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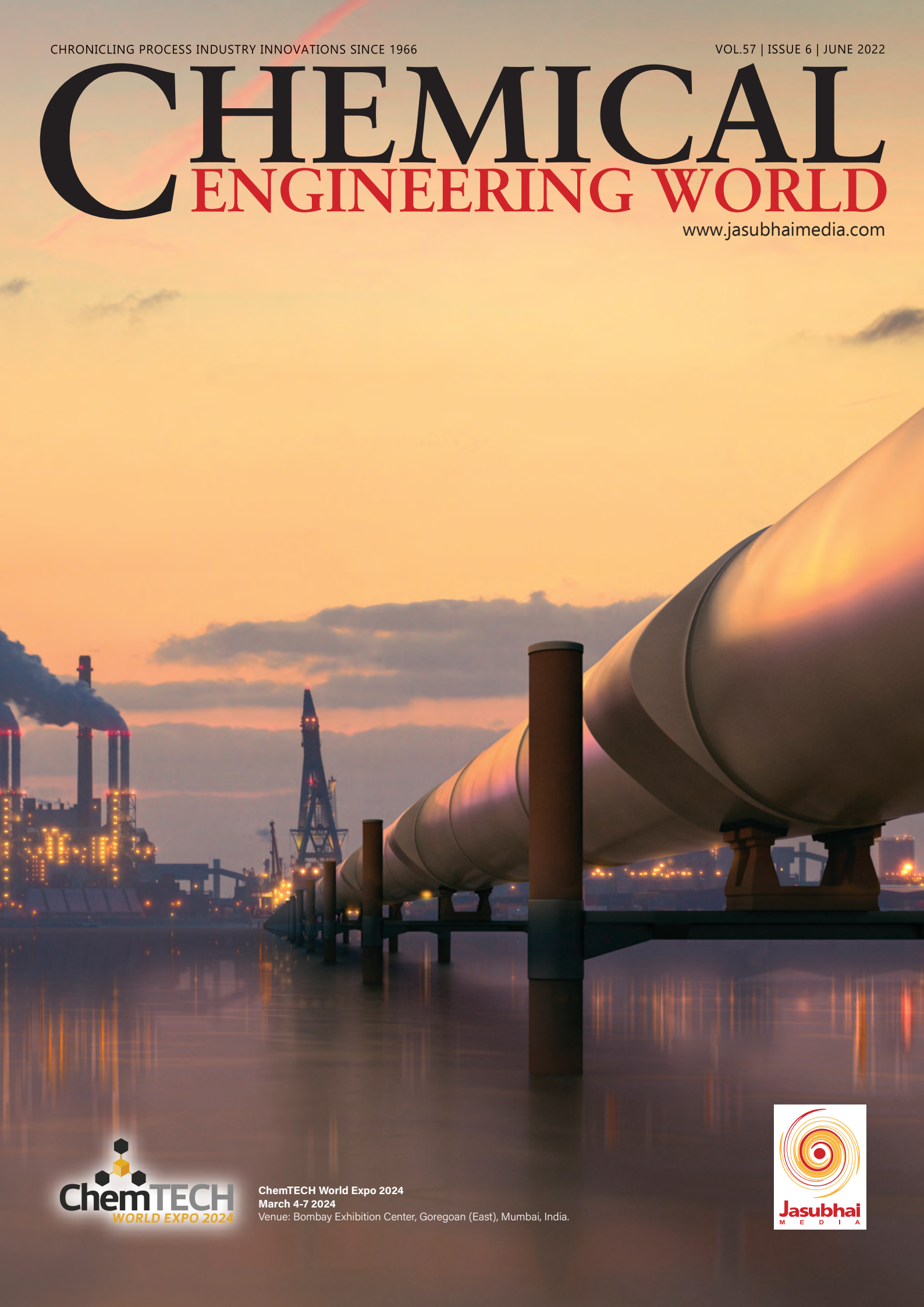

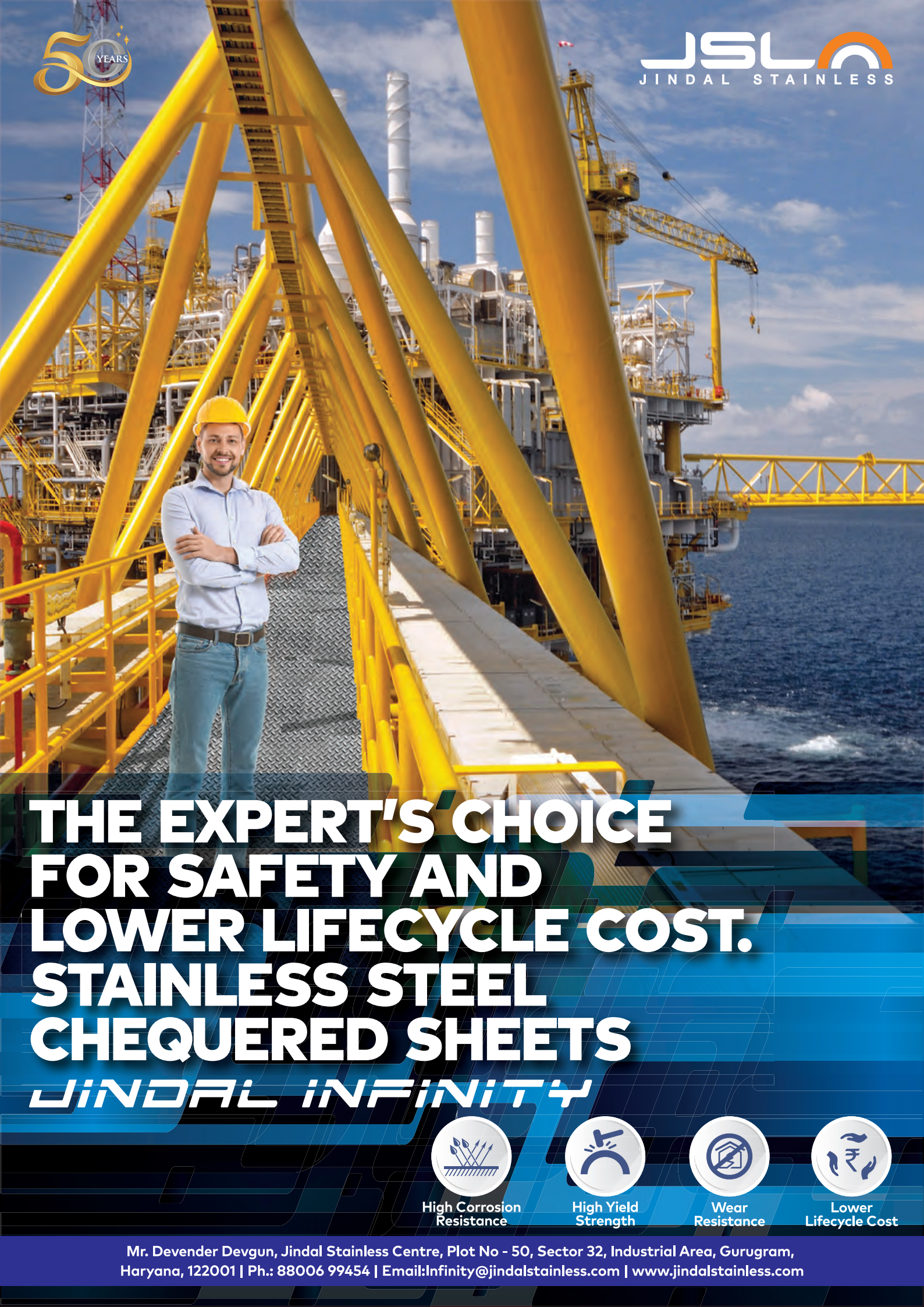
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CHEMICAL ENGINEERING WORLD
RNI REGISTRATION NO. 11403/66

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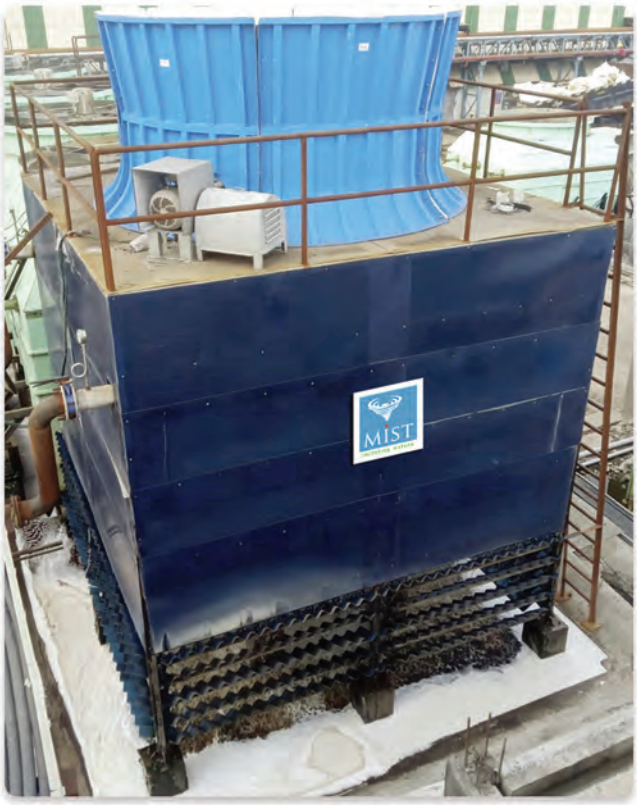

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Cairn Oil & Gas Signs Contract with Baker Hughes to help produce Geothermal Energy

Prachur Sah, Deputy CEO, Cairn Oil & Gas

New Delhi, India: Cairn Oil & Gas, India's largest private oil and gas exploration and production company, has signed a contract with Baker Hughes, an energy technology company, to harness geothermal energy from its repurposed oil and gas wells. On successful execution, the contract will help Cairn Oil & Gas co-produce up to 2.4 MW of electricity along with oil and gas and offset 17,000 tons of greenhouse gas per annum. This contract follows Cairn Oil & Gas's recently announced ESG roadmap where it committed to becoming a net-zero company by 2050.

Speaking on the development, Prachur Sah, Deputy CEO, Cairn Oil & Gas, said "At Cairn, we are firmly committed to fulfilling India's domestic energy demand while also encouraging sustainability in practices. Our association with Baker Hughes brings the best of technology to contribute to India's green energy basket. Across the world, there is a drive to promote geothermal energy production from dying oil fields and at Cairn, we are committed to bringing the best of global practices to India and aid our country's journey towards energy aatmanirbharta."

Neeraj Sethi, Country Director- India & Bangladesh, Baker Hughes said "With Baker Hughes' and Cairn Vedanta's strong relationship, we are excited to work with Cairn on their journey towards net-zero by 2050. We will jointly conduct a feasibility study for re-purposing existing oil and gas wells drilled in high-temperature formations to generate geothermal energy. As India looks for cleaner and more sustainable energy sources, we are confident that Baker Hughes' technology can play a significant role in supporting Cairn Oil & Gas to drive a more sustainable energy future."

Honeywell Introduces Hfo-Based Refrigerant for the Automotive Service Sector

Pune, India: Honeywell announced a new hydrofluoroolefin (HFO)-based refrigerant for the European automotive aftermarket that has the potential to reduce the greenhouse gas (GHG) emissions footprint of air conditioning systems in existing vehicles by more than 50%. Solstice® 456A provides an easy-to-use, economical, drop-in service solution for vehicles manufactured before 2017. It has similar performance to R-134A, helping to meet the needs of vehicle owners and auto repair shops amid ongoing climate-related legislation from the EU.

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Scope for ChemTECH World Expo 2024

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- Metals & Metallurgy
- Bioprocessing Equipment
- Construction Services Providers
- Plant Maintenance Services Providers
- Logistics & Supply Chain Solutions Providers
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- Industry Automation (Process & Factory)
- Systems Integration & ERP Solutions Providers
- Water & Waste Water Treatment Consultants
- Environment Solutions Providers
- Waste Management Consultants
- Financial Institutions
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FACTS & FIGURES - CHEMTECH WORLD EXPO 2022

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- Adhesives & Sealants
- Agrochemicals & Crop Protection
- Bulk Drugs & Intermediates
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- Cosmetics & Personal Care Ingredients
- Hygiene & Cleaning Chemicals
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- Contract Manufacturers

Scope for Biopharma World Expo 2024

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"With more than 200 million cars on the roads in Europe still using R-134A, there is a need in the market for a sustainable and economical product to support auto repair shops servicing these vehicles," said Rick Winick, vice president and general manager, Honeywell Automotive Refrigerants. "Solstice 456A is an ASHRAE A1-classified, nonflammable, easy-to-use refrigerant that can easily be adopted to work with existing AC service machines and tools." Solstice 456A will be commercially available to the European automotive aftermarket later this year. Honeywell has invested a billion dollars in research, development and new capacity for its Solstice technology, having anticipated the need for lower-GWP solutions to combat climate change more than a decade ago.

BASF expands Automotive Coatings Application Center in Mangalore, India

Mangalore, India: BASF has expanded its Automotive Coatings Application Center in Mangalore, India. As an integral part of BASF's existing research and development (R&D) facilities for automotive coatings solutions, the automotive coatings application center covers over 400 square meters of floor area and is equipped with state-of-the-art equipment, such as high precision climate-controlled spray booth and electrostatic rotary bell applicators, and advanced quick connection system for electrostatic applications. The facility is meticulously designed to enable customer-oriented R&D activities coupled by accurate simulation of OEM paint shops.

"The expansion of the application center is an important addition to serve the Indian market with high-quality coatings solutions. It symbolizes our strong commitment to supporting the automotive industry's long-term growth in India," said Narayan Krishnamohan, Managing Director, BASF India Ltd. and Head, BASF Group Companies in India.

JBCPL Announces the Change of its Identity to JB

Nikhil Chopra, CEO & Whole-time Director, JB

Mumbai, India: JB Chemicals & Pharmaceuticals Limited, the fastest growing pharmaceuticals company in India, has emerged in a new avatar as JB, retaining its core value of being 'Good people for good health'. In sync with the evolving healthcare industry, and the changing need of customers, JB has re-visioned the cause of spreading good health in India. JB aims to support healthcare providers and enrich patients' lives in innovative new ways while remaining committed to its core values of integrity, trust and reliability built over 45 years.

Announcing the change of identity to JB – Good People for Good Health, Nikhil Chopra, CEO & Whole-time Director, JB, said, "In 45

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years, we, at JB, have built a strong foundation of integrity, trust and reliability. Now we are taking the next leap forward towards becoming more agile, lean and simple. Our offerings and capabilities are becoming more diverse to cater to the evolving needs of our customers, our manufacturing processes are becoming more robust, and lean, our vision of looking at healthcare industry is becoming more progressive, globally. We are adapting ourselves to become more responsive to the needs of the healthcare world."

GE Steam Power signs $165 million contract for three nuclear steam turbines with BHEL

New Delhi, India: GE Steam Power has signed a $165m contract with BHEL for the supply of three nuclear steam turbines out of six units for NPCIL's domestic nuclear program phase 1 being developed at Gorakhpur, Haryana (units - 1 to 4 (GHAVP)) and Kaiga (Kaiga-5&6) Karnataka, India. This domestic program includes 12 units of 700 MWe being developed by NPCIL with their own nuclear reactor technology i.e., Pressurized Heavy Water Reactors (PHWR). In total, it will represent 8.4GW of CO2 free electricity for the country, enough to power more than 14 million homes. In 2018, GE and BHEL had signed a business cooperation agreement and a License and Technology Transfer Agreement to enable them to manufacture nuclear steam turbines of 700 MW. Thanks to this partnership, the two companies are well positioned to respond to the country needs for lower carbon source of energy. Supporting the Aatmanirbhar Bharat initiative launched by the government of India, GE will manufacture the nuclear steam turbines at its facility in Sanand, Gujarat.

These turbines are being engineered and manufactured with an improved design for enhanced output that will meet the requirements of the customer. Frédéric Wiscart, Nuclear New Build Leader for GE Steam Power, said "Nuclear energy is a critical and one of the most dependable sources of carbon-free power providing round-the-clock energy supply without interruption. At GE Steam Power, we are proud to partner with BHEL and to continue to support NPCIL and India in its path to reliable and lower carbon energy future. With our facility in Sanand, we have local manufacturing capability to deliver on the nuclear aspirations of India domestic programme." Today, GE's steam turbine technology operates in 50% of the world's nuclear power plants, producing 200 gigawatts (GWs) for the global grid.

Robust Technology & Financing Required to Achieve Net Zero Target by 2070

New Delhi, India: General Electric (GE) and EY have launched their whitepaper titled 'Decarbonization of India's energy sector: Policy roadmap to achieve clean energy targets'. Aligned with India's target of achieving a net-zero carbon economy by 2070, the whitepaper charts illustrative paths towards phasing down carbon and suggests a

strategic combination of renewables, gas, and storage for a most effective energy transition. Unveiling the whitepaper, Mahesh Palashikar, President, GE South Asia, said: "We decided to develop this whitepaper in collaboration with EY to help the Indian Energy sector chart the path towards 2030 goals. We recommend a combination of policies, technology innovations, and finance solutions to help the sector achieve our carbon reduction goals." Rajnish Gupta, Associate Partner, EY India, said: "India has witnessed significant progress in the renewables energy sector with a four-fold increase in renewable energy capacity in less than eight years. The whitepaper suggests solutions and ideas toward realizing India's vision for 2030 and 2070 including diversifying energy sources, enhancing storage, and attracting robust financing. India is at a critical phase of its energy transition journey, and we hope these proposed solutions can positively add to building a path that is profitable and efficient."

According to the Centre for Energy Finance (CEEW-CEF), India may require an investment of over USD 10 trillion to achieve its net-zero target by 2070. The GE-EY whitepaper highlights that India would continue to rely on coal power, at least in the near future. The country, thus, needs to focus on and incentivize cleaner coal technology to further reduce carbon emissions. The GE-EY whitepaper shares comprehensive insights on realizing India's green energy potential and provides recommendations on possible policy initiatives essential for a future driven by sustainable industries. It makes four key strategic recommendations.

VDMA: Robotics and Automation with High Order Intake but Disrupted Supply Chains

Munich, Germany: The robotics and automation industry in Germany is benefiting from a boom in demand: in the first four months of 2022, order intake increased by 38 percent year-on-year. The dynamic market development had already been noticeable with the results for 2021, in which industry turnover rose by 13 percent - more than expected. "The robotics and automation industry is booming," says Frank Konrad, Chairman of the VDMA Robotics + Automation Association. "However, suppliers will not be able to process the orders as quickly as usual. The challenge now is to manage bottlenecks in the supply chains." With a predicted growth of 6 percent, the industry forecast for robotics and automation is also positive for 2022 - but remains below previous expectations, reflecting the severely disrupted supply chains. In particular, a shortage of electrical and electronic components is extending delivery times.

Comparison of the three subsectors of robotics and automation- The three subsectors developed differently in 2021. Machine vision gained, 16 percent: industry sales reached 3.1 billion euros. Robotics sales rose by 13 percent to 3.5 billion euros. Integrated assembly solutions recorded an 11 percent increase in sales to 7.1 billion euros. Overall, sales in robotics and automation rose by 13 percent to 13.6 billion euros - more

than originally expected. VDMA Robotics + Automation forecasts a 7 percent increase in sales for integrated assembly solutions to 7.6 billion euros in 2022. In robotics, growth of 5 percent to 3.6 billion euros is expected.

LG Chem to Produce and Run NCC Plant on Hydrogen

Seoul, South Korea: 50,000 ton-capacity hydrogen plant in Daesan, 75 km southwest of Seoul expected to reduce carbon emissions by 140,000 tons annually - Construction to begin in first half of next year and completed by the second quarter of 2024 - New plant to play a key role in the company's circular supply chain by capturing and reusing carbon dioxide generated as off-gas - Aims to establish a circular supply chain that captures and repurposes carbon dioxide generated from hydrogen production SEOUL, June 20, 2022 – LG Chem announced its plan to produce hydrogen as a key component of its long-term 2050 Net Zero corporate sustainability goal. Aligned with this goal, South Korea's largest chemical company said it would establish a plant in Daesan, Korea, with the capacity to produce 50,000 tons of hydrogen annually by the second quarter in 2024. This plant will be the first LG Chem site to produce pure hydrogen, apart from those earned as offgases. "The establishment of our hydrogen plant and CO2 circulation system is an effort to create a sustainable future for our petrochemical business by achieving carbon neutrality," said Noh Kug-lae, head of Petrochemical Business at LG Chem. "Hydrogen will allow us to convert our petrochemical pyrolysis to a more sustainable low-carbon process."

The new plant employs technology which converts methane to hydrogen by creating a chemical reaction under high-temperature steam. Hydrogen will be made from methane off-gases generated by the naphtha cracking center (NCC) in the process of producing feedstocks. These hydrogen will then be depolymerized under high-temperature to be used as fuel again. Construction of LG Chem's hydrogen plant is expected to commence in the first half of 2023 and scheduled for completion by the second quarter of 2024. Once fully operational, LG Chem expects the plant to reduce carbon emissions by 140,000 tons annually – equivalent to 1 million newly-planted trees – by replacing methane used in the NCC process with high-purity hydrogen, which does not create carbon dioxide (CO2) during combustion.

Emerson Announces Net Zero Targets, Issues 2021 ESG Report

ST. Louis US: Emerson, a global leader in technology and software solutions, has announced its sustainability strategy to achieve net zero greenhouse gas (GHG) Scope 1, Scope 2 and Scope 3 emissions by 2045. The company detailed its goal to reach net zero and its environmental, social and governance progress in its 2021 ESG report.

"We help enable the low-carbon transition of some of the largest companies and most critical industries around the world," said Lal Karsanbhai, Emerson's president and chief executive officer. "Our net zero goal is a vital step forward as we evolve our business and contribute to a more sustainable world."

Emerson has aligned its sustainability approach to the Net-Zero Standard set by the Science Based Target initiative (SBTi), the leading organisation driving science-based target adoption. By 2030, Emerson plans to reach net zero across its own operations for Scope 1 and Scope 2 emissions and drive a 25% reduction in its Scope 3 value chain emissions compared to a 2021 baseline. These 2030 near-term targets have been approved by SBTi as consistent with the 1.5°C trajectory required to meet the goals of the Paris agreement. Emerson has also committed to validate its long-term 2045 net zero target, in line with the SBTi's Net-Zero Standard. "In addition to the depth of our own sustainability roadmap, Emerson's products, software and services help enable our customers, suppliers and partners to achieve their sustainability objectives," said Mike Train, Emerson's senior vice president and chief sustainability officer. "In the face of climate change, we believe driving at-scale adoption of energy transition solutions can make a net zero future a reality."

Topsoe to Build World's Largest Electrolyzer Production Facility to Accelerate Power-To-X Capacity

Ursula von der Leyen and Roeland Baan at North Sea Summit

Lyngby, Denmark: Topsoe, the global leader in decarbonization technologies, announces its intention to construct world's largest and most advanced industrial scale electrolyzer production plant. Topsoe's ambition is to

rapidly accelerate the adoption of green solutions in particular within Power-to-X. In this field, the company has the leading technology to decarbonize hard-to-abate sectors such as transport, chemicals, steel, and cement.

The new electrolyzer production plant, which will be constructed in Herning, Denmark, will be operational by 2024 and have an annual capacity of 500 MW with scalability up to 5 GW, making it one of the first industrial scale plants of its kind. Construction is scheduled to begin in the second half of this year, subject to Board and other regulatory approvals. Roeland Baan, CEO at Topsoe, says:"We are willing and able to support society's green ambitions and the need to accelerate the energy transition, and we have the technology to do it. With our new electrolyzer production plant, we lead the way in speeding up commercial-size Power-to-X solutions, and we do it with our highly innovative technology that outmatches technologies currently in the market."

Yokogawa to Launch Cloud-based OpreX Asset Health Insights Service -Increase Efficiency and Reduce Downtime for Asset-intensive Operations

Tokyo, Japan: Yokogawa Electric Corporation announces that it will release the OpreXTM Asset Health Insights. A new addition to the OpreX Asset Management and Integrity family, Asset Health Insights is a cloud-based plant asset monitoring service that collects, refines, and aggregates operational technology (OT) data from distributed assets. The service offers a real-time connection with assets from anywhere in the world, giving organizations a 360-degree view of operational assets that eases the task of asset management and increases both operational and business efficiency. Asset Health Insights is supported by an out-of-the-box framework for data enablement that will improve the health and extend the lifecycle of any asset by monitoring its performance in real-time, making it possible to predict and proactively respond to events before they can happen. The service allows customers to easily model and manage data based on the plant hierarchy defined in the ISA-95 standard. Asset Health Insights is powered by Yokogawa Cloud1 and is equipped with artificial intelligence (AI)- machine learning (ML) analytics capability.

Development Background As the adoption of Industry 4.0 technologies continues to gain pace, companies are changing the way they do asset management by introducing cloud-based technologies that can monitor assets from anywhere in the world and optimize their performance in real-time. Driven by customers' focus on integrated, remote, and increasingly autonomous operations, the company developed Asset Health Insights to make data more visible, integrated, and actionable.

Alok Sharma MP officially opens Tower Cold Chain's global HQ

Thames Valley, UK: The global headquarters of pharmaceutical thermal protection specialist Tower Cold Chain has been officially opened by The Rt Hon Alok Sharma, Member

of Parliament for Reading West. Tower Cold Chain manufactures robust, reliable and reusable supply chain containers, which are used worldwide to transport temperature-sensitive pharmaceutical, life-science and biotech products. A fast-growing business, Tower recently won the Queens Award for International Trade.

The official opening was also attended by members of the Tower board. Chairman Just Arne Storvik said: "The Theale facility offers world-leading technology to support the needs of pharmaceutical companies, airlines and logistics providers. We're proud to see the facility officially opened and honoured to have such an esteemed dignitary as Alok Sharma here to cut the ribbon.

AspenTech Completes Emerson Transaction, Expanding High-Performance Global Industrial Software Leadership

Bedford, UK: Aspen Technology, Inc. a global leader in industrial software, announced the completion of its transaction with Emerson Electric Co, including the addition of Emerson's OSI Inc. and Geological Simulation Software (GSS) businesses to AspenTech.

As part of the close of the transaction, Emerson has contributed $6.0 billion in cash to AspenTech, which will be received by AspenTech shareholders, in exchange for a 55% stake in AspenTech. In addition, Emerson and AspenTech have entered into an enhanced commercial partnership that will enable AspenTech to penetrate new and existing markets. The Company now employs more than 3,700 people located in 62 offices across 41 countries.

Toyo-Morton Presents New Bio-based, High-solids Laminating Adhesives

Tokyo, Japan: Toyo-Morton Ltd, Japan's leading manufacturer of laminating adhesives and a member of the Toyo Ink Group, has developed the ECOAD™ EA-B3860/EA-B1290, a high-solids solvent-based adhesive for use in the dry lamination of multilayered films in flexible packaging structures. Containing over 40% coating solids by weight, the new formulations contain less solvent and thus brings down overall CO2 emissions during lamination by roughly 25% when compared to the company's general-purpose laminating adhesives. The high-solids design also leads to less waste recovery and disposal for greater operational efficiencies and a cleaner work environment. Moreover, the new ECOAD systems were formulated with bio-based or renewable content of 10% by weight at the dried adhesive layer, making them a more eco-friendly alternative in packaging materials. ■

Methanol as a Viable Alternative Fuel from Cradle to the Grave

Timothy Chan
Assistant Director of Government & Public Affairs Asia & Middle East, Methanol Institute

What led to the inception of the Methanol Institute, your presence across the globe, and how long have you been operating in India?

The Methanol Institute was founded in 1989 in Washington, DC to lobby the US Congress to acknowledge methanol as an alternative fuel in road transport. For the past 30 years, we have added numerous new members, initially starting with the methanol producers, then methanol distributors and recently we are witnessing more interest from the end-users of methanol, especially when the end-users are companies developing energy applications like methanol internal combustion engines, methanol fuel cells, methanol cook stores, boilers, etc. We started our journey in India in 2016, with the launch of the Methanol Economy Program and inking a strategic collaboration with NITI Aayog. We continue to work on deepening our engagement and interactions with the Indian market and the different stakeholders to spearhead the methanol industry.

How is this entire usage of Methanol evolving across the globe? Which countries are really driving this initiative, and how do you compare this with other countries in India?

Initially, methanol was first adopted as an energy product or alternative fuel, with the policy interest to address energy security issues or import displacement. In the 1980s when the US was blending methanol with gasoline, it was probably during an era where we saw high oil prices. China also

followed the same approach as it started with fewer retailers. They realized if they blended a certain amount of methanol and gasoline, they could significantly reduce their cost and reap profits when they sell it to the market.

China has limited access to oil and gas, so they produce methanol from coal. Oil and gas were taxed as energy products, but methanol was only taxed as a regular consumer good. The tax differential resulted in a vast pricing difference between methanol and gasoline landing costs. That pricing differential changed the economics of utilizing methanol as a fuel in the road or marine transport. Other countries, such as Italy, have introduced methanol in gasoline and ethanol blends and India can draw parallels with it. Italy has projects on A20 blend with 15% methanol, and 5% ethanol with gasoline engines that can support the industry to reduce the burden on ethanol supply and make the fuel more cost-effective.

Methanol predominately produced from natural gas delivers emission reductions and significantly reduces SOx, NOx, and particulate matter. Increasingly as the countries are progressing to net-zero targets, methanol is produced from renewable feedstocks including biomass, municipal solid waste, and captured carbon dioxide. The climate benefits are compounded when methanol is used as a fuel to lower the carbon intensity of applications such as road mobility, power generation, cookstoves, and fuel cells. Europe has been at the forefront of driving the energy transition to e-fuels with a strong focus on establishing policy mechanisms for faster adoption of methanol. The region is witnessing the most promising growth in the future.

India is also progressing on the path of utilizing methanol since the launch of the methanol economy program in 2016. India has set standards for M15 (15% methanol with 85% gasoline) for gasoline engines. Recently, the Indian Oil Corporation rolled out M15 pilot project in Tinsukia district of Assam. In 2018, NITI Aayog along with Assam government and Assam Petrochemicals Ltd. rolled out methanol cookstoves to 300 households. The Indian Army has a history of utilizing methanol fuel cells for backup power generation in remote regions.

We are talking about a cradle to the grave kind of perspective when you analyze the greenhouse gas intensity of methanol produced from such pathways.

In the chemical/ petrochemical subsectors relevant to methanol and its derived products, improvements in energy efficiency, electrification, and replacing fossil energy input with renewable energy can greatly reduce the carbon intensity of their processes. However, the chemicals and materials produced need to be progressively defossilised through the use of renewable feedstocks that would allow related CO2 emissions to decrease over time to eventually reach net-zero emissions target. By following this greening path, methanol and all the chemicals

and materials derived from it (including formaldehyde, DME, MTBE, acetic acid, plastic, solvents) would gradually be able to reduce their greenhouse gas intensity. Compared to conventional fuels, renewable methanol can cut carbon dioxide emissions by up to 95% on a carbon lifecycle assessment (LCA) basis, reduce nitrogen oxide emissions by up to 80%, and eliminate sulfur oxide and particulate matter emissions.

What's your stance on India being a major chemical producer?

Methanol is strategic to India's efforts to be more self-sustaining as methanol can be produced with indigenous resources allowing the country to ensure energy security while growing a new domestic industry that will create more opportunities within the country. It will also further accelerate India's energy transition as methanol can be utilized as a low-carbon alternative fuel or feedstock for green chemicals when produced sustainably. The goal to have 50% of India's energy requirement be met with renewable energy sources will create significant opportunities for the Indian economy to gear up for new energy value chains and create significant economic benefits for the nation in its pursuit of a low-carbon economy. India has diverse sustainable feedstocks – such as captured carbon dioxide, municipal solid waste (MSW), and agricultural residue for the production of renewable methanol. Renewable methanol would be a viable product for industries such as steel, cement, and power utilities that can reduce their carbon footprint by producing renewable methanol from carbon dioxide flue gas emissions captured at their facilities. Hard to abate industries including chemicals and shipping have touted renewable methanol as a promising solution for reducing carbon footprint.

So in the Indian context, how much time do you feel that it would take to deal with agriculture waste, be it municipal solid waste, or whether it is the infrastructure or the kind of investments that are required for carbon capture?

It will be premature to talk about the time frame as a holistic approach is required to bring diverse stakeholders across the complete value chain to progress and advance the methanol industry.

For instance, if we look at agricultural residue the farmers, transport, and logistics companies need to work in tandem to amass and then bring it to a central location for production. For municipal solid waste, which holds a lot of potential some form of new processes can get employed to manage and process waste better. The waste can be efficiently processed and recycled to create new economic value in the form of chemicals and fuels such as methanol. This "waste", when converted into renewable methanol, would support investments in technology innovation, tackling pollution, and building a circular economy. Methanol produced from biomass feedstocks holds great potential to meet India's growing energy demand and supports commercial activities that

can further develop rural economies. Since renewable products have a green premium, they might be able to fetch a higher price because these are produced from sustainable production pathways.

An announcement by NTPC to set up a pilot plant in Vindhyachal to process CO2 from their power plants and produce green methanol reflects that market players and actors acknowledge that there will be economic value in green methanol. This is a testament to a positive start that can be amplified to different sectors of the economy and enhance greater participation across the value chain. The driving factor for the success of these projects would still be creating commercial value. Furthermore, stakeholders must be made aware of what value they can bring and accrue by being an active participant in this transition.

What are the major concerns you think need to be addressed?

The government can devise policies that will create an enabling ecosystem for alternative fuels that will attract investments in methanol. Incentives to promote the development of the methanol value chain is a significant step that would strengthen the country's energy security and offer India a viable and practical alternative fuel that can be produced with indigenous resources. With targeted policy interventions, the scale-up of methanol production and its wider adoption as a fuel and chemical can reduce the cost and accrue economies of scale to both methanol producers and users.

Additionally, India can work on stimulating demand for methanol applications to incentive future producers of methanol to set up production facilities in India. It is imperative to bolster the country's efforts to expand its portfolio of sustainable energy and alternative fuels by creating a level playing field for all alternative fuels that can play a pivotal role in the country's energy transition.

How is the industry reacting to it? Especially in the private sector?

From our experience, we are quite positive and encouraged by different members of the Indian private sector. Several companies are engaging in their R&D to look at the use of methanol in applications from road mobility, fuel cells for power generation to heat production in industrial boilers etc. Currently, we see active participation and interest from private stakeholders to lead and take initiatives for the growth of the methanol industry. With such a positive response, Methanol Institute launched the India Methanol Economy Coalition (IMEC) last year to unify Indian companies that have an interest in developing India's Methanol Economy, with the goal of providing them with a single, clear, and strong voice in India. It serves as a platform for policy advocacy, knowledge exchange, research and development along with consumer sensitization, and demand creation for the methanol industry. ■

Putting the 'U' in CCUS

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Carbon capture, utilization and storage (CCUS) has been a topic of interest for nearly two decades and has gained prominence with the advent of the race to net-zero. While CCS technologies are quite mature, few advancements have been made in CCU. It can be argued that CCU has been in practice when CO_2 is used for enhanced oil or gas recovery. But such a form of CCU is not always practical, for example when the CO_2 emission source is far away from a potential sink or when a storage basin or sink is very limited as is the case in India. In such a situation, a viable CCU alternative is to convert CO2 into useful products like methanol or mineralization like sodium bicarbonate, calcium carbonate and magnesium carbonate. Technology development for such conversion routes is quite advanced and ready for large-scale deployment although with limited installed references in operation. Nevertheless, these are promising routes for a country like India, where CO_2 emissions are largely in the interior sections.

Methanol Route

The CO_2 to methanol route is straightforward and quite similar to the conventional steam methane reforming syngas to methanol route as the type of catalyst and operating pressure and synthesis temperature conditions are alike. Subtle differences do exist with respect to pretreatment of the CO_2 to remove impurities, heat of reaction, compression of CO_2 and hydrogen and the types of machinery, but these can be addressed in a detailed feasibility study. All process technology licensors for syngas to methanol have the technology for CO_2 to methanol as well. The essential role of CO_2 as an intermediate in the catalytic process of methanol production was established in the 1990s. At about the same time, initial works on the synthesis of methanol from CO_2 and hydrogen were developed by technology licensors and catalyst manufacturers that have established the feasibility of such a process. Although conclusive, these initial works have attracted only recent interest. However, the CO_2 addition to the synthesis gas produced by steam reforming has been in practice to adjust the synthesis gas quality in some plants, with CO_2 being imported from a nearby ammonia plant or captured from the reformer flue gas. One of the advantages of the CO_2/H_2 based synthesis is a reduced level of byproducts compared to the traditional syngas route. Even if the modern catalysts are highly selective towards methanol, a small amount of higher alcohols, oxygenates and hydrocarbon are produced. Their production is favored by high temperature and a high CO to H_2 ratio and thus higher in syngas-based synthesis. Even though CO_2 conversion is slower compared to CO - based synthesis under similar conditions, it can be considered as a viable option. Despite the numerous academic works on alternative catalyst formulations, the Cu/ZnO supported on Al_2O_3 catalyst used for syngas-based synthesis so far remains the catalyst of choice for the CO_2 to methanol synthesis.

Hydrogen used for the CO_2 to methanol synthesis can be green H_2, blue H_2 or grey H_2. Using green H_2 entails a higher initial investment for the generation of renewable power and water electrolysis. A phased investment first would involve using blue H_2 or grey H_2 for the synthesis and then switching to green H_2 after a few years when the initial investment is paid out. Proximity to existing hydrogen generators and reliable supplies are key to profitability.

CCU is not practical if the CO_2 emission source is far away from a potential sink. A viable alternative is to convert CO_2 into useful products like methanol or mineralization e.g. $NaHCO_3$, $CaCO_3$ or MgCO3. Technology development for such conversion routes is quite advanced and ready for large-scale deployment although with limited installed references in operation.

Mineralization

Mineralization of CO_2 to produce sodium bicarbonate, calcium carbonate and magnesium carbonate is another promising route.

Production of sodium carbonate/ bicarbonate using CO_2 from another mineral source like calcium carbonate has been a proven process for more than a century but is quite energy intensive. An economically viable and emerging alternative is capturing CO_2 from existing plants, purifying and then reacting with sodium carbonate slurry. Sodium bicarbonate demand is continuously growing thanks to the food and pharmaceutical industries.

Other mineral feedstocks that can be used for reacting with CO_2 are concrete waste, cement plant bypass or other similar materials that are generally rich in calcium silicate and calcium oxide. This route produces aggregates that are very useful for building construction. Several mineralization technologies exist, some of which have installed industrial scale references and some at pilot or demonstration scale references.

Each technology is dependent on the type of feedstock in that some are more reactive to CO_2 and may not need additional ingredients while the less reactive ones may need more ingredients. Therefore, all technologies require a test phase with appropriate samples to evaluate the most reactive ones. The promising feedstocks are those that have stable quality and adequate quantity at an affordable cost.

As important as the technology and feedstock, so is the source location in proximity to the CCU facility and the end user's market. In a well negotiated contract, the mineral feedstock should be made available cost free to the CCU facility as the feedstock supplier would bear the disposal cost. In India, solid wastes rich in calcium silicate/oxide are available from concrete waste, cement and steel plants. So the mineralization route also can be quite promising for CO_2 utilization.

Overcoming Limitations

Although the CCS is technologically mature, it has certain inherent limitations for implementation, including the need for pipeline infrastructure, the collection of emissions from various locations, a geologically proven storage for 25 to 30 years, project and operations risk management and more.

Likewise, CCU also has drawbacks!

The availability of mineral feedstocks, hydrogen and the need for a concentrated CO_2 stream of at least 90 percent is readily available from most chemical, petrochemical and gas processing facilities that contain CO_2 from a non-combustion source. The flue gas stream from post combustion, typically from power plants and other combustion sources, contains a low 4 to 6 percent concentration of CO_2, which requires a high capital cost and an energy intensive process to separate the CO_2 and bring it to a level suitable for use. Hence as a first step for a demonstration scale facility, CO_2 from non-combustion sources can be captured for the methanol or mineralization process.

Although the CCS is technologically mature, it has certain inherent limitations for implementation, including the need for pipeline infrastructure, the collection of emissions from various locations, a geologically proven storage for 25 to 30 years, project and operations risk management and more.

Nevertheless, utilization of CO_2 to produce chemicals is technically and economically feasible and more importantly a viable route when storage options are limited or do not exist. This is particularly applicable for India with its vast resources and ample opportunities. Hydrogen and mineral feedstock sourcing strategy, plant location and a commercial supply framework are three main factors that will drive the project economics. A market survey to evaluate supply and demand and sound master planning are fundamental prerequisites for a successful CCU venture. The use of CO2 to produce methanol and carbonates eventually will be a beneficial model for a circular carbon economy . ■

The Dynamic and Ever-Changing R&D Sector Booming with New Trends

Richard Lobo
Head – Innovation & CQH (Business Excellence)
Tata Chemicals

How is Tata chemicals building innovation in its recent developments, and what are some breakthroughs being aimed at in the upcoming five years?

Innovation at Tata Chemicals is centred around ensuring that we are, Responsive to our customers and stakeholders with science-differentiated, sustainable technologies and solutions based on Green Chemistry, Resilient in a challenging environment through innovation-led operational excellence rigors, and Responsible for a better world, by focusing on sustainability, circularity, and positive impact to our communities.

Our expert team of 220+ scientists are continually undertaking research programs and collaborating with world-class institutions and academia to develop next-generation technologies and products for delivering value to customers, and long-term sustainable value for the company. On the other hand, our 5,000+ employees globally are focused on delivering operational excellence and quality leadership, ensuring we progress steadfastly towards world-class manufacturing in all areas.

Could you shed some light on the latest research initiatives at Tata Chemicals and how they are being driven in the organization?

We have a number of products that are born out of our R&D centre over the years; some of the recent ones include: Highly dispersible Silica through green-patented technology, which improves tyre performance and reduces consumption of fuel, Nano ZnO as anti-microbial and antiviral ingredient for use in PPEs in the fight against Covid-19, besides cosmetics and other industrial applications, Development of synbiotics (pre and probiotics) for improving immunity; enzyme encapsulation technology with better thermo-stability to enhance food shelf life, FOS/Prebiotic as natural sweetener in sugar-free Chyawanprash to improve immunity during the pandemic, Medikarb – India's first branded pharmaceutical-grade sodium bicarbonate, Development of natural extracts technology for harvesting bioactives from medicinal plants, for food and pharma industries, Water-soluble fertilizers: Aquafert Foliar – Vegetables and Aquafert Fertigation – Grapes.

What are some key areas and impact of R&D in India?

R&D, in many ways, is rooted in building on the momentum of centuries of applying emotion and intellect to solve challenges faced by humankind. The differentiation rests in a sharp nimbleness of speed to market, bringing together collaboration of resources like never before and innovating for the right outcomes. India is blessed with the most brilliant minds and talent in the world, born out of institutions of eminence that sharpen not just skills, but also acumen. While R&D outcomes in space and nuclear energy are evident, there is significant effort in multi-disciplinary sciences delivering distinct differentiation. We might not be comparable with the international chemicals R&D spend, however, in terms of focus on next-generation chemistries and Green Chemistry areas, I find Indian scientists and researchers to be at the forefront.

What are your thoughts on developing affordable products and reducing the time from bench to commercialization?

There has been a paradigm shift in the way companies look at commercialization. From businesses treating commercialization as a series of separate steps or an inherently creative task not to be tightly managed, today's companies view the process as a highly disciplined system, which governs the quality of manufacturing, setting of goals for ongoing improvement, and the development of organizational skills to understand and navigate through the market.

The business environment today is constantly and rapidly changing, demanding new approaches and outlooks in the ways companies function. Going by this trend, there is need to evolve technologies and make them market-ready at a similar pace. Hence, the ability to commercialize technology and move a product from concept to market quickly and efficiently makes all the difference. Commercializing innovation is key to economic success. As more and more, better products get produced and introduced in the market, guided by the cycle of demand and supply, this ecosystem further encourages more innovation, which will in the long run result in bringing about affordability of those products and eventually commercialization.

What are some challenges in bringing new research into the market flow? Can these challenges be addressed through government initiatives, and how conducive is the Indian market vis-a-vis other international markets in the region?

The market is dynamic and ever-changing, influenced by new trends and needs of customers. Research helps to keep up with these changes, to understand the competition, to observe customer demand and habits, to develop suitable products for them, and thus serve the market better. However, this comes with its own set of challenges that need to be addressed in real time.

One of the biggest challenges is to see that new research keeps pace with the changing and prevailing market scenario, following which are the market-related issues such as keeping products relevant, sustainable and affordable in the market, which efficient R&D must try to achieve. Also, research itself is never static, constantly evolving and basing itself on what the current needs are. This requires regular investment and support.

Meanwhile, what is seen as a challenge, is also a strength that India can perfect. Often compared with neighbouring China in the realm of manufacturing, India's strides in research can be built upon for the country to rise as a power in its own right in the region. Besides focusing on manufacturing, India may also look at strengthening its research potential. Compared to its neighbours, India boasts of a massive knowledge base, thanks to a large number of scientists, researchers and engineers. These statistics allow India to leverage this huge potential for cost-effective R&D, and to emerge as a major knowledge capital not only in the region, but the world. ■

The Era of Alternative Fuels led by Green Hydrogen

Ashwini Kumar
a green hydrogen expert

The unfolding of events in Europe over the past few months has put energy on the centerstage of all political discussions around the world. Nations are coming to terms with the fact that excessive dependence on imports for satisfying their domestic energy requirements is not suited for any country's future economic and national security. The looming threat of energy exporting nations ceasing to trade with energy deficit countries is no longer a 'remote possibility' in the current globalized environment but can be visibly seen in Europe affecting half a billion people. The ideals of freedom and liberty are being tested in Europe and other Asian nations where citizens are being requested by their governments to judiciously use energy. In a move termed as 'Russian Gas Weapon' where halting supplies of energy by Russia to European nations is seen as weaponizing energy reserves in Russia. Independence then in its true form can no longer depend on the political and geographical considerations alone, and the focus of the governments must shift to achieving energy independence which can lead a nation to becoming truly independent.

The Indian economy is the fastest growing large economy in the world dependent majorly on imported oil and gas. This is not a convenient situation even with our diversified energy supply chains. We need to create and develop an ecosystem which can be supported by domestically generated energy and build indigenous manufacturing capabilities and technological prowess. The Government of India has recently begun a policy shift to focus on fuels other than the traditional oil & gas and bring a range of alternate fuels into the mainstream.

The evolution and acceptance of alternate fuels in India is a result of the rising prices of imported energy and the falling costs of renewables and other alternate fuels. Among the wide base of alternate fuels, ethanol has the biggest advantages for the Indian economy, benefitting not only the energy and transportation sectors but also increasing the incomes of Indian farmers while reducing pollution. According to a report by the Niti Aayog, twenty percent ethanol blending in petrol is possible and within reach for the nation by 2025. Immense benefits can accrue to India by the gradual rollout of E20 ethanol, saving over Rs. 30,000 crores of foreign exchange, energy security, lower carbon emissions, better air-quality, self-reliance, use of damaged food grains, increased farmer incomes, employment generation, and greater investment opportunities for the country, said the report.

The other champion alternate fuel suitable for India is methanol, a low carbon, hydrogen carrier, produced from high ash coal, agricultural residue, etc. and touted as an important means to reaching India's commitments to the COP 21. Methanol can replace both petrol and diesel with some modifications to the existing infrastructure in the transport sector. It can also be consumed in other areas where diesel and petrol are currently being used, like DG sets, boilers, farm machinery, etc. India has explored methanol-based cooking fuel programme which has been implemented in states like Uttar Pradesh, Maharashtra, Gujarat, Telangana, Andhra Pradesh, Goa, Karnataka, Jharkhand, and Manipur, reaching over 1,00,000 households.

Green Hydrogen is the ultimate alternate fuel for a country like ours which is endowed with enormous renewable power potential. Hydrogen can be produced using renewable sources like solar, wind, geo-thermal, tidal, etc. through a process called electrolysis where water is split into its components, oxygen and hydrogen, and this hydrogen can be transported across any distance either in its gaseous or liquid forms, or as a compound with other elements, ammonia or methanol.

As an energy vector, Green Hydrogen, i.e. hydrogen produced using renewable energy, is completely carbon neutral and the process does not release any carbon dioxide into the environment, except during the production of the components involved in hydrogen generation and distribution. India has one of the largest potentials to produce cheap renewable energy and by using it to generate hydrogen, India can become one of the world leaders in exporting hydrogen. Countries such as Germany, South Korea, Japan, etc. where the renewable energy generation capacity is not sufficient to satisfy their domestic needs will require to import clean energy for meeting their requirements.

Green Hydrogen is also key to India's domestic energy supplies and its most substantial use would be in the hard to decarbonize sectors like steel, fertilizers, hydrogenation, aviation, shipping, long distance trucks and buses, chemical feedstock and much more. The Prime Minister of India proclaimed from the ramparts of the Red Fort to make India a global hub for Green Hydrogen and further said that green hydrogen would give India a quantum jump in its efforts to counter climate change.

India's current challenge is also the enormous generation of agri-waste which can be used advantageously by us for the generation of biogas, including by using municipal, sewage, and food waste. Waste-to-energy conversions have been determined to be a renewable form of energy, and they can be efficiently used in transportation. Biogas processes and infrastructure has been under development in India since the past two decades, however, its wide-spread adoption recently is a result of vigorous government policies to make villages self sufficient in respect of their energy needs.

The developments surrounding alternate fuels is a boon for the environment and reducing emissions overall for India. Our goal to achieve net-zero by 2070 cannot be contemplated without the use of alternate fuels. India's energy consumption is increasing exponentially, and its demand can only be met with the use and adoption of alternate fuels. ■

Digital Transformation and Sustainability is Focus of ARC Industry Forum Asia

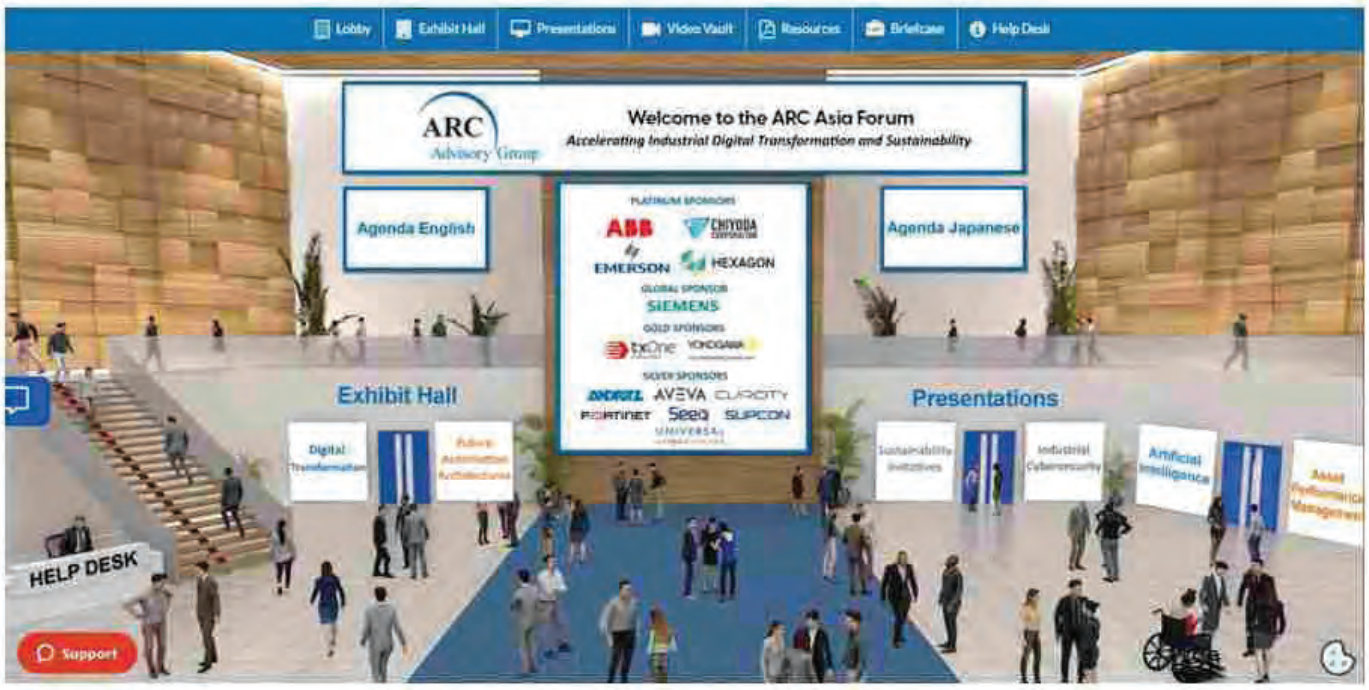
The world as we knew it has changed and new business models have emerged. As we return to a new normal, industrial innovation is accelerating. A renewed focus on sustainability, the circular economy, and climate change is sparking innovation and powering transformational and technological change across industries. Executive speakers from several industries will share their experiences in digital transformation, future automation architectures, sustainability initiatives, industrial cybersecurity, artificial intelligence, and asset performance management.

The virtual format features more global executive speakers and end user participation than ever before. Instead of hosting separate Forums across Asia it is more practical to host a combined virtual Asia Forum and pool our resources to structure an agenda that is informative and reflects the volatile business environment.

Sharada Prahladrao
Editor and PR Manager, ARC India

ARC's Global Forums

ARC's recent virtual Forums in the USA and Europe focused on industrial digital transformation and sustainability, and this will be the recurring theme at the Asia Forum too. It is clear that companies that have adopted digital technologies



are seeing business improvements and surging ahead. The last two years have taught us that digital technologies are critically important for companies to function effectively with reduced staff during a crisis.

Pandemic Lessons

We would like to believe that the worst phase of the pandemic is over and that what we are experiencing now are the dregs. Still, there are pockets of infection and fear lurks. The new normal created by the pandemic impacted companies and propelled them to respond faster and become more agile and operationally resilient. It is now imperative to leverage technologies for remote operations, collaborate across geographies, and improve project outcomes. The competitive distance between those capable of leveraging digital technology and their less digitally evolved peers has dramatically increased. The pandemic forced organizations to restructure work processes (remote operations, social spacing and so on), and fueled concerns about plant operations, maintenance, and fulfilling market demands. During these tough times, operational resilience has become all-important. ■

Mega Energy Storage System

Vinay Bajaj
Business Consultant & Advisor
Energy Storage, Electric Mobility & Clean Energy

Energy Storage enables electricity to be saved for a later use, when and where it is needed the most. This creates possibilities for its use in the electric grid as well as electric vehicles, apart from modern age devices, appliances, and instruments. Many of the applications have the ability to reduce greenhouse gas (GHG) emissions, the need for which has never been felt stronger than ever before.

Lithium – ion Batteries

Our modern world thrives on the most commercialized form of Energy Storage viz. Lithium-ion Batteries. Since the time in 1991, when Sony combined the now Nobel laureate John B. Goodenough's cathode and a carbon anode into the world's first commercial rechargeable lithium-ion battery in their hand-held video camera, lithium-ion batteries have been put into laptops and cell phones, creating several multi-billion-dollar industries of small electronics.

Much later, Tesla did with lithium-ion batteries, something similar to what Sony did with them, however at an immensely larger scale, in a single 'device', when they used them in Roadster, their first electric car released

in 2008, and also in Powerwall and Powerpack, their stationary battery storage systems, in 2015-2016. In the recent years, lithium-ion batteries have been popularized to such an extent that it seems that various organizations are involved in some kind of a race to increase their utilization, as if they were an end in itself. This prompts many of us to ask - is it really the case?

It is amply clear that despite having many advantages, lithium-ion batteries do have various limitations, some of them being serious enough, particularly in consideration to Mega and Long-Duration energy storage, sustainability and environmental intensity with respect to rare earth materials, which make them unsuitable for acquiring the status of a 'one-stop solution' for all energy storage applications. This leads us to explore some of the promising technologies for Mega and Long-Duration Energy Storage.

Mega & Long Duration Energy Storage

As we are generally aware, energy storage can be categorized into following different types:

- Electrochemical energy storage
- Mechanical energy storage
- Thermal energy storage
- Electrical energy storage
- Chemical energy storage

Examples of upcoming technologies and startups which are rapidly driving these technologies for Mega and Long-Duration energy storage towards commercialization can be found amongst all of the above energy storage types. The most common characteristics of these technologies include:

- Have capability to store Mega energy (in terms of MWh)
- Offer possibility to store energy from days to weeks to months (beyond 4-8 hours - the sweet spot for lithium-ion batteries)
- Make available option to utilize existing infrastructure of a conventional thermal/gas power plant
- Offer possibility to overcome the concerns around sustainability and environment intensity

Following technologies are noteworthy when it comes to Mega and Long-Duration energy storage:

▪ **Aqueous Sulfur Flow:** In a standard Flow Battery, both anolyte and catholyte (electroactive materials dissolved in liquids) can be stored in big, easily swapped tanks. So, if we want more storage, we can just add larger tanks while those other pricey parts, including the electrodes, remain the same. In in the case the anolyte is a polysulfide solution, which simply means it contains chains of sulfur atoms. The catholyte is a metal salt dissolved in water. The key to an Aqueous Sulfur Flow Battery is to use a sulfur-based solution as the anolyte, since sulfur is among the most abundant elements in the earth's crust as well as it is a by-product of fuel refining, so it is extremely cheap and can store a lot of energy. Form Energy from the US is in the process of commercializing this technology.

▪ **Compressed Air:** A-CAES is unique as a grid storage solution, since it provides Mega and Long-Duration storage like pumped hydro, but has the key advantage of being able to be flexibly sited where the grid needs it, allowing the targeting of high-value (and immediately available) grid applications like transmission deferral and fossil plant replacement. The technology operates very similarly to a gas plant but is entirely non-emitting, is much more cost-effective than batteries at scale with a 40+ years asset life and is ideally suited to providing the long-duration storage resource necessary for decarbonizing the grid. Hydrostor is the world's leading developer of utility-scale energy storage facilities using its proprietary A-CAES technology and purpose-built underground storage caverns.

▪ **Geomechanical Pumped:** Pumped Hydroelectric Storage (PHS) projects generally involve an upper and lower reservoir. Another interesting concept being considered is to locate one or both reservoirs below ground (sub-surface). Geomechanical Pumped Energy Storage (GPES) utilizes an innovative Geo-mechanical Pumped-

Storage (GPS) system, where wells and other underground man-made or naturally occurring features are adapted for energy storage applications. Their system uses the pressure in underground wells to generate electricity and is unique in its ability to be installed in flat areas, eliminating typical Pumped Storage Hydropower (PSH) geographical challenges in finding high and low elevations in close proximity. Operating similar to a reversible pumped storage turbine, a bi-directional Injector-Generator(INGEN) can store or generate electricity through pumping or release of pressurized water. Quidnet Energy is taking forward this technology towards commercialization.

▪ **Liquid Air:** Liquid Air Energy Storage (LAES) is an innovative large-scale storage technology, which uses liquefied air as a storage medium. It is also known as Cryogenic Energy Storage (CES) because it uses low temperature (cryogenic) liquids such as liquid air or liquid nitrogen as energy storage. The low boiling point of liquefied air means the round-trip efficiency of the system can be improved with the introduction of above ambient heat. A high-efficient system captures, and stores heat produced during the liquefaction process (charging the system) and integrates this heat to the power recovery process. The system can also integrate waste heat from industrial processes such as thermal power generation or steel mills. During power recovery, very cold air is exhausted and can be captured in high-grade cold store. This can be used at a later time to enhance the efficiency of the liquefaction process. Alternatively, the system can integrate waste cold from industrial processes such as Liquefied Natural Gas (LNG) terminals. Highview Power is racing this technology towards commercialization. ■

Birla Carbon announces Major Global Growth Plans

Santrupt B. Misra, Group Director, Birla Carbon

Birla Carbon, the leader in sustainable carbon black solutions, announced an additional 200 kMT capacity expansion across key markets. Based on customer demand and feedback, the expansion will cover strategic markets in Europe, India, and China in support of both rubber and specialty applications. The expansions are expected to be complete in the calendar year 2024.

Sharing his thoughts on the development, Dr. Santrupt B. Misra, Group Director, Birla Carbon; Director, Chemicals & Director, Group H.R., Aditya Birla Group, said, "This investment marks yet another milestone in the transformational journey of Birla Carbon in recent times. From Sustainability to Circularity and finally, to its Net Zero carbon emissions aspiration, Birla Carbon has led changes in the industry, creating new benchmarks in line with customer and industry expectations." He further added, "Birla Carbon will continue to focus on building new capabilities and enhancing the availability of carbon black across key regions, further consolidating its global leadership." Speaking about the expansions, John Loudermilk, Chief Executive Officer, Birla Carbon, said, "We have been listening to our customers expressing their desire to grow around the world. The availability of our unique products is a critical component of their growth plans as we all seek to simplify and secure supply chains. Whether it is unique, highly specialized processes to tailor materials for specialty applications, security of supply, or consistent quality, Birla Carbon aims to achieve a seamless availability of our world-class products and services for customers." He further added, "The new capacity will enable us to sustainably serve growth in a range of segments including tire, rubber goods, plastics, coatings, and other specialty markets."

Tata Steel to raise Neelachal Ispat Nigam operation to 1.1 million tpa

N Chandrasekaran, Chairman, Tata Steel

Tata Steel after completing acquisition will strengthen the operation of Neelachal Ispat Nigam (NINL) to rated capacity of 1.1 million tpa within the next one year. However, the ramping up of the operations of NINL will be subject to obtaining statutory clearances. Tata Steel arm, Tata Steel Long Products (TSLP), in January 2022 won the bid to acquire a 93.71 percent stake in NINL at an enterprise value of Rs 12,100 crore. The acquisition is important considering the proximity of the NINL plant to Kalinganagar plant and its potential to become the hub for long products business in the near future.

Tata Steel has continued to accelerate its capital allocation for the six million tpa pellet plant and 2.2 million tpa cold rolling mill complex as part of the five million tpa expansion at Kalinganagar. The six million tpa pellet plant will be commissioned in Q3/FY23, followed by the cold roll mill complex and five million tpa expansion.

P.V. Industries to begin mild steel ingots manufacturing unit in Punjab

P.V. Industries to set up a mild steel ingots manufacturing unit with a 1,94,400 tpa capacity. Spread over a land of 9.37 acre in Ludhiana district of Punjab, as of now P.V Industries is anticipating environment clearance for the project and is expected to start work by December 2022. ■

R.N.I. No. 11403/1966 Date of Publication: 29th of every month

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