees have been trained in Safety. More than 110 employees are trained w.r.t ESG & BRSR requirements marking a step towards Sustainable practices back home.
- Solar panels have been installed at various location of MGL offices / CNG ROs and City Gate Stations
- 1,000 TPD CBG plant to be installed at Mumbai is in discussion stage with Govt. of Maharashtra
- MGL has planned the installation of Solar Canopy at 2 CNG Stations viz., Vile Bhagad and Usarghar in FY 24-25
- MGL uses 100 per cent CNG/LNG powered CTVs/ LCVs for CNG Transportation.
- MGL has planned to develop Miyawaki forest with the help of Savali Trust for ecosystem restoration that acts as a protection against global warming. It aims at creating an accelerated forest equivalent to a 100-year-old indigenous forest within 10 years.

MGL has also disclosed its Scope 1, 2 & 3 emission for FY 23-24.

Mahanagar Gas Limited CNG station

For thorough analysis of MGLs Emissions and further define the roadmap for Net Zero, MGL will shortly announce its Net Zero road map in line with India's commitment.

MGL had announced a partnership with Baidyanath LNG Pvt Ltd to form Mahanagar LNG Pvt Ltd. How would you describe the growth of this collaboration?

Mahanagar Gas Limited (MGL) and Baidyanath LNG Private Limited (BLNG) have formed a joint venture, Mahanagar LNG Private Limited (MLPL), to leverage their combined expertise in the LNG sector. MLPL's initial goal is to establish 6 LNG stations across Maharashtra and neighboring states. The first station, located in Aurangabad, began operations in October 2024 and expect to commission a few more outlets by the end of this FY.

In the second phase, MLPL aims to expand its network nationwide, focusing on regions with significant manufacturing, mining, and logistics activity to accelerate the adoption of LNG as a cleaner fuel.

Could you throw more light on the recent venture by MGL into cell manufacturing following the tie up with IBC US?


Mahanagar Gas Limited LNG Storage Tank

MGL entered into Share Subscription Agreement (SSA) and Shareholders Agreement (SHA) on 7th November 2024 with International Battery Company, Inc and International Battery Company India Pvt. Ltd to form a joint venture company for establishing a Giga factory in Bangalore, Karnataka for manufacture of prismatic Li-ion battery cells. MGL plans to hold around 40 per cent shareholding in the JV company. The project is planned to be executed in two phases with 500 MWh line in each phase. To start with, the cells produced will primarily cater to the two-wheeler market. The product has been designed and developed with a focus on the specific requirements of the Indian market such as long warranty, fast charging, safety and reliable performance at high temperatures, recyclability, and easy integration into battery packs.

When will the state-of-the-art giga factory at Bangalore be commissioned? Can you share details about the upcoming factory?

The Giga factory is planned to be set up in two phases with 500 MWh line in each phase. Phase I is likely to be commissioned by H1 of FY27 and the second phase by FY28. The Giga factory will be a technology agnostic plant which would be compatible with manufacturing other chemistry cells like LFP, Sodium ion and Solid state in addition to NMC. This Giga factory will be established with a total capex outlay of approx. ₹825 crores.

What are the future plans of MGL, and investments earmarked for the same?

MGL is progressively taking steps to diversify its portfolio into newer forms of energy and molecule while simultaneously strengthening its core business. The company is constantly evaluating opportunities and may plan to invest as and when it finds such opportunities worthy of investment. However, a sizeable chunk of such future investments may go into each of the new businesses that MGL has ventured into where significant opportunities exists for further business expansion across the value chain and MGL has right to win in such areas. ■

Setting a Blueprint for decarbonised European Steel Industry

French company GravitHy, a low-carbon iron producer for the clean steel sector, has announced a €60 million funding round to accelerate the decarbonisation of the steel industry. GravitHy, a sustainable iron company was founded in 2022, at the initiative of InnoEnergy. The company is leading the way to play a critical role to accelerate the decarbonisation of the steel industry with Direct Reduced Iron / Hot-briquetted Iron (DRI/HBI) becoming a very important commodity in the future and traded on a global basis.

With the new funding, Gravithy is well-positioned to propose a faster and Capex-light solution to steelmakers eager to produce green steel while focusing on their core-business without having to invest heavily in the full H2-DRI value chain at their existing sites.

Revolutinising Steel Production

"GravitHy's approach builds on the decoupling from iron and steel that will arise from the decarbonization imperatives. It will no longer be relevant nor feasible for steelmakers to build and operate both iron and steelmaking facilities on the same location. Instead, we will be able to make the best use of the synergies between H2 production and iron-making, and to sell competitive, low-emissions DRI/HBI to the steelmakers," said José Noldin, Chief Executive Officer of GravitHy, in an exclusive email interview with *Mittravinda Ranjan.*

GravitHy's market entry is well-supported by Europe's push for industrial sovereignty and decarbonisation, a strong legislative framework that will be reinforced by the Clean Industrial Deal and Steel & Metals Transition Plan, as well as the increasing shortage of low-carbon metallics. GravitHy's strong shareholder base significantly derisks the project and boosts confidence in the future of green steel in Europe.

"The Clean Industrial Deal and the Steel & Metals Action Plan provide a solid and timely foundation to accelerate the deployment of green iron and steel in Europe," said Noldin. "Although the Steel and Metal Action Plan emphasizes the role of scrap in the automotive sector, recycling cannot be the only solution due to quality and availability issues. This framework must therefore be complemented by a strong demand-side incentive for H2-DRI based steel. A clear certification framework for green steel is essential to establish these lead markets expected to be defined in the Industrial Decarbonisation Accelerator Act (Q4 2025)," he said.

Noldin also welcomed the European Commission's commitment — in the Steel & Metals Action Plan — to extend or adapt the mechanism for compensating indirect carbon costs beyond 2030. "For electro-intensive projects like ours, this is key to providing long-term visibility on competitiveness, without waiting for a revision of the EU ETS or CBAM," he said.

GravitHy plant

Fundraising Round

With the injection of fresh capital, the company is looking forward to finance its action plan, targeting a final investment decision after completing project development in 2026. The new

José Noldin, Chief Executive Officer, GravitHy

funding has brought in new investors including Ecolab, Japan Hydrogen Fund (a fund serviced by Advantage Partners), Marcegaglia, Rio Tinto, Siemens Financial Services, and additional investments from existing shareholders Engie New Ventures and InnoEnergy. For this funding round, GravitHy was accompanied by the advisement of Rothschild & Co, Société Générale and Herbert Smith Freehills. Other shareholders include FORVIA, GROUPE IDEC, Plug Power and Primetals Technologies.

"We are thrilled by the confidence our diverse investors have shown in GravitHy. Collaboration is key to disrupting the steel value chain, and we are proud to welcome these incredible partners who share our vision, values, and development goals. Their support accelerates our flagship project in Fos-sur-Mer, creating jobs, driving technological progress, and setting a blueprint for a resilient, decarbonized, and sovereign European steel industry," remarked Noldin.

A Game-Changing Business Model

The future plant is scheduled to start commercial production in 2029, after an exhaustive commissioning phase and progressive pre-commercial ramp up, creating up to 500 direct jobs with an overall investment of 2.2 billion euros. It will be located on a 75-hectare site in the industrial zone of Fos-sur-Mer (France) and will produce 2 million tons of Direct Reduced Iron (DRI)/Hot Briquetted Iron (HBI) every year – the equivalent of one Eiffel Tower a day.

The electrolyzer producing the green and low carbon hydrogen used to reduce the iron ore will have a capacity of approximately 750 MW - the biggest in France, and one of the largest in the world. To supply the necessary power, GravitHy has made significant progress in securing part of the electricity supply to its future plant, signing a letter of intent (LOI) with EDF for a Nuclear Production Allocation Contract (CAPN) in 2024. The access to the planned extension of the electricity transmission infrastructure by RTE has been officially confirmed in the decennial network development plan, ensuring a secure and reliable execution.

GravitHy is optimistic about ensuring a consistent and reliable supply for the 2 million tons of DRI/HBI production. "We have several shareholders with high level experience of H2 projects (Plug and Engie New Ventures in particular). InnoEnergy has also already supported a dozen projects on the H2 stream. Because there are synergies to be exploited between the ELY part and the DRI part (e.g. PRD water recycling)," informed Noldin.

"By 2026, we aim to have completed the basic engineering FEL 3 stage, ensuring that all engineering and technical aspects are thoroughly validated," he said.

The conventional coke-based ironmaking, the step directly upstream of steelmaking, is responsible for more than 80 per cent of the CO_2 emissions throughout the entire process. As a sector, the production of iron and steel contributes around 8 per cent (Source: World Steel Association) of global carbon emissions and requires new technologies, redesigned processes, and new infrastructure to decarbonize. Therefore, steel produced with low-carbon emissions is an essential component of the net-zero energy transition.

Noldin noted that the upcoming delegated acts on low-carbon hydrogen are expected to provide the clarity needed to move forward. He elaborated that in France, recognizing the specific carbon content of nuclear PPAs will be critical to reflect their low-carbon value and support cost-effective hydrogen production. Furthermore, the Clean Industrial Deal's focus on reducing electricity costs and securing supply — through measures like the Action Plan for Affordable Energy and financial guarantees for PPA offtakers — will be instrumental in helping GravitHy manage its energy needs and infrastructure.

"Overall, these European initiatives provide a clear regulatory framework, long-term policy visibility, and essential support mechanisms that align with GravitHy's goals of transforming the European steel industry for a sustainable and competitive future," said Noldin.

Recruitment & talent retention

Considering the importance of skilled labour in advanced manufacturing and the challenges related to recruitment and talent retention, GravitHy has chosen to adopt a proactive HR policy, based on anticipating skill needs and integrating the local community into the development of this ambitious project from the outset. "Our HR team is already in contact with a large number of local stakeholders (recruitment, inclusion, and training sector actors). This collaboration allows us to build a hybrid strategy, combining the anticipation of skilled labour needs with consideration of the territory's specificities," he opined.

"We attach great importance to creating synergies with the economic and social actors of the territory, in order to promote the professional integration of the inhabitants of Fos-sur-Mer and neighbouring municipalities. Our goal is to ensure that this project generates benefits beyond direct jobs, by stimulating the local ecosystem through services, suppliers, and community initiatives," remarked Noldin.

Noldin adds that they are convinced that by adopting this proactive approach from the early stages of the project, they will be able to build a qualified local workforce and contribute to making this project a real development opportunity for the region.

"GravitHy fosters a culture of innovation and collaboration. We encourage our employees to bring new ideas to the table and support them in implementing innovative solutions that drive our business forward. Diversity / Inclusion, at GravitHy - we gather not less than 12 nationalities; Bold, Trustworthy, Impactful - we adhere to these 3 strong values. They define our spirit and drive our actions. We attract talent with the bold mission that we have set ourselves: decarbonise the steel industry," concluded Noldin.

Investors' Speak

"We are delighted that GravitHy has reached this important milestone in its growth plan, 3 years after InnoEnergy launched the project as part of our European Green Hydrogen Acceleration Center (EGHAC). Bringing in strategic investors from across the green steel value chain will help ensure demand for GravitHy's low-carbon iron is secured from the get-go. This successful funding round is further proof that there is momentum for green industrial projects set to be a key driver of both economic growth and industrial decarbonisation in Europe," said Diego Pavía, Chief Executive Officer, InnoEnergy.

"We are very proud of being a part of GravitHy's investors, to support one of the most important European Green steel projects. The steel industry is the biggest emitter in industry, and AP is committed to reducing emissions in the hard to abate sectors," said Richard Folsom, Co-Founder and Representative Partner, Advantage Partners group.

"As a global leader in water, we know that reducing, reusing and repurposing water can help protect this vital resource, while helping industry deliver sustainable business performance. We are excited to support the development and growth of GravitHy and their innovative approach to decarbonizing the steel industry," said Thierry Troudet, Senior Vice-President & Country Manager, Ecolab.

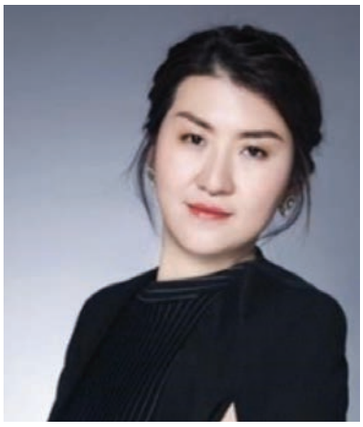
"Marcegaglia has decided to participate in this important deal for two reasons. Firstly, because it is an investment that adds to the wide range of projects we have underway to decarbonise our Group's many activities. Secondly, because it is functional to the developmentof our Fos-sur-Mer plant, which we recently acquired and which we intend to relaunch through a major industrial transformation plan," said Antonio Marcegaglia, Chairman and Chief Executive Officer, Marcegaglia Steel.

"Supporting the industry to accelerate the proliferation of low-carbon iron and steelmaking is core to our decarbonisation strategy. Rio Tinto will be supplying high-grade iron ore to GravitHy and managing the sales of the low-carbon HBI that they produce," said Simon Farry, Head of Steel Decarbonisation, Rio Tinto.

"We are excited to become a strategic investor in GravitHy, helping to further decarbonize the steel industry. We are eager to provide our financial know-how as well as our technological expertise to help reduce the carbon footprint of steelmakers in Europe," said Steffen Grosse, CEO Equity Finance, Siemens Financial Services. ■

(Compiled by Reshmi Menon)

"Our vision is to create a safer, more secure, efficient, and sustainable world"



Lily Tang
Global Head
KBR's Essential Material Technologies

KBR's Chemicals Technology portfolio, known as the Essential Materials portfolio, plays a vital role in key industries ranging from renewable energy and solar power to textiles, medicines, and everyday essentials. To expand its offerings, the company has recently partnered with Sumitomo Chemical to introduce energy-efficient Propylene Oxide by Cumene (POC) technology, which is beneficial for polyurethane production in automotive and infrastructure applications. In an exclusive email interview with *Mittravinda Ranjan,* **Lily Tang, Global Head of KBR's Essential Material Technologies**, speaks about industry trends, KBR's market leadership, and the evolving role of essential materials in building a sustainable future.

What are the most significant trends you see shaping the future of chemical processing technologies?

With changing energy dynamics, regulations, and evolving supply chains, chemical producers are being pushed to rethink how and what they produce, especially in the short term. Today, most chemical companies are focused on addressing cost pressures and capital efficiency. There is a strong push toward optimising both Capital Expenditure (Capex) and Operational Expenditure (Opex), alongside growing demand for flexible, energy-efficient technologies.

Increasingly, companies are looking for integrated solutions that can deliver both economic and operational advantages. For example, phenol-BPA (bisphenol A) integration and phenol co-production options can significantly help reduce capex while improving efficiency – an area KBR is actively addressing through its technology offerings.

In the long run, chemical processing technologies are embracing biosourcing, bioprocessing and sustainability, Artificial Intelligence (AI) and automation transformation, etc. These trends are driving the industry towards being more sustainable, efficient and interconnected. KBR is growing its focus on using renewable feedstocks and developing sustainable process techniques internally and collaboratively with our partners. In addition, we initiated the AI and digital

automation transformation to increase team working efficiency, improving the chemical processes and data-driven decision making.

Given the rapid pace of technological innovation, what are the key emerging complexities facing the chemical processing industry, and how is it adapting?

While innovation remains critical, today's market demands more than just new technologies. There is also growing pressure to deliver solutions that are not only innovative but also capital efficient – with a clear emphasis on affordability, lower capex, and faster time to market.

Furthermore, regulatory compliance, sustainability, data management and security keep challenging the chemical processing industry for innovations. The industry is adapting by embracing efficiency, safety, sustainability, digitalization, and automation while addressing evolving customer demands and regulatory pressures.

What is your overarching vision for KBR's Chemicals Technologies, and how does it align with the evolving needs of the global chemical industry?

Our vision is to create a safer, more secure, efficient, and sustainable world by delivering innovative, high-quality, technology-led solutions. This vision is deeply aligned with the evolving needs of the global chemicals industry, where companies are actively seeking technologies that reduce emissions and improve efficiency.

How is KBR addressing the challenges and opportunities presented by the drive towards a circular economy in the chemical industry? What role does KBR see for itself in the evolution of sustainable chemical production?

KBR's Chemicals business has been rebranded as Essential Materials Technologies, reflecting our commitment to sustainability, innovation, and supporting modern lives. Many of our core technologies across the phenolics and acetyls value chain play a critical role in advancing circular economy principles.

We are actively working with industry leaders and partners to develop solutions that reduce environmental impact, improve resource efficiency, and support closed-loop systems. Beyond our own portfolio, we are also collaborating across KBR's broader business lines to advance green initiatives.

KBR is known for its diverse portfolio of chemical technologies. Could you highlight some of the most impactful innovations KBR has introduced recently, and what problems do they solve?

Over the years, we have introduced several innovations across our portfolio. In phenol, we have significantly improved cleavage and amine neutralization processes, enhancing yield and product quality while reducing energy consumption. In acetyls, our vinyl acetate monomer (VAM) technology continues to stand out for its improved designs and yields.

We have also focused on streamlining integration opportunities across our portfolio — for example, linking phenol and acetone production with BPA – enable capex and opex savings. These innovations are built on decades of engineering experience and continuous R&D.

With the increasing focus on sustainability, how is KBR adapting its chemical processing technologies to minimise environmental impact? Walk us through some of the recent path breaking technologies KBR has introduced?

Our technologies are purpose-built to minimize environmental impact. We have introduced several energy-efficient and low-emission processes that reduce both emissions and waste. In addition to technology development, we are focusing on process integration, which allows for reduced energy consumption and overall sustainability. For example, KBR has allied with Sumitomo Chemical to license propylene oxide by cumene (POC) technology. This environmentally friendly process delivers a minimal carbon footprint, lower wastewater generation, and optimized energy recovery, ensuring high propylene oxide yield and smooth plant operations. We are also working on a study on phenol-POC co-production. It will provide product flexibility for our customers, reduce capex, and reduce carbon footprint.

Could you highlight some of the key innovations particularly within the phenolics and acetyls technology areas? How does KBR tailor these to specific customers?

In the phenolics chain, we have developed a total solution with phenol-BPA integration to drive capex and opex savings. Within the acetyls chain as well, we have introduced unique process enhancements, such as improved methanol and acetic acid integration. Our VAM also offers various packages to suit different customer demands. Our overall approach has always been to tailor solutions to customer needs, helping them achieve performance, cost, and sustainability targets.

Please talk to us about the evolution of this technology and adoption across the industries. (Please share any challenges that the customer/s had to face during implementation and help/hand holding by the KBR experts in the entire process)

KBR has a strong global reference base. Our VAM plant in China is a leading example. We commercialised the largest single train, 300 KTA VAM unit, working closely with our partner CSC and the client Shenghong refining and petrochemical to achieve full capacity plant start up within 40 days. Designed and built by KBR, this plant has set new benchmarks in size and scale. In phenolics, we have the largest market share globally and are proud of our longstanding relationships with major customers and licensors globally who rely on us.

KBR's Acetyls technologies are described as delivering high yields and low operating costs. What are the key technological differentiators that enable this & how have customers responded to the adoption of these technologies? (Please share any challenges that the customer/s had to face during implementation & help/ hand holding by the KBR experts in the entire process)

Our acetic acid (ACETICA®) and vinyl acetate monomer (VAM) technologies have benefited from decades of R&D, robust process, and advanced catalyst, resulting in industry-leading selectivity and performance.

A common challenge for acetic acid producers is the loss of precious metals in homogeneous reaction systems. KBR's Acetica technology minimizes precious metal loss due to its unique catalyst structure and heterogeneous reaction system, enhancing cost-effectiveness.

Regarding the PVC technology that KBR provides, it offers the lowest environmental footprint. Could you elaborate on how KBR has made that possible?

KBR's PVC production technology integrates multiple innovations, including energy-efficient process design, advanced reactor systems and wastewater recycle systems to significantly lower environmental impact. We have also incorporated emission controls and heat recovery systems to reduce emissions.

- Energy efficiency: PVC production technology incorporates energy-efficient processes that reduce overall energy consumption and greenhouse gas emissions.
- Waste reduction: The technology is designed to minimize waste generation during the production process, ensuring that fewer by-products are released into the environment. Collaborating with our partners, the wastewater recycle systems could achieve zero wastewater discharges.
- Global Response: The technology has been well-received globally, with companies recognizing its potential to reduce environmental impact while maintaining high production efficiency.

With the current global economic climate, how is KBR ensuring that its chemical technologies remain competitive?

We work closely with our customers, understand their evolving needs, and continue to improve our technologies. Our solutions are designed to be cost-effective and scalable, ensuring they remain viable even in uncertain market conditions.

What are KBR's strategic priorities for the Essential Materials business in the next 5-10 years?

Our focus will continue to be on expanding our portfolio with advanced technologies that align with the shifting market demands. A key priority is enabling greater value chain integration and advancing circularity across our offerings, helping clients reduce waste and improve sustainability outcomes. We are also strengthening our execution and R&D capabilities to accelerate the development and deployment of advanced solutions. ■

INTERVIEW

"We are Setting the Stage for a Sustainable, high-tech future"

DR. AMITT NENWANI
Managing Director
Shivtek Spechemi Industries Ltd

Shivtek Spechemi Industries Ltd. recently announced a significant investment of ₹650 crores to establish two new state-of-the-art specialty chemical plants in Gujarat and Rajasthan. These facilities will also mark the first-time domestic production of certain high-grade chlorinated compounds, supporting import substitution and export potential. In an email interview with *Reshmi Menon*, **Dr. Amitt Nenwani, Managing Director, Shivtek Spechemi Industries Ltd,** throws more light on the company's new plans and its successful growth journey so far.

How would you describe the growth of Shivtek Spechemi Industries Ltd since its establishment?

Shivtek Spechemi Industries Ltd has made phenomenal growth ever since its formation in 1987, and today is a market leader in the business of petrochemical and specialty chemicals. Shivtek started production with chlorinated compounds and has expanded its production capacity up to 150,000 MTPA in due course. Shivtek was able to diversify its range of products to serve a large number of industries such as plastics, mining, pharmaceuticals, and industrial additives and is facilitated by manufacturing bases in Punjab, Andhra Pradesh, and Gujarat. Shivtek is poised for another growth stage now, with investment planned for new chemical plants in Gujarat and Rajasthan, for the production of caustic soda, chlorine, and derivatives like specialty chlorinated products. The move is aimed at supporting the local industry and minimizing the import dependence of India. Besides its expansion process, Shivtek is planning for sustainability in the long term by including solar and wind power in its production process.

What have been the major challenges that the company faced in its journey?

Like any other company operating in the sector, Shivtek has also encountered a number of challenges along its path. One of the major impediments has been meeting the stringent environmental laws of the specialty petrochemical industry. In this regard, the company has embraced high-end Zero Liquid Discharge technology and instituted green production

processes to reduce its carbon footprint. To address the challenge of maintaining a steady supply of important raw materials like salt, hydrocarbons, and sulphuric acid, the company fortified its supply chain to ensure uninterrupted production.

Operating in overseas markets presented their own range of challenges too, but Shivtek has been able to build a niche of its own to emerge as a Government of India Star Export House with exports to more than 75 countries. Additionally, India's reliance on imports for critical products such as caustic soda and chlorinated polyethylene led to market volatility. Shivtek is meeting this challenge by increasing its local production capacity, assisting in lowering the country's dependence on imports and making supply more reliable.

With net-zero emissions being a top priority, how has the process and R&D at Shivtek Spechemi Industries Ltd evolved?

Shivtek has made conscious investments in research and development to enable its net-zero goals and switch to cleaner production methods. It is pioneering the way of creation of environmentally friendly, low-carbon-footprint green plasticizers that represent a clean alternative to conventional petroleum-based chemicals. Shivtek has also introduced Zero Liquid Discharge (ZLD) processes through Reverse Osmosis (RO) and Multi-Effect Evaporation (MEE) systems to reduce the environmental impact of its manufacturing facilities. Additionally, the firm is adopting principles of green chemistry, lowering the amount of toxic by-products released during production and gradually adopting the utilization of renewable raw materials. Under the domain of fuel additives, Shivtek has launched products such as Shivasol Lubrione, a product made from natural gas, that improves the efficiency of fuel and assists in reducing emissions. These efforts together are in line with the firm's long-term net-zero emission strategy.

How would you describe the company's journey/ presence in the global petrochemical market?

Shivtek has established a strong reputation worldwide with its products now being exported to more than 75 countries in Asia, Europe, Africa, and the USA. Shivtek is also recognized worldwide for its quality specialty chemicals, solvents, and industrial additives, and these are extensively utilized in various industries, including the automobile sector, construction, pharmaceuticals, and coatings. In order to make its global footing even stronger, Shivtek is investing heavily in a new specialty petrochemical plant. The cutting-edge plant will deal with the production of biofuels, specialty solvents, and specialty additives that will allow Shivtek to move into the surging bio-based and performance-directed chemical solutions as well as find a place amongst the world's top petrochemical players.

What are the trends that you foresee in the petrochemical market?

The specialty petrochemical sector is increasingly being defined by sustainable practices. There is a rising focus on green chemistry that is restructuring business practice, as firms switch towards recyclable and renewable resources. As the trend spreads, several firms are also turning to low-carbon technologies in order to lower their impact on the environment. In India, efforts are being strengthened towards specialty petrochemical self-reliance with increased emphasis placed on augmenting domestic production of specialty chemicals to reduce dependence on imports. Shivtek's strategy to grow fits absolutely into the nation's vision by making the firm a forerunner in driving this shift.

Concurrently, demand for specialty chemicals of superior performance is rising, propelled by industries like the pharmaceutical, plastics, and paint sectors. Through the use of automation, artificial intelligence, and real-time monitoring of processes, Shivtek is accelerating operational effectiveness, improving product quality, and setting the stage for a sustainable, high-tech future.

What are the company's future plans – both in the Indian as well as the global market?

Shivtek's five-year strategy is based on the very pillars of growth, sustainability, and worldwide leadership in the specialty chemicals business. Shivtek intends to establish local manufacturing capability in depth with the commissioning of new specialty petrochemical plants in the states of Gujarat and Rajasthan. One of the landmark achievements along the way in this process of growth will be inaugurating a new specialty petrochemical facility with emphasis on biofuels, specialty solvents, and specialty additives that will further entrench Shivtek's presence in domestic as well as global markets. The company aims to enhance its reliance on renewable sources of energy with a rise in the capacity for solar and wind power used in its operations. It also aims to invest in green activities, including the manufacturing of advanced, bio-based chemical materials, which will allow it to meet the demands of growing markets while at the same time pursuing environmental objectives. ■

Capacitors and Supercapacitors (Energy Storage): An overview

Energy storage is the ability to capture energy at one time for use at a later time. Capacitors, Supercapacitors and Batteries are such devices that can capture and store energy for later use, addressing intermittent power and demand issues, especially with renewable energy sources. Storage devices can save energy in many forms (e.g., chemical, kinetic, or thermal) and convert them back to useful forms of energy like electricity.

A capacitor is typically made up of two conductive metal plates (like aluminum, silver, or other metals) separated by an insulating material called a dielectric, which can be made from various materials like ceramic, plastic film, paper, glass, mica, or even air, depending on the type of capacitor; essentially, the key components are the conducting plates and the dielectric material between them.

A capacitor stores energy by creating an electric field between two plates separated by a dielectric material, while a supercapacitor stores energy through a double-layer of ions at the interface between an electrode and an electrolyte, resulting in a significantly higher capacitance and faster charge/discharge capabilities.

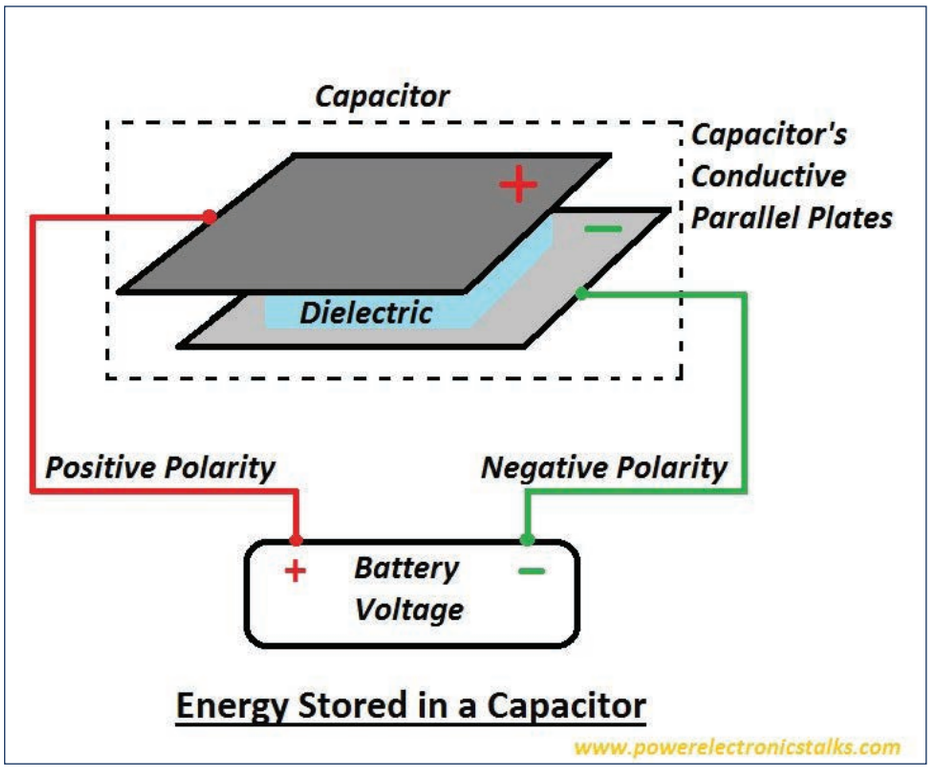
Capacitor comprises the following components:

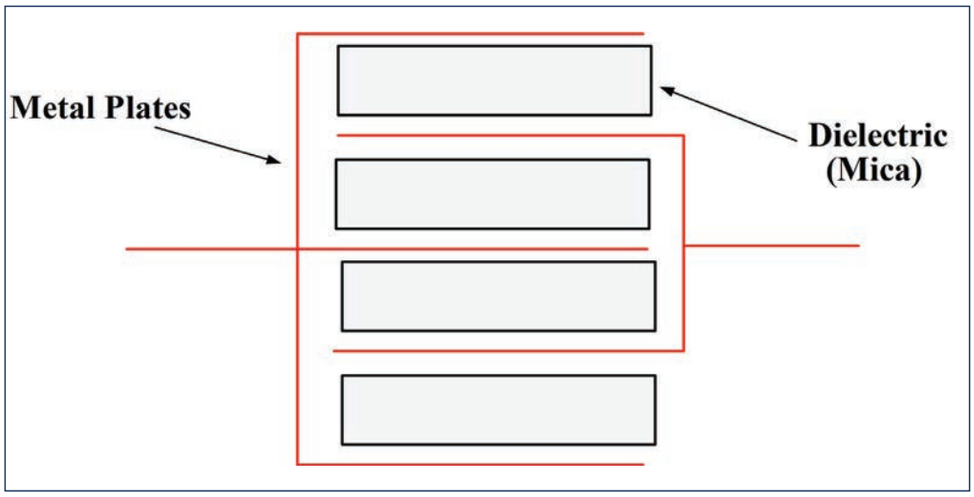
Conducting plates: Usually made from metals like aluminium, tantalum, or silver.

Dielectric material: The insulating material between the plates, which can include ceramic, plastic film (like polypropylene), paper, mica, glass, or air. Commonly employed dielectric materials being - Ceramic like barium titanate.

Electrolytic capacitors: deploy a metal oxide layer (like aluminium oxide or tantalum pentoxide) as the dielectric, often with an electrolyte solution.

Film capacitors: Utilise plastic films like polypropylene or polyester as the dielectric.





MICA-type Capacitor

The energy stored in a capacitor can be expressed in three ways: Ecap=QV2=CV22=Q22CEcap=QV2=CV22=Q22C, where Q is the charge, V is the voltage, and C is the capacitance of the capacitor. The energy is in joules when the charge is in coulombs, voltage is in volts, and capacitance is in farads.

Energy stored in a capacitor is electrical potential energy, and it is thus related to the charge Q and voltage V on the capacitor. Capacitance is determined by the physical characteristics of the capacitor, such as the size and shape of the plates, the distance between the plates, and the type of dielectric material used between the plates.

It may be noted that while applying the equation for electrical potential energy ΔPE = qΔV to a capacitor, ΔPE is the potential energy of a charge q going through a voltage ΔV. Whereas, the capacitor starts with zero voltage and gradually comes up to its full voltage as it is charged.

The first charge placed on a Capacitor, experiences a change in voltage ΔV = 0, since the capacitor has zero voltage when uncharged, while the final charge placed on a Capacitor experiences ΔV = V, since the capacitor now has its full voltage V on it.

Hence, the average voltage on the Capacitor during the charging process is V/2, and so the average voltage experienced by the full charge q is V/2.

Therefore, the energy stored in a Capacitor, Ecap=QV/2, where Q is the charge on a capacitor with a voltage V applied. Charge and voltage are related to the capacitance C of a capacitor by Q = CV, and so the expression for Ecap becomes Ecap=QV/2=CV^2/2, where Q is the charge and V the voltage on a capacitor C. Here, the energy is in joules for a charge in coulombs, voltage in volts, and capacitance in farads.

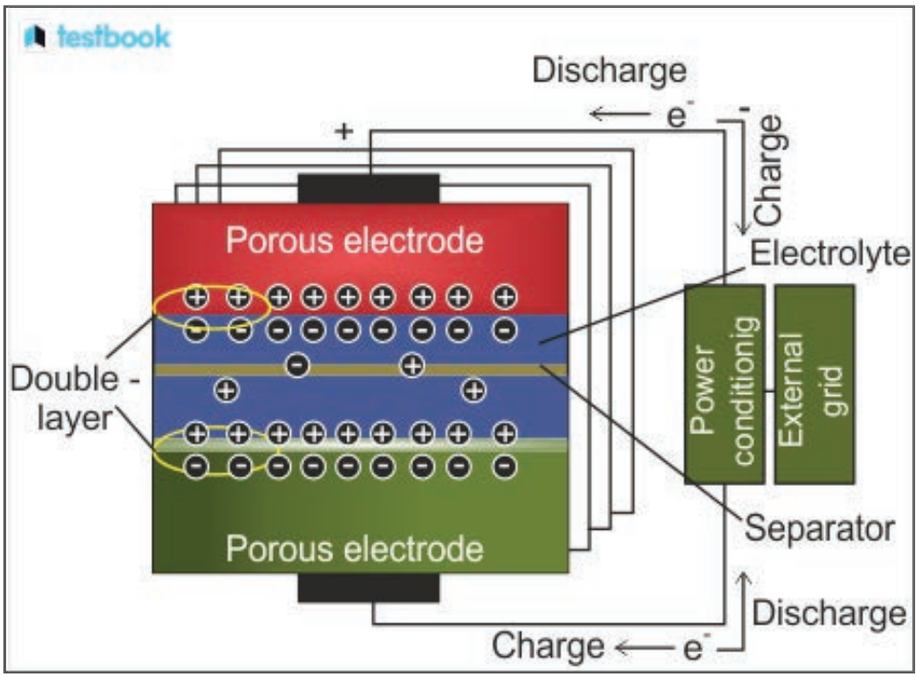
Capacitors come in various types, categorized as fixed or variable, examples of fixed capacitors being; ceramic, electrolytic, film, mica, and paper, whereas variable capacitors are Trimmer-type, Ceramic-type, Tantalum-type, also included are Ultra-capacitors used for tuning capacitance.

Fixed capacitors are constructed to particular capacitances and cannot be altered. Most capacitors employed in an industry fall under this category. They are formed in different shapes and sizes, contingent on the needed capacitance, voltage rating.

There are several types of capacitors developed and available commercially. Conventional dielectric and electrolytic capacitors store charge on parallel conductive plates with a relatively low surface area, and therefore, deliver limited capacitance. However, they can be operated at high voltages.

As an alternative, electrochemical capacitors (ECs), i.e. supercapacitors are the ones that store charge in electric double layers or at surface reduction–oxidation (Faradaic) sites.

In effect, in order to overcome the issue of low power density of the conventional batteries, Supercapacitor devices have gained attention in energy systems due to their high power-density, continuous power is produced by certain renewable energies such



Schematic diagram of working of a supercapacitor

as nuclear energy, biomass energy, hydroelectric energy, and geothermal energy. However, the energy generation of these renewable sources are not aligned with peak electricity consumption. In such scenarios, supercapacitors of various sizes and types are suited for storing energy and discharging it as and when needed, e.g. mobile devices, vehicles, robots, and ramping up power supplies. This is due to their nearly infinite fast charge-discharge life cycle, large capacity and power density, low cost, and ease in development of modular design.

Although supercapacitors have lower energy densities than comparably sized batteries, their power densities significantly exceed those of batteries. Both the entities; supercapacitors and batteries can be integrated to form an energy storage system that maximises the utility of both power and energy, which at present is being pursued in industrial research through demonstration globally.

There are 3 types of supercapacitors, viz. Electric Double-Layer Capacitors (EDLC), hybrid supercapacitors, and pseudo-capacitors.

The formation of EDLC occurs by arranging two parallel conductors as electrodes with dielectric interlayers within and applying a voltage to one side, grounding the other. This setup leads to the accumulation of charges on both sides until they reach an electrostatic equilibrium.

At times, charges accumulate on both sides of the electrodes and be stored through rapid redox reactions on the electrode surface, resulting in a pseudo-capacitive charge storage mechanism. As suggested by the name, hybrid supercapacitors merge the features of double-layer capacitors and pseudo-capacitors. ■

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The Social Cost of Carbon and its impact on Carbon Price

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Understanding the Social Cost of Carbon (SCC) in monetary terms is key to evaluating the economics of decarbonisation polices. This article explains the concept of SCC, its calculation methodologies and its significance in the policy formulation towards decarbonisation by any government. It also highlights how a governing dispensation can change the calculation methodologies to suit their line of thinking on decarbonisation i.e do less in this area if they want to.

Commentariat have gone to town with their views around the total cop out of COP29 at Baku, Azerbaijan. USD300b per year by 2035 was the agreed figure for climate finance goal against an estimated requirement of USD2-2.3 trn per year by 2030 and USD3-3.5 trn per year by 2035. Mechanisms for raising these funds were also not clearly laid out. Operationalization of the Internationally Transferred Mitigation System (ITMOs) to make the cross border trade in carbon credits expedient and thus establish a bumpless cross border climate related flow of finance is still in the lurch.

Baku is only the latest in the failures of COPs'. COP21's promise of the "New Collective Quantified Goals" to go beyond Paris' USD100b/year did not actually go anywhere. The narrative is always stuck at "North is encouraged to help the South". Nothing more really!

Moral of the story – the South needs to help itself!

We need to set our own house in order as far as climate financing is concerned. India is one of the most deeply impacted countries. We were ranked as the 5th most vulnerable country to climate change by the Global Climate Risk Index 2019. Millions of dollars are spent every year in dealing with the impacts of climate change – floods, heat waves, avalanches, landslides etc. and yet, we struggle to put into place a Social Cost of Carbon, which would help shape (and justify) our decisions to pro-activatively fund preventatives schemes against climate change.

So what is the Social Cost of Carbon (SCC)? Beyond our understanding of the social cost of carbon in kind, we need to understand and determine a dollar value for it. There are established mechanisms to establish this figure.

Social Cost of Carbon is an estimate of the cost to society of an incremental ton of CO_2. It is expressed as USD/ton of CO_2. 80-90 per cent of the CO_2 continues to lurk in the atmosphere for centuries. The social cost of carbon is calculated as the net present value of the discounted stream of dollar impacts caused by an additional ton of CO_2 for any period far out into the future.

The SCC helps policy makers justify their climate legislations through a cost-benefit analysis. For example, under its Fit for 55-climate package, EU would ban all cars with IC engines by 2035. The legislation estimates 55 per cent emissions cut in the transport sector. The dollar value of the benefit from multiplying the SCC with the tonnes of CO_2 that is equivalent to the 55 per cent emission cuts, would far outweigh the regrets of stranded assets and job losses. Re-purposing the factories to manufacture EVs and reskilling of worker for re-employment would only add to the benefits. Legislation is thus justified in cost-benefit terms.

William Nordhaus (Nobel Prize, 2018) developed the first meaningful Social Cost of Carbon using a Dynamic Integrated Climate Economy (DICE) model that made an integrated assessment of the cost of climate change to the society. While DICE (and RICE – Regional ICE) are still in extensive use, more versatile models have now been developed.

Two key components of the models for computing the SCC are the Damage Function and the Discount Rate.

Damage function: This captures the economic reality of climate change due to global warming. It defines the relationship between temperature rise and GDP loss. GDP loss could be from the impacts on various sectors - infrastructure, human health and mortality, agricultural productivity (and multi factor productivity), land use, biodiversity etc. Effect of temperature rise on all these sectors are estimated and rolled up as the overall impact on the GDP.

There are significant variations/uncertainties in outcomes from different models. For example, Nordhaus predicts a 1-2 per cent decline in GDP from a 3^{o}C rise in temperature; Burke et al predict ~12-13 per cent decline for the same temperature rise. Multiplier impacts of the "tipping points" (thawing permafrost, melting glaciers, reduction in Earth's albedo etc.) may be modelled differently, or not at all, by various damage functions, which may lead to different outcomes.

Discount Rate: A high future damage prediction would mean the Present Value of damage is high and, therefore, the discount rate used in the model would be low. Applying a higher discount rate would mean that that future damages/impacts are discounted more and so they are shown as smaller in Present Value.

For instance, the Obama administration had kept the discount rate at 3 per cent and had computed the SCC at USD43/tCO_2. The previous Trump administration increased the discount rate to 7-10 per cent. As a result, the SCC came down to a range of USD3-USD5/tCO_2. Further, his team limited the damage function to only consider the American landmass/population, thus effectively decoupling the impact of American emissions on the rest of the world.

The SCC @USD3-5/tCO_2 helped the Trump administration discontinue some of the climate legislations that were promulgated by the Democrats, particularly the legislations regarding coal fired power plants and vehicle emissions.

At present, the Biden administration uses an SCC of USD51/tCO_2. In 2022, EPA (Environmental Protection Agency) suggested an upward revision to USD190/tCO_2 using an average SCC of its own modelling / meta-analysis, Climate Impact Lab model and the Give Model (Greenhouse Gas Impact Valuation Estimate). Averaging does help with reduction of the uncertainties from a single model.

It will be interesting to watch what view Trump 2.0 takes on Social Cost of Carbon. A repeat of the stance that the Trump administration had taken in its 2017-2021 term will make many of Biden administration's policies on CO_2 reduction uneconomic. The world will watch, and indeed hope that science will inform decision making in this regard by Trump 2.0!

Two approaches to fixing the discount Rate: Economists use two approaches to choose a discount rate: the descriptive approach and the normative approach.

In the descriptive approach, discount rates are based on the average interest rate prevalent in the economy over the last 10-30 years. While economically robust, this

approach has morality issues; the future generations who would eventually suffer the damage have no say in it!

Some economists have, therefore, propounded the normative approach or the ethical approach to fixing the discount rates. It takes into consideration intergenerational equity, imposes the burden of morality on the current policy makers, and forces them to consider discount rates they ought to take to save the future generations rather than just an economic number generated by historical analysis. This makes sense because of the "nonlinearity and transience in the damage caused by global warming". As early as in 2006, Nicholas Stern in his famous Stern Review of Climate Change, considered a discount rate of 1.4 per cent.

Impact of Social Cost of Carbon on the carbon price

Carbon pricing is an efficient way of dealing with a negative externality like climate change as it provides a price signal that helps internalize the negative externality and change behaviours while creating a revenue stream that can fund green initiatives.

In theory, the carbon price should be equal to the social cost of carbon – if the society incurs a damage worth USD50 for one ton of additional CO_2 emission, it should also cost USD50 to emit that same ton of CO_2. In practice, however, this is difficult to achieve. Carbon pricing – Carbon Tax or Emissions Trading Scheme (Cap and Trade), today covers only 23-25 per cent of the global emissions.

Hoel and Kverndokk (1996) came up with a model to explain the relationship between SCC and Carbon pricing and recommended considering the dynamic nature of SCC. The authors described the time progression of two curves (Emissions versus Time) as the economy continues to grow:

- "Business as Usual" with no carbon tax. This path has a higher peak (hump) of emissions but considers the end of the fossil fuel era at some finite time when the cost of technology (the backstop technology) to do so become economic.

- The second scenario is with a carbon tax. This has a lower peak emissions' hump but has a long drawn tail of fossil fuel use.

The benefit of the path with carbon tax is better because it does not rely upon "a technology" which would help the world stop the use of fossil fuels completely when such a technology indeed becomes economically feasible to deploy. The probability of such a breakthrough, even if not completely absent, would be very low. Further, up until that happens, the emissions would be spewed unabated as the fossil fuel use grows with a growing economy.

For developing countries like India, the high tax based on SCC would make it difficult to resolve the trilemma of energy security, energy equity and environmental sustainability in ways that do not expose the population at large to higher levels of poverty and misery.

That said, it should never be the case that there is no disincentive at all against emitting CO_2 without a cap for various player in the economy, especially when the Social Cost of Carbon is estimated to be the highest for India .

One estimate has put the Social Cost of Carbon for India at USD86/tCO_2 (Ricke et al., 2018). It is difficult to say if this is the right number unless bodies like Niti Ayog and/or TERI carry out a deep analysis. The sooner we did it, the easier it will be to justify the government policies framed for spending on projects in Carbon Capture and Storage, Green Hydrogen, 2nd/3rd/4th generation biofuels etc. At present, these projects that are so needed for CO_2 abatement, are NPV negative without considering a Social Cost of Carbon. Government funding of research in possible technologies that can prevent climate change and, indeed, generate preventative and control barriers against its impacts will be justifiable if we can factor in a Social Cost of Carbon in the economics of these initiatives. ■

Enhancing Automated Material Handling with Advanced Layer Gripping Technology

The global manufacturing landscape is undergoing a transformative shift, driven by automation and smart technologies. Industries are increasingly adopting robotic solutions to enhance efficiency, precision, and scalability. Automated systems streamline production, reduce dependency on manual labor, and ensure consistency in quality. With the rise of Industry 4.0, manufacturing units are integrating robotics, IoT, and AI-driven technologies to create connected and intelligent workflows.

India, as one of the fastest-growing industrial economies, is witnessing a rapid adoption of automation. The push for smart factories and digital transformation is being fueled by factors such as increasing labor costs, demand for higher productivity, and the need for error-free production. Sectors like automotive, pharmaceuticals, food and beverage, electronics, and logistics are actively investing in robotic automation to stay competitive. Palletizing, depalletizing, material handling, and packaging are among the key processes being automated to improve operational efficiency.

Lightweight layer grippers ZLW

How Automation Transforms Manufacturing

Integrating automation into manufacturing workflows brings multiple advantages. Increased production speed allows companies to meet growing market demands without compromising quality. Reduced labor dependency helps mitigate workforce shortages and minimizes fatigue-related inefficiencies. Enhanced workplace safety ensures that employees are not exposed to hazardous lifting tasks, preventing workplace injuries. Moreover, automation contributes to cost savings by reducing material waste, optimizing energy consumption, and lowering operational expenses. However, automation is not just about robots replacing manual tasks — it is about enhancing

The lightweight layer gripper ZLW from Schmalz is designed to optimize palletizing, depalletizing, and various intra-logistics processes.

collaboration between humans and machines. Human-Robot Collaboration is becoming a critical aspect of modern manufacturing, where lightweight robots and collaborative automation tools assist workers in repetitive and physically demanding tasks. This is where advanced gripping solutions play a crucial role in optimizing material movement across production lines.

Lightweight Layer Gripper ZLW

To fully leverage the benefits of automation, manufacturers require adaptable and efficient material handling tools. The lightweight layer gripper ZLW from Schmalz is designed to optimize palletizing, depalletizing, and various intra-logistics processes with high precision and minimal effort. Its modular and lightweight design makes it ideal for cobots and smaller robotic systems, ensuring seamless integration into automated workflows.

The lightweight layer gripper ZLW from Schmalz is designed to optimize palletizing, depalletizing, and various intra-logistics processes.

This innovative gripper extends beyond palletizing to multiple production and packaging applications. It plays a critical role in logistics and warehousing, where it automates depalletizing and goods movement between different stages of packaging and distribution. In the food and beverage sector, it efficiently handles packaged goods such as cartons, jars, cans, and plastic-wrapped products while ensuring hygienic and damage-free transportation. The pharmaceutical industry benefits from its precision when handling medicine boxes, vials, and sterile packaged goods, meeting strict hygiene and safety standards. Additionally, it enhances consumer goods packaging through pick-and-place applications, transitioning items between production lines and final packaging. For automotive and manufacturing, the gripper facilitates line changeovers, transferring components between workstations, and moving finished products into storage or final packaging.

It is designed to accommodate a variety of handling requirements and is available in different sizes, ensuring suitability for diverse applications. Its lightweight aluminum construction minimizes the load on robots, maximizing efficiency. The gripper handles varying load capacities, making it suitable for both small and medium-sized workpieces while maintaining a secure grip on different materials. Customization options allow for adaptation to specific industry needs. The sealing elements come in two configurations — plug-in suction cups, ideal for uniform and stable surfaces, and sealing foam, which offers a secure grip on irregular or delicate items. An optional floating flange compensates for height variations within a layer, ensuring consistent performance. The vacuum system can be tailored to specific operational requirements, with options for external vacuum connection for high-power applications or an integrated vacuum generator for a compact, self-contained setup. Additionally, an optional rounded safety frame enhances protection in human-robot collaboration environments.

Handling Capabilities and Workpiece Variability

One of the key advantages of this solution is its ability to manage a broad spectrum of workpieces. It efficiently grips cardboard boxes, shrink-wrapped packages, plastic containers, metal cans, glass jars, and irregularly shaped products. The adaptable sealing options ensure a firm hold on both smooth and uneven surfaces, making it suitable for delicate as well as robust materials. This flexibility eliminates the need for frequent tool changes, optimizing workflow and productivity.

How It Works

Equipped with advanced vacuum technology, the gripper secures and transports workpieces with precision. Once mounted onto a robot or gantry system, it positions itself over the target layer. The vacuum system activates, generating negative pressure to ensure a strong grip. If a floating flange is included, it automatically adjusts to height variations for even gripping force. Once secured, the system smoothly transfers the workpieces to the desired location, whether for palletizing, line transitions, packaging, or production movement. The vacuum is then released efficiently, enabling seamless integration into automated workflows.

Optimizing Material Handling Beyond Palletizing

While widely used in palletizing and depalletizing, this gripper offers significant advantages in production line transitions, where it assists in moving products between workstations for line changeovers. It also plays a key role in transferring finished goods to packaging stations, ensuring a smooth workflow through the final stages of manufacturing. Additionally, it simplifies the handling of goods for packaging, speeding up the movement of items into cartons, crates, or wrapping machines. These capabilities make it an indispensable tool for modern automated manufacturing and logistics operations.

Key Advantages

This technology delivers multiple benefits that enhance usability and efficiency. Its lightweight structure reduces payload demands, making it ideal for collaborative robots and smaller automation systems. The modular configuration allows users to customize the gripper based on specific handling tasks, whether through different sealing elements, vacuum sources, or safety features. Energy efficiency is a standout feature, as optimized vacuum generation minimizes power consumption while maintaining superior gripping performance. Additionally, the high compatibility ensures easy integration with various robotic and automated systems, while safety-enhanced operation makes it suitable for HRC applications without compromising workplace safety.

With its flexibility, efficiency, and precision, this lightweight gripper streamlines material handling across production, packaging, and logistics. Its adaptability and customization enhance automation, boosting productivity, safety, and process reliability. ■

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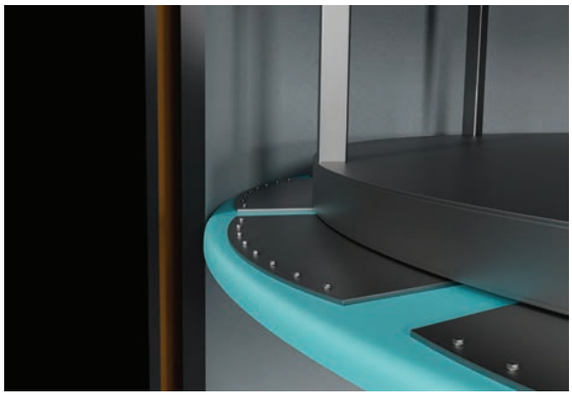
Roto Pumps unveil 'P' Range compact pumps

Roto Pumps Ltd has launched its latest innovation of Roto P-Range compact pumps. The new range is applicable for critical industrial sectors such as oil and gas, mining, wastewater treatment and food processing across global markets. It is engineered to handle an extensive range of media such as shear-sensitive, abrasive, highly viscous and solid laden media. It delivers uniform, metered, and non-pulsating flow. The pumps transfer fluids with characteristics such as Thixotropic and dilatant liquids; Shear-sensitive and shear-stable materials, Abrasive and solid-laden slurries, Aggressive chemicals and Sticky adhesive media, amongst others. ■

Trelleborg launches IRIS – advanced sealing system



Trelleborg Marine and Infrastructure has launched a new advanced sealing system, IRIS, for Airtight Platforms (ATP). The new seal eliminates the need for welded steel landing rings traditionally used in monopiles (MPs) and Transition Pieces (TPs), providing an effective solution to lower Levelized Cost of Energy (LCOE) for offshore wind projects, a crucial metric for developers seeking to maximize their return on investment. Key advantages of the IRIS include significant reductions in costs associated with primary steel, welding, and engineering, alongside lower maintenance, and operational expenses. Its streamlined design also advances ease of installation, saving both time and resources. ■

AvanStrate Inc launches Super Green SaiSei Series

AvanStrate Inc. (ASI), a Vedanta Group company, announced the launch of its Super Green SaiSei® series — an industry-first display glass with at least 50 per cent recycled content that enables 95 per cent carbon emissions reduction. Developed to address rising sustainability demands in the display industry, this product not only supports customers' ESG objectives but also aligns with Vedanta's vision to lead in sustainable technological advancements across high-tech industries. Certified by the Société Générale de Surveillance (SGS), the Super Green SaiSei® series can reduce CO_2 emissions by 95 per cent (according to Taiwan Environmental Protection Administration protocol), helping address the growing need for high-performance display glass with lower environmental impact.

The new product incorporates minimum 50 per cent recycled glass, as compared to an average of 20 per cent; reduces 95 per cent carbon emissions per unit weight; has almost the same property and process requirement compared to currently prevalent material; reduces energy consumption by 20 per cent during manufacturing, while minimizing dependency on virgin materials; created in furnaces that repurpose construction waste, meeting RoHS, WEEE, and other global green product requirements.

Additionally, the SGS certification confirms that the Super Green SaiSei® series meets the definition of recycled content as outlined in ISO 14021:2016. ■

Siegwerk brings in Nitrocellulose-free Toolbox

Siegwerk has launched a new Nitrocellulose-free toolbox for flexible packaging, enabling its customers to create future-proof flexible polyolefin packaging solutions that are not only compliant with the latest recycling criteria but also ensure high packaging performance in lamination and surface applications.

The new offering combines new developments with Siegwerk's proven NC-free ink portfolio and includes solutions for lamination as well as surface applications in gravure and flexo printing. The toolbox is designed to enable customers and brand owners – initially in the EMEA region – to realize recyclable flexible packaging across the full-range of application segments. Although inks based on nitrocellulose offer many advantages such as high resistance, fast drying and excellent adhesion, which has made them a common solution in packaging printing for a long time, they can also significantly hinder the material recycling process. For example, they can cause unpleasant odors and discoloration, leading to a lower mechanical strength of the recyclates and thus to a reduced film quality. The newly introduced toolbox for flexible packaging is bundling its latest generations of NC-free inks, especially for the realization of recyclable polyolefin packaging. The toolbox offers customers the full range of color, white, and overprint varnishes for both lamination and surface applications in gravure and flexo printing. All the solutions are fully compliant with current recycling guidelines and are available as either ready-to-use ink or masterbatch system. ■

Huntsman develops new generation of anti-static wheels

Elastomers experts at Huntsman have been working closely with the team at wheel and castor manufacturer RÄDER-VOGEL to develop a new generation of polyurethane-based, anti-static PEVOTEC® wheels. The wheels – which are available now and utilize Huntsman's TECNOTHANE® hot cast elastomers – have been designed for use in industrial applications where the use of trolleys, carts, pulleys, and automatically guided vehicles (AGVs) is vital to the smooth running of operations.

Using Huntsman's TECNOTHANE® materials, RÄDER-VOGEL has developed a range of PEVOTEC® anti-static wheels, with a variety of options available ranging from 55 to 97 shore A hardness. The materials also give RÄDER-VOGEL the flexibility to tailor make customized solutions for customers to meet specific needs. Initially, RÄDER-VOGEL will be targeting the new range of wheels at four application areas including warehousing and logistics for automated guided vehicles that move thousands of products; space-saving automated car park systems in cities where vehicles are parked using lifts; clean rooms where wheels are used in trolleys and overhead pulleys and mining for lift shafts that must function with no risk of sparks that could ignite coal dust. ■

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