CHRONICLING PROCESS INDUSTRY INNOVATIONS SINCE 1966

VOL.57 | ISSUE 9 | SEPTEMBER 2022

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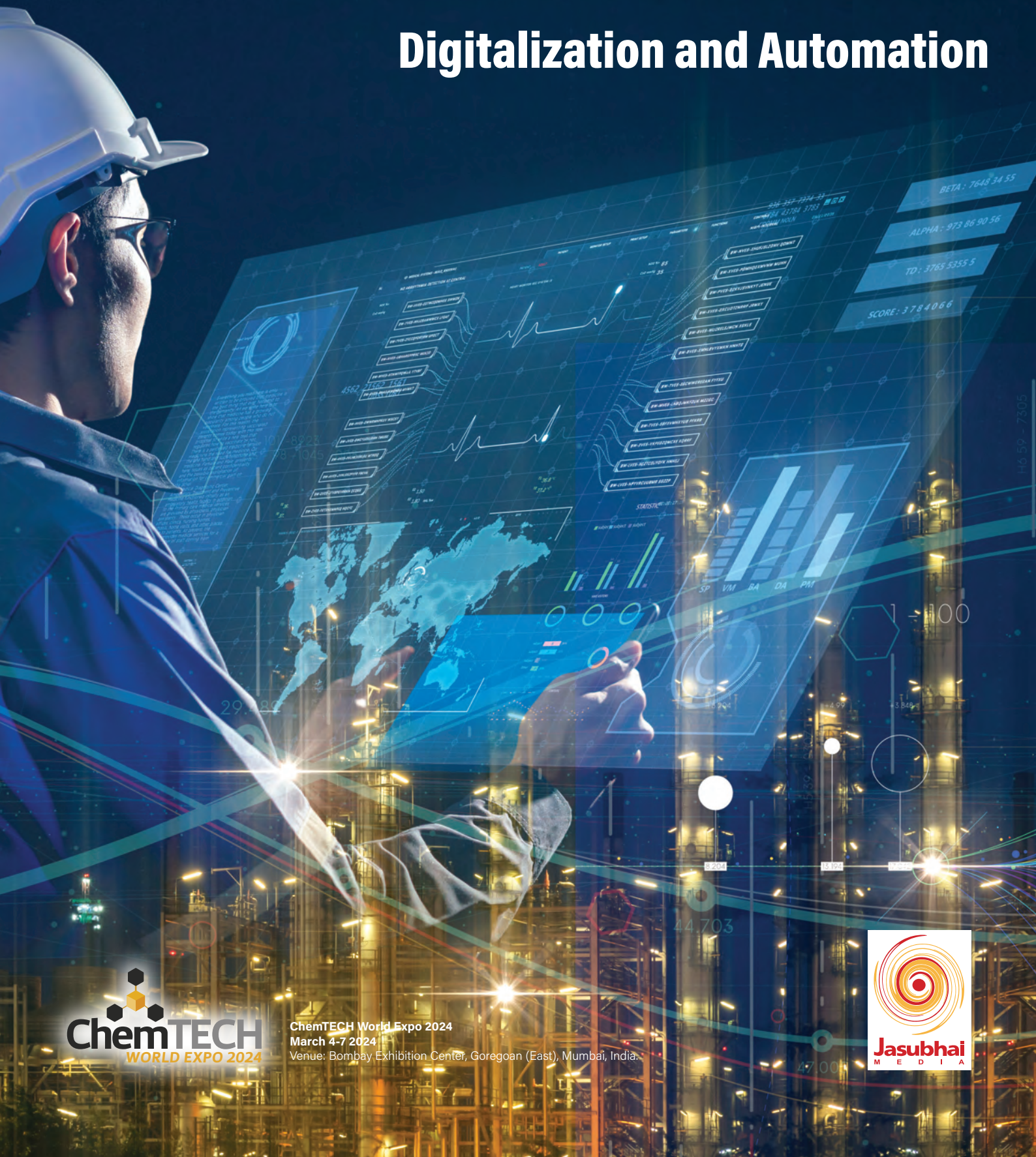
Digitalization and Automation



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Registered Office: 26, Maker Chambers VI, 2nd Floor, Nariman Point, Mumbai 400 021, INDIA.
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Prime Minister launches National Logistics Policy

New Delhi, India: Prime Minister, Shri Narendra Modi launched the National Logistics Policy in New Delhi today. Addressing the gathering, the Prime Minister said that India had taken yet another important step towards becoming a developed nation with the National Logistics Policy. Union Minister of Commerce and Industry, Consumer Affairs, Food and Public Distribution and Textiles, Shri Piyush Goyal said that the National Logistics policy would end to silos and bring all departments and states together, in-line with the holistic vision of the Prime Minister.

The Minister expressed confidence that the implementation of the National Logistics Policy would bring down logistics costs, give a fillip to international trade, help in making India 'Atmanirbhar' or self-reliant, usher in prosperity in the nation and present new opportunities to our start-ups. The policy would be highly beneficial to the farmers of the country, helping them to take their produce to the markets at a faster pace and reduce wastage and delay. This would bring down prices in the economy as well, he added.

The Policy will be implemented through a Comprehensive Logistics Action Plan (CLAP). The interventions proposed under the CLAP are divided into eight key action areas:(i) Integrated Digital Logistics Systems (ii) Standardisation of physical assets and benchmarking service quality standards (iii) Logistics Human Resources Development and Capacity Building (iv) State Engagement (v) EXIM (Export-Import) Logistics (vi) Service Improvement framework (vii) Sectoral Plan for Efficient Logistics (viii) Facilitation of Development of Logistics Parks.

Minister for Chemicals and Fertilizers, Dr. Mansukh Mandaviya Calls for creating India's own model to lead the global chemicals and fertiliser market

New Delhi, India: "Chemicals and petrochemicals sector can transform India into a global manufacturing hub in sync with PM Shri Narendra Modi Ji's vision of 'Make in India, Make for the World' ". This was stated by Dr Mansukh Mandaviya Union Minister of Chemicals & Fertilizers and Health & Family Welfare, at the third meeting of Chemicals and Petrochemicals Advisory Forum.

While addressing the occasion Dr. Mandaviya stated that the Indian Chemical and Petrochemical industry has a substantial potential to play a significant role in boosting the nation's growth. "India needs to create its own model to lead the global market in chemicals and fertilisers", he stressed. He urged the companies and the Advisory Forum to create a "futuristic strategy which would be in sync with the global demands and the emerging requirements of aligned industries. India has the capacity to rise to the challenge; what is needed is a strategy which is focussed on outcomes".

"Let us create our own model of decision making which is consultative and multi-pronged, while identifying actionable points to take India to the height of meeting its own domestic demand and the global one too", Dr. Mandaviya highlighted.

India to become a powerhouse driving global growth by 2047

New Delhi India: Union Minister of Commerce and Industry, Consumer Affairs, Food and Public Distribution and Textiles, Shri Piyush Goyal said that India is on the path to become a powerhouse driving global growth by 2047. He said this while interacting with the Business Community of Southern California.

In his address, the Minister said conclusion of the Indo-Pacific Economic Framework (IPEF) IPEF is an important milestone for free and fair trade with like-minded countries, who share a common objective to have rule based international order and a transparent economic system.

Noting that India today has emerged as the trusted partner of the World, Shri Goyal said India has now emerged as a high quality manufacturer of valuable goods and services, given the skillsets and the talent pool available across sectors- IT, textiles, hospitality, gems and jewellery and added that each one of these would provide opportunity for investors looking to engage with India.

Overall Coal Production Increases by 8.27% to 58.33 Million Ton in August, 2022

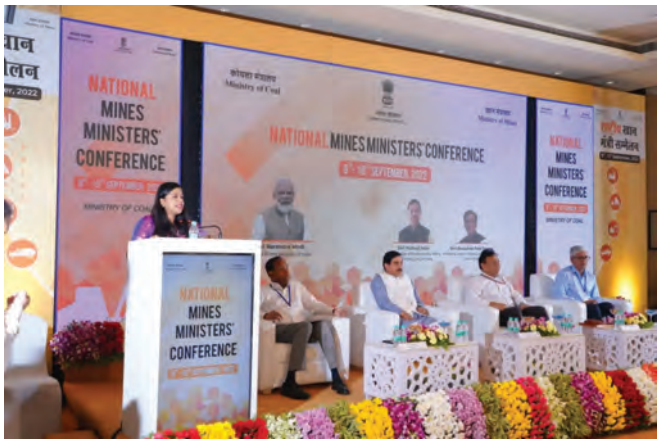
New Delhi, India: India's overall coal production increased by 8.27% to 58.33 Million Ton (MT) from 53.88 MT during August, 2022 as compared to Aug 2021. As per the provisional statistics of the Ministry of Coal, during Aug 2022, Coal India Ltd (CIL) and captive mines/ others registered a growth of 8.49 and 27.06% by producing 46.22 MT and 8.02 MT respectively. However, SCCL registered a negative growth of 17.49% during the month. Of the top 37 coal producing mines in the country, 25 mines produced more than 100 % while the production level of five mines stood between 80 and 100 per cent.

At the same time, coal despatch increased by 5.41% to 63.43 MT from 60.18 MT during Aug 2022 as compared to Aug 2021. During Aug 2022, CIL and captive /others registered a growth of 5.11% and 26.29% by despatching 51.12 MT and 8.28 MT respectively.

The power utilities despatch has grown by 10.84% to 54.09 MT during August 2022 as compared to 48.80 MT in Aug 2021 due to increase in power demand.

The overall power generation in Aug 2022 has been 3.14% higher than the power generated in Aug 2021.

Union Government introduced several reforms in partnership with States to boost Ease of Doing Business in the Coal sector



Hyderabad, India: Union Minister of Coal, Mines and Parliamentary Affairs, Shri Pralhad Joshi inaugurated the National Mines Ministers' Conference (NMMC), the Conference was another step in the direction of making the coal sector 'Atmanirbhar' and promoting Sustainable Mining in India.

Ministry of coal executes the commercial agreements and it is the State's responsibility to look after the operationalization aspects. Revenue from commercial auctions also goes to the concerned States. It was discussed that States are free to frame Land Compensation policy and the Centre may follow States policy if it is better.

Some of the Next-Gen Reforms that are proposed by Ministry of coal are sale of coal through market determined pricing mechanism, Coal Gasification and Just Energy Transition. It was informed that various steps have been taken by the Ministry to promote coal gasification including incentives such as 50% rebate in auction bid price, long term linkage from CIL has been allowed and a

PLI scheme is being framed to support coal gasification by both public and private entities. The stakeholders were also informed about the country's target to cut the emissions to Net Zero target by 2070 which may pressurize the coal sector not only to adopt more sustainable mining practices but also be ready for the transition. It was conveyed to lignite rich States that high-capacity lignite-based power plants may be established.

Rajesh Kumar Srivastava Undertakes Additional Charge as ONGC CMD

Rajesh Kumar Srivastava, Director (Exploration), CMD (Addl. Charge), ONGC

New Delhi, India: After Dr. Alka Mittal retired as ONGC CMD on August 31, 2022, Rajesh Kumar Srivastava, Director (Exploration), ONGC, assumed additional responsibility as Chairman and Managing Director (CMD) from September 1, 2022. Srivastava has been serving as Director (Exploration) since 2 August 2019 and is the senior-most Director on the Board of the energy company.

Srivastava is an expert in up-stream hydrocarbon exploration, from well-site operations, development geology, seismic data interpretation, through monitoring and planning of exploration. He has over 38 years of expertise in the Petroleum Exploration and Production sector.

He first worked as an exploration geologist in the Krishna Godavari Basin before joining ONGC's Institute of Reservoir Studies in Ahmedabad. He was known as one of the best experts in reservoir modelling, which is used to prepare field development plans, simulation studies for production forecasts, and techno-economic evaluations of prospects. He is credited for introducing the art and science of "geo-cellular modelling" to ONGC, with the Neelam offshore field serving as the organization's first "whole field" fine-scale geo-cellular model for dynamic modelling for rehabilitation.

Mr. Srivastava is recipient of the National Mineral Award in 2009. He is also the Chairman of ONGC TERI Biotech Limited (OTBL) and the President of the Indian Geological Congress (IGL).

Bharat Petroleum Corp. Ltd. (BPCL) at CII 23rd National Awards for Excellence in Energy Management 2022

New Delhi, India: At Energy Efficiency Summit held in New Delhi on 21st Sept'22 presented by CII 23rd National Awards for Excellence in Energy Management 2022, which is a recognition of high calibre and outstanding contribution to the field of

Energy-Efficiency by BPCL. During the programme the following awards were presented to BPCL for their excellence in said fields.

'Energy Efficient Unit' Award in Energy Management for the year 2022 was received by Pipeline Entity for implementing 17 Energy Savings Projects across our pipeline network, which resulted into power savings of 2.9 Million KWH, equivalent to Rs 2.4 Crore.

'Most Innovative Energy Saving Product' award went to 'Bharat Hi-Star', an Energy Efficient Domestic LPG Cooking Stove, which has been conceptualize, designed & commercialized by our R&D department.

Aniruddha Kulkarni, Manager (R&D), was conferred with the 'Young and Emerging Leader' for his significant contribution to the development of 'Energy Efficient LPG & PNG Stove' and state-of-the-art Grid Interactive 1.05 MWp Solar Power Plant.

Indian Oil becomes the first Oil Marketing Company to produce and market AVGAS 100 LL in the country

New Delhi, India: We are undergoing a remarkable transformation which is almost revolutionary. We are reducing dependence on imported fuels by promoting biofuel blending, green hydrogen and introduction of electric vehicles.", stated Shri Hardeep Singh Puri, Minister of Petroleum and Natural Gas & Housing and Urban Affairs while addressing at the launch of AVGAS 100 LL. Shri Hardeep Singh Puri in the presence of General (Dr.) V. K. Singh (Retd.) Minister of State for Civil Aviation and Road Transport and Highways, launched AVGAS 100 LL, special aviation fuel meant for piston engine aircrafts and Unmanned Ariel Vehicles. Under Prime Minister's Atmanirbhar Bharat vision IOCL has come up with AV Gas 100 fuel which was imported so far at huge cost.

AV GAS 100 LL is important to serve the needs of a thriving aviation industry with increase in footfall on airports, rise in number of aircrafts and Flying Training Organisations (FTOs) in trainee aircrafts for pilot training in future. As the demand for air transport in India is expected to increase manifolds in the future, there is going to be a huge demand for trained pilots also. And for this, the number of FTOs is also expected to increase significantly, he added.

Reliance Industries to invest Rs. 75,000 crores in O2C business

Mumbai, India: Reliance Industries Limited will invest Rs. 75,000 crores i.e. approx. 10 billion USD in Oil To Chemicals (O2C) business in existing value chains for capacity expansion and creating new value chains said Mr. Mukesh Ambani, CMD, RIL at 45th Annual General Meeting.

First, in the Polyester value chain, we will build one of the worlds' largest single-train PTA plants of 3 MMTPA capacity at Dahej. We will also invest in a 1 MMTPA PET plant at Dahej. Both PTA and PET will be targeted for

completion by 2026. We will also reinvest in Polyester Filament Yarn (PFY) and Polyester Staple Fibre (PSF). Polyester expansion with a capacity of over 1 MMTPA will be completed in phases by 2026. Second, in the Vinyl chain, we will more than triple our existing capacity by adding world-scale plants at Dahej and Jamnagar in India, and also in the UAE. We will aim to complete 1.5 MMTPA of feedstock integrated PVC expansion at Dahej and Jamnagar in phases by 2026. We will also add capacities to make EDC and PVC at Ruwais, in the UAE, as part of Ta'ziz Chemical Zone. Third, consistent with our vision for New Materials, we will build in phases India's first and one of the world's largest Carbon Fibre plants at Hazira with a capacity of 20,000 MTPA, based on Acrylonitrile feedstock. We will commence Acrylonitrile production next year and aim to complete the first phase of the carbon fibre plant in 2025 said Mr. Mukesh Ambani at the AGM.

Reliance has commenced its journey to become net carbon zero by 2035 with a set of concrete actions.

Reliance Industries Limited to acquire majority stake in SenseHawk

Mumbai, India: Reliance Industries Ltd ("RIL"), has today signed definitive agreements to acquire a majority stake in SenseHawk Inc ("SenseHawk") for a total transaction value of USD 32 million, including funding for future growth, commercial rollout of products, and R&D.

SenseHawk, is an early-stage developer of software-based management tools for the solar energy generation industry. It helps accelerate solar projects from planning to production by helping companies streamline processes and use automation.

Customers see value with SenseHawk in:

a) Pre-construction evaluation and process optimization: The platform approach enables unification of multiple processes and data into a single GIS supported view for dashboarding, land data management, design option management, BOQs, approvals and more.

b) Construction management: Combined with the map view, chat, and digital forms, the SDP provides improved communications between project teams enabling early issue detection and onsite resolution, automated progress reports, connects engineering drawings and schemas to components on site and accelerates processes.

c) Operations and maintenance: SenseHawk bring all stakeholders to a single interface. Teams work off of the same map-based tasks, with access to all required data mapped to a digital twin, significantly improving new site ramp up. Customers save time and effort with preventive maintenance schedules, alarm handling and performance visualization.

Calibre, an Everstone Capital portfolio company, acquires RheinPerChemie GmbH, from Evonik.

Mumbai, India: Calibre Chemicals (Calibre), nutrition, pharmaceuticals and personal care specialty chemicals company, has entered into a definitive agreement to acquire 100% shareholding of RheinPerChemie GmbH (RPC), from Evonik. RPC, located in Rheinfelden Germany, is a prominent

Mr. Deepak Chander, CEO, Calibre

manufacturer of ammonium and sodium persulphates in Europe. Calibre is the largest manufacturer of potassium persulphate, perchlorates and iodine derivatives in India and serves customers in over 100 countries.

Calibre now will become a global, full range persulphates supplier while expanding onshore presence in the European market and would be a front runner for Indian specialty chemical companies investing in green electrochemical opportunities in the western world. Calibre's CEO, Deepak Chander, said, "We are excited about the cultural and geographical diversity in our functional teams.

The RPC acquisition will accelerate organization learning to provide best-in-class products and services to customers and enhance customer centricity for all our business lines in Europe. Teams across the two continents would work together to expand our electrochemistry capability and capacities to further improve existing products and manufacture new products as well." Calibre and RheinPerChemie's offerings are complementary and revenue accrediting. Calibre has plans to further strengthen manufacturing at RPC and will also add new persulphates capacity in other geographies.

Hero MotoCorp & Hindustan Petroleum Corporation Ltd. Collaborate to propel Emerging Mobility Solutions - Partnership to Bolster EV Charging Infrastructure across India

New Delhi, India: Hero MotoCorp and Hindustan Petroleum Corporation Limited (HPCL) have entered into a collaboration to establish charging infrastructure for Electric Vehicles (EVs) in the country. As a part of the initiative, the companies will set-up charging infrastructure for two-wheeled electric vehicles (EVs) across the country, thereby providing a fillip to mass mobility's transition towards an electrified future.

The two companies will first establish charging infrastructure at HPCL's existing network of nationwide energy stations, with the likelihood of subsequently broadening the collaboration for supplementary business opportunities. In the first phase, charging stations will be set up in select cities, which will then be expanded to other key markets with the aim of establishing a high density of EV charging station network across the country.

Hero MotoCorp will lead the infrastructure development for the charging network. Each charging station will feature multiple smart and fast chargers, including DC and AC chargers that will be available to all two-wheeled EVs. The entire user charging experience will be controlled by a Hero MotoCorp Mobile-App, based on a cashless transaction model.

NEWS

BASF signs agreements with various MNCs for production and procurement of pyrolysis oil from mixed plastic waste, construction of world's first demonstration plant for electrically heated steam cracker & other sustainable technologies.

Germany: BASF, SABIC and Linde have started construction of the world's first demonstration plant for large-scale electrically heated steam cracker furnaces. By using electricity from renewable sources instead of natural gas, the new technology has the potential to reduce CO2 emissions of one of the most energy-intensive production processes in the chemical industry by at least 90% compared to technologies commonly used today.

"BASF's mission is to achieve climate neutrality, and electrification of the hugely energy-intense steam cracker is a significant milestone in our transformation journey towards net zero," said Dr. Martin Brudermüller, Chairman of the Board of Executive Directors of BASF SE.

While BASF SE has concluded a framework agreement for the purchase of pyrolysis oil from mixed plastic waste with ARCUS Greencycling Technologies GmbH, a technology company based in Ludwigsburg, Germany. The two companies want to contribute their respective know-how to the value chain in order to return plastic waste that is not recycled mechanically in the sense of a circular economy and reduce CO2 emissions.

"With the guaranteed purchase of the oil produced, ARCUS can build further plants with higher capacity and thus make a significant contribution to closing material cycles together with BASF," said Daniel Odenthal, Chief Operating Officer of ARCUS Greencycling Technologies. Christoph Gahn, Vice President Chemical Recycling Business & Technologies at BASF said "The collaboration with ARCUS underscores BASF's commitment to conserving resources by using recycled raw materials in the chemical industry and to drive the transition to a circular economy".

In regards to Renewable agenda, BASF and Sulzer Chemtech (GTC Technology) have signed a Memorandum of Understanding (MoU) with the goal of advancing technologies for renewable fuels and chemically recycled plastics that will further expand the partners' portfolio of sustainable

solutions. The companies agreed to enter a strategic partnership to reduce the carbon intensity of renewable diesel and aviation fuel. They will also drive the development of innovative, cost-effective chemical processing solutions to improve the conversion of plastic waste into new plastics.

Digital Sustainability Solutions for Carbon Industries to be brought about by Schlumberger and ARAMCO Collaboration

Texas, United States: A digital platform that will provide sustainability solutions for hard-to-abate industrial sectors will be created through this collaboration. The proposed platform will enable companies in industries such as Oil & Gas, Chemicals, Utilities, Steel et cetera to measure, report and verify their emissions and form measurement data driven approach towards evaluating different decarbonization pathways.

"Aramco and Schlumberger are hoping to draw on our long history of collaboration and partnership to deliver a digital sustainability ecosystem that enables global organizations to manage their carbon emissions and realize ambitious sustainability goals," said Olivier Le Peuch, CEO, Schlumberger. While Ahmad A. Al-Sa'adi, SVP (Technical Services) at Aramco said " "This collaboration represents an unprecedented opportunity for both companies to leverage digitalization to tackle one of the most critical challenges of our generation. At the same time, it would expand digital capabilities within the Kingdom of Saudi Arabia and harness Schlumberger's global reach to potentially deliver a worldwide impact."

Customers will be able to measure and report baselines, targets, emissions, offsets and credits, which will help them manage their carbon footprints more effectively by increasing the availability and visibility of relevant data in a transparent and flexible solution.

Yokogawa Selected by Grön Fuels as Preferred Supplier of Technology, Equipment, and Services for North America's Largest Renewable Fuels Complex".

Tokyo, Japan: Yokogawa Electric Corporation announces that its subsidiary Yokogawa Corporation of America has been selected by Grön Fuels, LLC as the preferred supplier of automation technology, equipment, and services for North America's largest renewable fuels production facility to be constructed at the Port of Greater Baton Rouge in Louisiana.

Grön Fuels will develop and operate a 65,000 barrel per day sustainable aviation fuel (SAF) and renewable diesel (RD) GigaSystem plant serving global offtake customers in need of low carbon transportation fuels. The said

system is designed to use all traditional renewable feedstocks, including fats, oils, and greases, as well as emerging feedstocks such as algae oil and cover crops. The Grön Fuels GigaSystem will also include biogenic carbon capture and sequestration (BECCS) and carbon negative power (CNP) facilities that will further reduce the carbon intensity of the SAF and RD produced from all feedstocks. The integrated use of proven technologies will enable carbon negative renewable fuel production. The plant is expected to start production in 2025.

Kevin McMillen, president and CEO of Yokogawa Corporation of America, added, "The Grön Fuels GigaSystem is perfectly aligned with Yokogawa's sustainability goals and business direction. We look forward to co-innovating with their team to optimize all aspects of this project, from instrumentation through to enterprise systems, and all IT/OT requirements in between."

Infrared makes PET greener in Brazil

Sao Paulo, Brazil: Recycled food-grade PET is booming in Brazil. According to a recently published official study, the nominal capacity for PET recycling in the country is around 400,000 tons per year (t/year). From which, about 140,000 t/year are from the only recovered thermoplastic that is approved in the country for direct contact with food and beverages (except mineral water), according to Irineu Bueno Barbosa, Jr., partner and commercial director of recycler Global PET. With its production having increased 60% since 2017, Global PET shows how hungry the market is for recycled food-grade PET.

With Kreyenborg's system, PET flakes are heated, dried, and crystallized before extrusion which can be cited as one of the reasons for Pao Saulo based company. "We intensively compared conventional heating and drying technologies with that of infrared light some years ago. At the end of that study, the advantages of the IRD were clear, when compared to systems that work without pre-drying before extrusion," concludes Barbosa, Jr. When Global PET first purchased Kreyenborg's IRD, the recycler produced 1,500 t/month. "A year later, in 2018, we started up the second IRD and expanded production to 2,500 t/month. With the delivery of the third rotary drum in the second half of the year, we will move to 3,500 t/month of food-grade recycled PET," Barbosa, Jr. said.

Pioneering mathematical formula paves way for exciting advances in health, energy, and food industry

Bristol, U.K.: A ground breaking mathematical equation has been discovered, which could transform medical procedures, natural gas extraction, and plastic packaging production in the future.

Lead author Toby Kay, who is completing a PhD in Engineering Mathematics, said:

"This marks a fundamental step forward since Einstein and Smoluchowski's studies on diffusion. It revolutionises the modelling of diffusing entities through complex media of all scales, from cellular components and geological compounds to environmental habitats.

Further research is needed to apply this mathematical tool to experimental applications, which could improve products and services. For example, being able to model accurately the diffusion of water molecules through biological tissue will advance the interpretation of diffusion-weighted MRI (Magnetic Resonance Imaging) readings. It could also offer more accurate representation of air spreading through food packaging materials, helping to determine shelf life and contamination risk. In addition, quantifying the behaviour of foraging animals interacting with macroscopic barriers, such as fences and roads, could provide better predictions on the consequence of climate change for conservation purposes.

Evonik and LIKAT Discover New Variant of Hydroformylation

LIKAT: A team of researchers from Evonik and the Leibniz Institute for Catalysis (LIKAT) has achieved a breakthrough in the field of Hydroformylation, it is one of the most important reactions in industrial organic chemistry where unsaturated compounds are converted with synthesis gas to aldehydes and alcohols. It has now been demonstrated for the first time that the catalyst in this reaction is stable even at low pressures. This opens up a cost-effective and environmentally friendly route to Aldehydes and alcohols. The

research team reports on this in the renowned journal Science.

Until now, scientists assumed that this reaction, if catalysed with cobalt, could only be carried out under high pressure conditions without the catalyst decomposing. With the current achievement in the backdrop it has been disproved by Prof. Dr. Robert Franke, head of hydroformylation research at Evonik along with research partners from LIKAT-Dr. Baoxin Zhang and Dr. Christoph Kubis. "With this discovery, we have discovered new process options for hydroformylation," says Franke, who is also a professor of chemistry at Ruhr University in Bochum. "In the future, it may be possible to make this largescale reaction much more economically and environmentally friendly. Developing these processes is our task for the next few years."

New bio-based polymer PEF shows low CO2 footprint

Nova Institute: The nova-Institute conducted a peer-reviewed Life Cycle Assessment (LCA) of Avantium's PEF (polyethylene furanoate) applications within the framework of the European PEFerence project. The Dutch company Avantium has developed a technology (YXY®) to convert plant-based sugars into a fully recyclable polymer. The new 100 % bio-based polymer, PEF (polyethylene

furanoate) has superior performance properties compared to PET (polyethylene terephthalate).The study demonstrated that the use of 100 % renewable carbon in PEF instead of fossil carbon in PET for producing 250 ml and 500 ml bottles would result in significant reductions in greenhouse gas (GHG) emissions. Avantium plans to start-up the world's first commercial FDCA plant in 2024. FDCA (2,5-furandicarboxylic acid) is the main building block of PEF. CO2 is absorbed by plants and released at the end of the product life cycle. Plant-based carbon has a net-neutral impact on the CO2 concentration in the atmosphere. In contrast to this, materials and polymers based on fossil carbon from underground, release additional CO2 into the atmosphere. ■

Digitalization of Training through OTS

LNG operations is inherently a risky affair. There is little room for operator error - hence professional training is of paramount importance to keep abreast of these complex units which can include both routine & non-routine operations. Safety in process operations for a greenfield LNG regassification unit can be particularly challenging. Reasons are many! Inexperience in LNG operations, staff turnover, remoteness of sites, availability of experienced trainers to mention a few.

To train operators even before a new plant has been commissioned and started up is imperative to ensure safe operations. Operator Training Simulator (OTS) is a digital tool that can be effectively implemented for acclimatizing the new operators to various simulated scenarios. They acquire experience in handing various modes including emergencies in a simulated environment allowing them to learn from mistakes and improve operability. The training ensures that inexperienced operators do not lead to inefficient operations and potential disasters. OTS brings faster learning, more efficient personnel training, contextual knowledge & higher safety. The cost of OTS implementation is paid off through less errors leading to product losses and reduced downtimes.

OTS (Operator Training Simulator)

The main engine of an OTS is the Process Simulation Model of the plant that replicates actual plant operation in a virtual system. Although simulators may originally be developed by companies for presentation of technical process & unit operations, process optimization or design in software, they can also be developed further to provide an important part of basic, refresher, troubleshooting/ abnormal conditions, and emergency trainings.

OTS have long been recognized as the best method of training in the airline, nuclear power, aerospace, military, and process industries. In process industries OTS provides a virtual plant on your computer, allowing plant operators to train in plant operations ahead of plant start-up and throughout plant lifecycle. OTS enables the plant operators to gain experience in an off-line, non-intrusive environment without any damage on the actual plant, for both inexperienced and experienced plant operators.

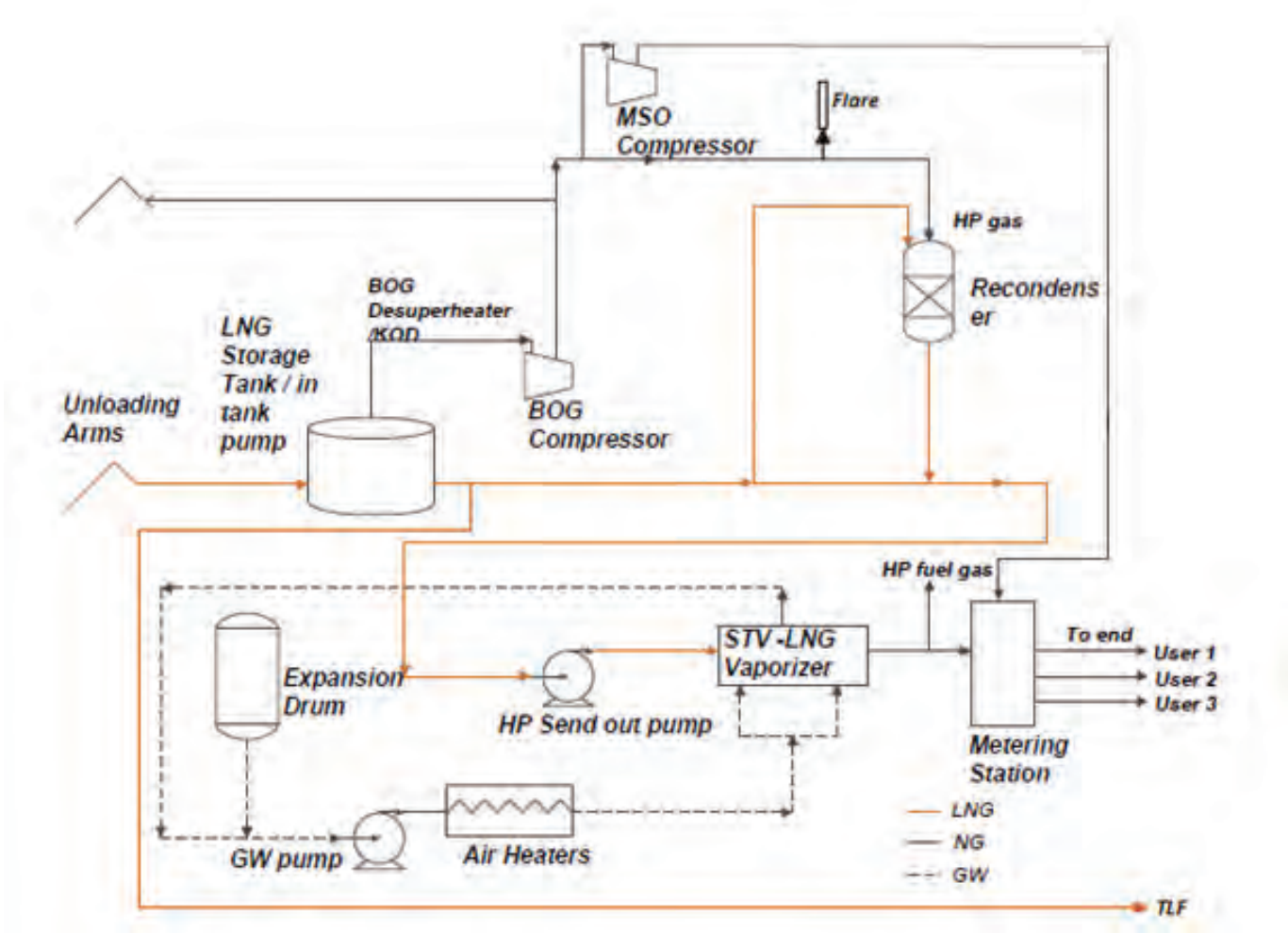
LNG Regas Process Description

LNG from the ship is unloaded into LNG storage tanks by connecting unloading arms on jetty. This stored LNG is then pumped to Recondenser and high-pressure pumps by low pressure in-tank pumps.

Since the LNG in the tank is stored at bubble point, there is continuous generation of boil off due to heat leak in the tank from atmosphere. The challenge of this boil off gas is managed by recondensing in Recondenser by sub cooled LNG. High pressure LNG is then regasified in shell & tube vaporizers by using glycol water as heating media. Regasified LNG eventually leaves plant battery limit to customers via sendout line after fiscal metering.

Why implement training simulators?

- With an OTS, it is possible to train plant operators and plant engineers.
- Training on a virtual plant with identical look and feel, reproducing realistic plant behaviours with identical DCS and SIS operational environments.



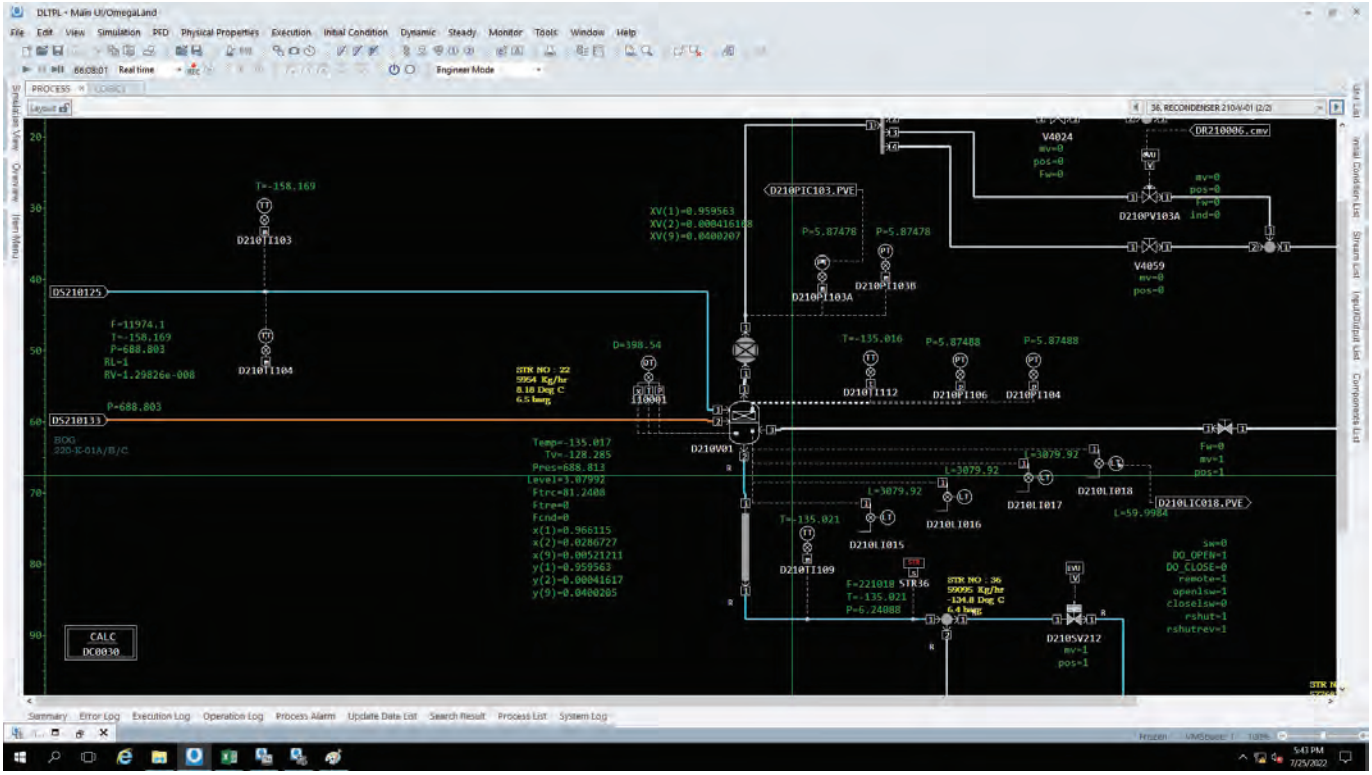
DLTPL Process flow diagram

- Various tasks and situations training at any time.
- Plant start-up, shut-down and normal plant operations experience without impacting actual plant operations.
- Offers hands on experience of the most credible scenarios, so that operators are ready to respond in real-life.
- Increases process knowledge and confidence in operators for better plant operations
- Validates procedures & checkout controls to fix problems before commissioning.
- Any minor deficiencies or inefficiencies in DCS discovered during OTS project can be changed in the DCS configuration before DCS commissioning.

Process of Implementation, Project Schedule

OTS project implementation starts with finalizing Functional design specification of project in consultation with client→ Data Collection for modelling (e.g., P&IDs, Process descriptions, Process datasheets, HMB etc.) → Model Building on Simulation software → Model Validation Test →DCS integration →Factory Acceptance Test → Site Acceptance Test → Operators Training.

Generally, project schedule of implementation of OTS project depends upon the complexity of plant process,



OTS Model

however a typical LNG regasification terminal OTS development project schedule is in range of 8 to 10 months.

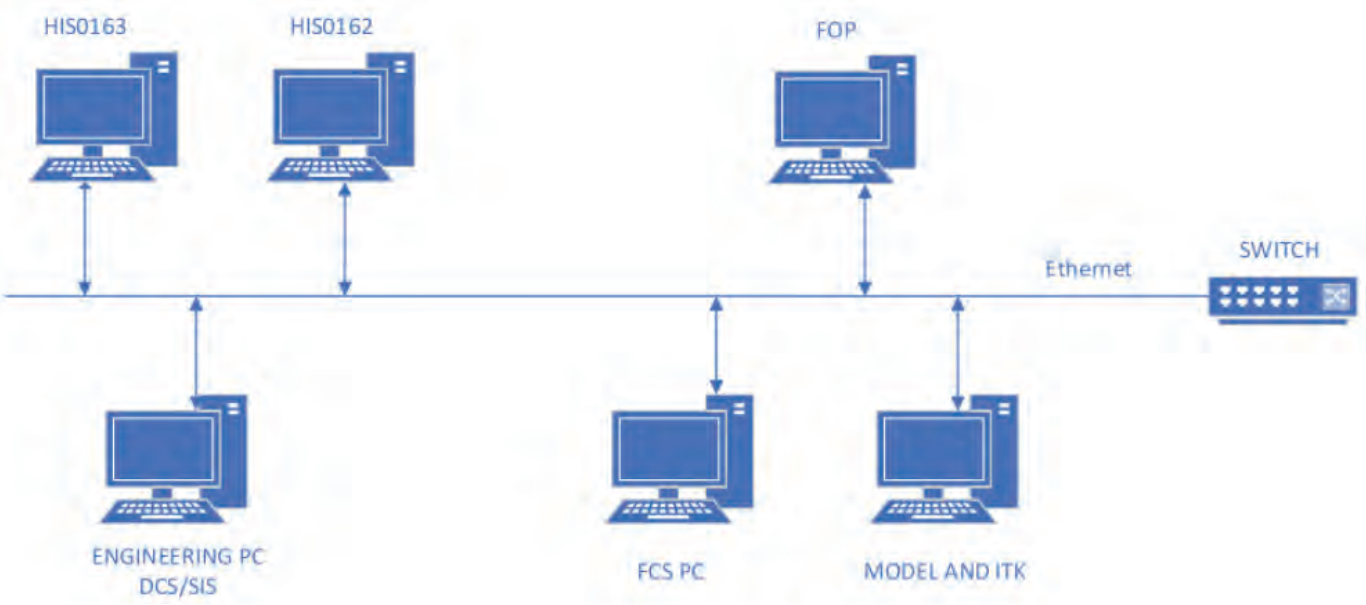
Model Development & Validation

The single most important component in an OTS is the mathematical model that should accurately simulate the dynamic behaviour of the process. Model Development work is done by competent simulation engineer based on fundamental principles of chemical engineering and appropriate thermodynamic properties using simulation software that provides an integrated, dynamic simulation environment.

Typically, model is a replica of plant (digital twin) that is created using Process flow diagram & P&IDs. Process data input is given by using Heat & Mass Balance, Equipment datasheets to prepare robust process model that exhibit model behaviour close to real plant operation. The model tuning is done to match Heat & Mass Balance & then validated using various test functions that are finalized in functional design specification by involving multi-disciplinary team having hands on experience in plant operations & domain knowledge. This team includes experienced Plant Operators, Process Engineers & Instrumentation Engineers. The deviations observed during Model Validation Test are liquidated by Simulation Engineer before DCS integration. Once the confirmation of model validation is done after implementing the required changes, model is then integrated with plant DCS. The final validated model which behaves exactly in line with plant operating conditions is then accepted.

OTS System Configuration

The Operator Training Simulator System consists of Model-PC, ENG-PC, Operator



Stations- PC, Field Operation Station (FOP-PC), FCS/SCS-PC

OTS Application at DLTPL

DLTPL OTS Room

One of the applications is for training to handle Cooldown operation. The operators have been trained in OTS to get familiarised before actual cooldown of unloading headers. Cooldown of the 2.4 km unloading headers is a critical process while introducing LNG first time in the terminal. As per guidelines, the lines to be cooled at the rate of 10 °C/hr. This process has been simulated in the OTS model by using series of Heat exchangers to predict cooldown behaviour of the lines during actual cooldown.

The training is imparted by OTS Instructor who is competent person possessing the thorough knowledge of Model & Plant Process. Total 4 Panel operators have been trained by instructor to respond against equipment malfunctions and emergency situations like how to maintain Tank pressure in case of BOG compressor trip. Training scenarios are set up by an instructor without any impact on the actual process. Training typically includes start-up and shutdown, change of load and critical process situations.

Conclusion

- To overcome the ever changing technological/process upgrades and training needs arising thereon, OTS implementation can be an effective solution.
- OTS develops competency & confidence of operators to achieve flawless start-up of plant, which gives immediate benefits to management like less time to start up & to meet commissioning target.
- Several benefits can be achieved with OTS which includes, teaching operators how to operate in critical conditions and to run the plant in a safe manner.
- Plant engineers can practice and witness different plant scenarios, to conduct what-if analyses and monitoring the dynamic process behaviour. ■

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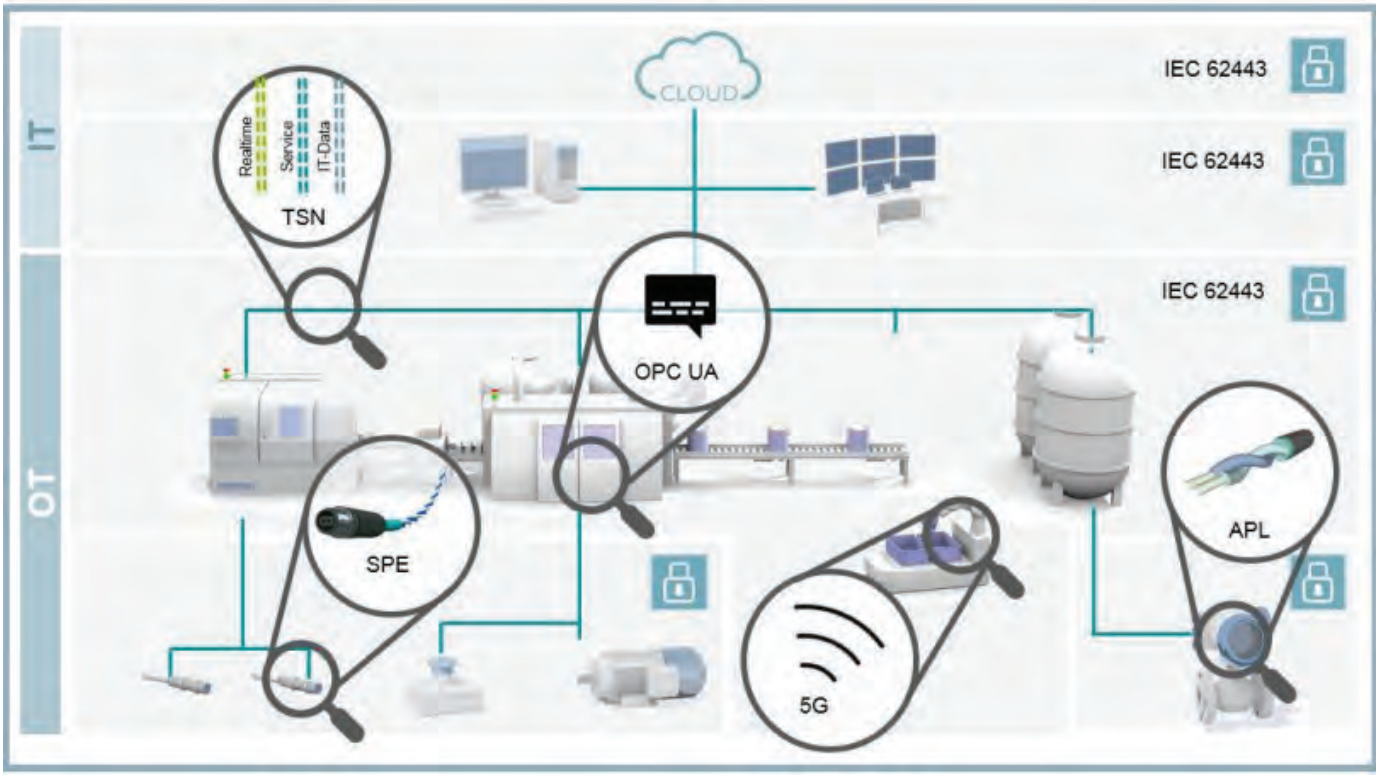
From Sensor to Cloud Networking in the Age of Digitalization

Digitalization in industry is a prerequisite for making processes more flexible in order to remain economical and competitive in the future, even with increasing complexity. However, this requires an enormous amount of data. Also, directly from the process; of machines, systems, field devices, sensors and actuators. This is the only way to drastically optimize processes, for example with the help of predictive maintenance and self-optimizing processes (keywords: process analytics and big data analytics).

The prerequisite for Digitalization- Everything can Communicate with Everything.

This requires a continuous and efficient network infrastructure:

- Ethernet up to the last meter: Smart devices,
- Sensors and actuators are integrated into the Ethernet network
- Mobile, flexible and area-wide communication is required



- All devices speak the same language
- Real-time communication in the network is ensured
- Data security becomes the standard for all communication

Enabling Prerequisite Technologies for Digitalization

Developing low-cost, simple, space saving solution

Today's Ethernet connections and the supply of power to end devices often require too much space, power dissipation and are too expensive in relation to the device costs. A network connection is therefore often uneconomical. In order to be able to integrate the smart field devices economically and practically into the network, a low-cost, simple and space-saving connection technology is required for the network connection and the power supply.

The solution: Single Pair Ethernet (SPE) & Advance Physical Layer (APL)

What exactly is Ethernet APL?

The abbreviation APL stands for Advanced Physical Layer and describes a further development of physical data transmission in Ethernet networks. This physical layer makes it possible to exchange Ethernet data via only two wires, instead of the previously required four or eight wires.

Aside from pure communication, the technology also optionally enables the supply of power to be connected devices on the same pair of wires.

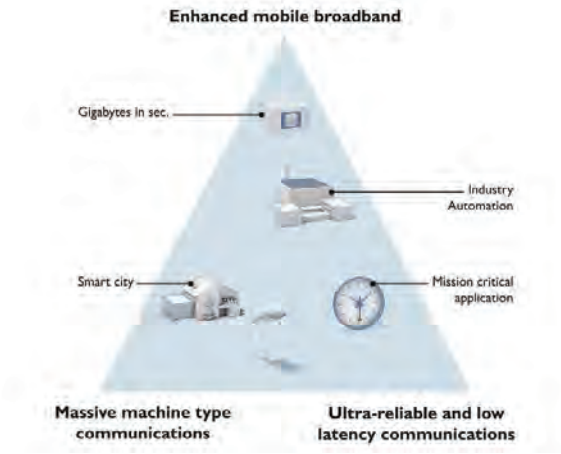
Ethernet APL therefore is one of several manifestations of the Single Pair Ethernet (SPE) and enables the direct connection of sensors, thereby making possible a

Features of APL Technology

- Bridging large distances: Trunk lengths of up to 1,000 m, spurs up to 200 m
- Use in explosion-protected areas is possible (zones 0, 1, and 2)
- Interoperability of the devices and systems of different manufacturers
- Capture and analysis of huge amounts of additional data is possible (big data) – new solutions such as predictive maintenance can be realized to increase availability
- Cost-efficient modernization of systems thanks to use of existing cabling and proven Ethernet protocols such as EtherNet/IP™, HART IP, OPC UA, and PROFINET

continuous communication to the last few meters in the field.

Developing Mobile, flexible and area-wide communication



Today's systems such as WLAN or 4G cannot meet these requirements because there is no exclusive transmission medium. This means that all communication takes place via a common medium or spectrum (frequency range), the availability of which is shared between the respective users. We also speak of a "shared medium". Since the medium is shared between the users, there is no control over its availability and therefore no guarantee for the real-time capability of a system. You never know how many others you'll share the medium with.

The solution: 5G.

What can 5G do?

Depending on requirements, the new 5G mobile communications standard offers enormous bandwidth in the gigabit range, real-time capability or high subscriber numbers with extremely high reliability and security. In addition, private networks can be realized for the first time. Thus, 5G meets all requirements for a flexible and future-proof network connection in mobile or highly flexible applications.

Conclusion

New communication standards such as OPC UA, TSN, SPE, and 5G are currently being created by various committees and in standardization projects. These new technologies, however, are not to be considered independent of each other – rather, they will form the communication of the future together.

As a technology leader with more than 30 years of experience in industrial communication technology, Phoenix Contact is actively involved in all of the key standardization committees. In these committees, we are helping to shape the new, cross-manufacturer communication standard for automation for you. ■

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SAHAJ: Achieving Consumer success through Digitalization

Petroleum and Natural Gas Regulatory Board (PNGRB) being the regulatory body has authorized GAIL Gas to implement CGD Projects in 16 nos. of Geographical Areas. City Gas Distribution (CGD) refers to the distribution of Natural Gas to consumers in Four Segments - Domestic, Commercial, Industrial and Transport sectors through a network of pipelines. Domestic PNG (DPNG) consumer segment is one of the four segments of City Gas Distribution business. After the completion of 11th CGD bidding round, CGD network shall potentially cover 98% of population and 88% of geographical area of the country including smart cities situated within the GAs.

In regards to City Gas Distribution Services (CGD) till Oct'2020, almost all activities related to DPNG segment except customer ID generation & invoicing of Customers, were carried out in offline & manual mode. With increase in customer base, it was becoming difficult to keep real time update of various activity related to any DPNG customers. Major challenges faced by CGD can we summed up as follows

- Lack of Digitisation of Customer data which further creates inconsistencies in Meter mapping, Meter Reading issues.
- Late Conversion of Customers.
- Inconsistent Invoicing of Customers due to Logistic and Manpower issues.
- Delay in Payment Updation of customer ledger.
- Due to Lack of Customizable Software, delay in redressal of customer complaints.
- Lack of Access of Software Platform to all Stakeholders.

SAHAJ: Digital Initiative of GAIL Gas

In order to cater the varied requirements of different stakeholders, there was a need to digitize the whole process of customer on boarding of DPNG segment. There was no customised IT solution available in market which can meet the complete requirement & hence, through internal Brainstorming it was decided to undertake the job internally by engaging a software

developer for developing of IT solution as per requirement of company.

Salient features envisaged for Digitization in DPNG Segment were as per below:

- **Versatile** enough to cater to a wide variety of stakeholders.
- **Customised** software which should be Highly Customizable to fit to the needs of changing dynamics and situations of CGD segment.
- **Securely stored** Data being maintained via the software needs to be easy to comprehend, authentic as well as secure.
- **Compatibility** of the platform needed for seamless integration with Mobile based Apps so that ground level work could be seamlessly updated with already existing data.
- **MIS Reporting** enabled with Customised reports related to the customer Onboarding, Billing, Complaints etc.

Before any software development it was important to capture each stakeholder associated with the DPNG business segment. Some of the stakeholders are Customer, supplier (i.e. CGD Entity), Execution Agency, Direct Marketing Agency, Debt Recovery Agency, CRM Agency, Billing Agency, Regulatory body et cetera. While to achieve the greater Versatility, Accessibility and Flexibility in expanding user base as well as to minimise the challenges faced in the retail environment extensive data management modules at the back-end and on front-end modules focused on ease of interaction were developed.

The modules are collectively called as SAHAJ, they capture each and every detail of activities of stakeholders associated with the DPNG business segment. Following are the activities which are related with DPNG consumer in CGD business and they are spanned over entire life cycle of the customer.

The modules work seamless and synchronously, some of the features implemented in them towards achieving customer success and increasing organizational productivity and efficiency according to use are

Customer On-Boarding

These include all the facets of Registration, Connectivity and LMC Contractor Management, this module has the following features Registration, Meter Details, GI details and RFC Status of Customers, JMR(Joint Meter Reading) of every individual customer, Real Time Data Integration et cetera.

Billing & Payment

These include all the facets of web-based platform which is integrated with On-the-Spot Billing software for smartphones, Payment Receipt and Updation through Different Modes, Invoice Generation et cetera.

CRM (Complaint Redressal Mechanism)

For decreasing the turn-around time and accelerating the resolution with relevancy to issue-Complaints through every Mode Lounged in the Module, they are forwarded as per Escalation Matrix, to ensure that customer centricity SMS/ Email communication sent to Customer for Complaint Registration and Complaint Closure, for ease of operation inside the organization the sorting mechanism is GA Wise, Department wise, Level wise Reports of Open and Close Complaints.

Towards continual Improvement Post SAHAJ

Some of the areas/aspects throughout process cycle of DPNG segment which have witnessed improvement are stated below:

Focused on front end were the improvements in Customer On boarding Process, Meter Reading and Billing, Geo tagged data, document repository and digitization, transfer of on-ground meter data to central system for real time billing et cetera.

Focused on back end and organizational level improvements were advancements in Revenue Recovery Process such as attributability of activities with respect to debt recovery agency can be ascertained whereas for CRM an enhanced sorting and tracking system using ID tags were developed in-house.

Conclusion

SAHAJ has helped GAIL Gas to revolutionize its DPNG segment through Digital Intervention, which has improved revenue realization by Company and achieve Customer Satisfaction. GAIL Gas has implemented DPNG Platform which is having wide spectrum of functionalities for all stakeholders and the experience can be used to cater wide variety of other CGD segments. GAIL Gas has also successfully extended this package to parent company GAIL (India) Ltd. SAHAJ is being well appreciated by other CGD companies in country and no. of Joint Venture Companies of GAIL/GAIL Gas has shown interest. GAIL Gas is also keen to share experience and knowledge of this Digital Journey with industry and can act as a nodal point of Digitization Initiatives in DPNG segment across CGD industry. ■

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Sustainable IT: A key ingredient in the winning formula for The race to net zero

The race to net zero not only drives attention to the areas where we must cut back, and re-orient, but also triggers businesses to put measures and controls in place to assess how businesses are doing. With ever-increasing IT technology penetration, it has become imperative that the technology itself needs to be managed and assessed so that in the long haul it does not become a liability but a key enabler to finish the race to net zero.

We live in a finite world system and hence our needs should be met with finite resources. The whole focus and motive of Sustainability is on defining the limits of being finite. In contrast, our core human drive is to strive for maximizing the accumulation of resources rather than meeting finite ends and coexist.

IT technology can help businesses to make better decisions (applied analytics, simulated outcome), practice more agility in business operations (real-time data, service base model) and manage data (360 degree one-truth view of the business, past-present-probable future). Using these value outcomes, the business can develop strategies and assess its trajectories to achieve net zero.

Sustainability in context of IT

- Manufacturing of IT components (all associated hardware and peripherals),
- Utilization for a business/purpose outcome (deployment and software application),
- Management of software application and systems lifecycle, hardware and firmware upgrades
- Disposal (migration and obsolescence) of Information Technology ecosystem in a way that minimizes its impact on the environment and business ecosystem.

In totality the subject covers on how IT technology is consuming resources (infrastructure, natural resources, electricity, utilities, man power) to build

and run software application to deliver a business outcome.

End-user Perspective

The two dynamic aspects of Utilization and Management can make a difference from the perspective of an end-user company on how IT technology is sweated and made use of in the race to net zero.

Utilization

This aspect deals with how the needs of IT technology are sized, evaluated, provisioned/procured, and put into use to deliver a business outcome. From the hardware perspective, the line items can range from a simple networking switch to lengths of cable, servers, IT infra racks, routers, converters, network towers, and components, UPS, power & cooling requirements, physical space & protection, access points, and user peripherals. The software stack comprises of coding/application build platform, software deployment system, the front end (user-facing) and the back end of the application, the database which stores all the data, and complete package software ecosystem which can deliver a business result by interacting with the users.

Decision makers must evaluate on what shall be the load of utilization on the assets and what flexibility they shall have to monitor the utilization and if required to crank up/turn down the asset usage. Latest breakthrough technologies like

- **On-Demand computing** which Deals with the churning of IT resources as and when the business demands and hits peak limits on how they are provisioned and sized. For e.g.: during peak load of business hours, the computational and network resources can be optimized to deliver business users' needs and in offload hours the same resources can be used for back-end activities like back-ups, archives, policy updates, and software application maintenance.
- **Virtualization** which provides an edge to mitigate dependency on physical infrastructure and provision on-demand resources with help of in-house virtualization technologies or from cloud service providers where one can provision a basic server, scale up ports, interfaces, connections, update policies on a switch/firewall at the click of a button. It is the optimum use of these technologies that the same e-comm websites work flawlessly at any point in time(sale, non-sale, festive, or usual) of the year be it day or night, rain or shine.

These are very instrumental to keep a tab on the utilization aspects of sustainable IT.

Management

Once you are done with the first time build and deployment of IT infrastructure, resources and software application system there is an ever-inflating need to manage the ecosystem which includes

- Software application system updates
- Bug fixing
- Hardware firmware upgrades
- Updates to mitigate risks for known cyber vulnerabilities
- Interfacing with the new application system,
- End-user support
- Database tuning
- Data cleansing
- Supporting the application ecosystem to cater to evolving business needs.

These tasks are open ended and are worked on as needed basis. Of course, there is a planning and strategy behind to manage the activities but what shall be the actuality and cost associated are practically unknown. Worst case scenario can be like laying down a road and opening it to the public and discovering that within 1 year the resources spent on its maintenance and upkeep have overshot the of building a new one. On top of that, there is no rule book apart from practical ground experience and best practices to get it done right the first time.

Provisioning IT infrastructure and ensuring its reliability

Recovery Time Objective (RTO) specifies the duration of restoration of IT resources and user experience post a disruption/ failure and Recovery Point Objective (RPO) quantifies the duration the data loss is tolerable by the business. These are the two aspects on which the needs must be quantified otherwise one can land in under/overkill of Disaster recovery systems. RPO Both these KPIs must be well assessed and must be practically tested periodically to assess the cost of keeping a disaster recovery ecosystem to deliver reliability to business users. Netflix has been experimenting with the concept of Chaos Monkey which autonomously and sporadically disrupts their IT ecosystem and forces the ecosystem to be resilient on a global scale and also tests the needs and limits of the ecosystem increasing resilience.

Emerging trends in Sustainable IT

- **Green Coding** encourages programming produced and written in a way that minimizes the energy consumption of software. To deliver a particular functionality there are n number of ways a software application can be built and deployed. Apart from the coder's/solution designer's

experience, there is hardly any governing factor that can ensure that the application is built and deployed in a way that consumes the least amount of resources.

- **Containerization** enables new methods to build and deploy an application. It significantly lowers application deployment time and requirements for the nonproduction environment where build and testing take place while also giving the flexibility to be independent of Operating System (OS – Windows, Linux) environment and distributed computing with microservices architecture. Breakthrough application like BHIM, Paytm, ONDC(Open Network for Digital Commerce), etc which works on the principle of open and distributed computing heavily utilizes such technologies.

Sustainable IT Roadmap

- Analyse and Assess your IT application landscape on a periodic basis.
- Build a sustainable IT platform: continuous cycle of application design-build-deploy-maintain-retire/ upgrade.
- Keep a watch on your IT CO2 footprint to account for resource consumption apart from money.
- Kick start and develop a culture that is conscious of Sustainable IT and contributes to sustainable business.

Conclusion

In the race to net zero, one needs to be nimble but still scalable and better decisions, improve response time and be closer to responding to real-time events, and **eventually decide faster on what business model and strategy works well for you.** In the sea of unknowns and uncertainty, only the learner and adaptable shall be the first survivor. Businesses that can respond quickly will not only have an early mover advantage but also have tacit learning unique to them. Technology and data can be your secret tools for survival, provided you get them right at the right time. ■

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Energy Efficiency & Environmental Sustainability Path Forward To Net Zero Emissions

Transition of refining industry to carbon neutrality is the most exciting challenge in recent times. The roadmap for environmental sustainability and net zero target will be defined by the energy efficiency improvement plans.

Climate Action is the defining term of this decade. Energy industry is one of the most crucial stakeholders in transitioning to a sustainable future. UNEP's (United Nations Environment Program) six-sector solution has identified energy efficiency improvement in refining industries as a focus area for climate action. Petroleum products remain the most used energy resource today and are likely to remain so in the next decade. Transition of refining industry to carbon neutrality is the most exciting challenge in recent times. The roadmap for environmental sustainability and net zero target will be defined by the energy efficiency improvement plans.

Sustainability has been part of Bharat Petroleum Corporation Limited (BPCL) corporate culture and is demonstrated by the fact that BPCL is the 8th best company in the world and best in India out of 29 companies assessed in the O&G sector with respect to Sustainability benchmarking by Dow Johns Sustainability Index (DGSI) platform. BPCL, as a corporate, has laid out a stringent roadmap to achieve net zero emissions by 2040, in line with the Indian government's commitment to reach net zero by 2070.

Scope 1, 2 & 3 Emissions

Emissions can be broadly categorized in 3 categories, i.e., Scope 1, Scope 2, and Scope 3 emissions. Scope 1 emissions are due to energy utilized for refining operations, within the refinery premises. Scope 2 emissions are due to energy purchased from outside refinery premises, in order to sustain day-to-day operations. Scope 3 emissions are caused by ensuring availability of raw material and utilization of petroleum products in the market (customer centric). Scope 3 emissions, alone, contribute 70% of the total GHG emissions from BPCL. Reduction of Scope 3 emissions would imply changing

the business policies of BPCL, which is going to be a progressive process. BPCL group of refineries, therefore, must target reduction of Scope 1 and Scope 2 emissions to help realize our net zero targets.

Mumbai Refinery (referred to as BPCL MR hereafter) is the flag ship manufacturing Business Unit of Bharat Petroleum Corporation Limited and one of the state-of-the-art refineries in India having current crude processing capacity of 12 MMTPA. BPCL MR configuration includes two crude processing trains, associated secondary units and off-site facilities. Refining capacity has progressively increased from 2.2 MMTPA in 1955 to 12.0 MMTPA (current) through various projects, unit revamps and improved on-stream factor. In past 5 years, BPCL MR has installed Diesel, Gasoline and Kerosene Hydro-Treaters in order to meet the Government mandate of 100% Bharat-VI fuel market. Addition of these units did nothing to augment the crude processing capacity, although, it did increase the overall GHG emissions from the refinery.

Solomon Associates is a benchmarking leader in refining space and generates indices to compare Refinery performance. Energy Intensity Index (EII) is the Solomon index to compare energy performance amongst Refineries. BPCL MR has been participating in the benchmarking study since 2012 and was in Quartile 2 (Q2) of EII in the latest study cycle in 2020. BPCL MR strives to be in Quartile 1 of the Solomon Benchmarking Index and thus achieve the energy efficiency and sustainability target, to achieve a sustainable refining future.

Initiatives taken by BPCL

Energy reduction plan of BPCL MR to reach Quartile 1 in Solomon EII would contribute to corporation's target of GHG emissions reduction by then. BPCL has taken noteworthy initiatives taken at Mumbai Refinery (refer: fact box)

- **Measure & Monitor :** Challenge to realize GHG emissions reduction, is measurement. To this end, BPCL MR in FY 2020-21, had 2.25 MMT of CO2 equivalent Scope 1 & Scope 2 emissions. Similarly, for future years, the various levels of emissions have been worked out. Our plan is to reduce Scope 1 emissions to the levels of 1.15

Initiatives taken at BPCL Mumbai Refinery

- Energy transition from Power generation by fossil fuels to Solar Power (Renewable energy).
- Facilitation of Green Hydrogen production and utilisation.
- Commissioning of units catering to latest fuel norms and regulations (BPCL MR is 100% Bharat-VI capable).
- Reduction of Scope-II emissions by importing Renewable power.
- Changing compressor drives from steam turbine to Motor.
- Replacement of fuels burnt in furnaces with cleaner and renewable fuels.

MMT of CO2 and nil contribution via Scope 2 emissions.

- **RE Power:** BPCL MR has identified Renewable power generation as a key thrust area, with the initial objective of addressing our inhouse power requirements through renewable sources and subsequently being an established renewable power producer. The target is to ramp up from the current Renewable Energy portfolio of around 42 MW, to reach a level of 1 GW by 2025 and 10 GW by 2040.
- **Hydrogen for de-sulfurization**: BPCL MR uses large quantities of Hydrogen for de-sulfurization processes to make Diesel, Gasoline etc. Currently, Hydrogen is produced through Steam Reforming of Natural gas / Naphtha, which results in high CO2 emissions, resulting in what is termed as 'Grey hydrogen'. Therefore, world over, refineries are setting up large scale electrolysers to produce Green Hydrogen from water and thereby decarbonizing Hydrogen production.
- **Green hydrogen:** BPCL MR has done internal studies, and assessed that, to reach a target of 10% Green hydrogen production by 2030, around 12 MTPD of Green Hydrogen would be required. BPCL is planning to set-up a 50 MW electrolyser at BPCL Bina Refinery to meet a combined 57 MTPD Green Hydrogen demand of all the three refineries.
- **Carbon Capture and Storage:** BPCL is also in the process of identifying proper Carbon Capture and Storage (CCUS) technologies which can be implemented in the refineries to capture GHG emissions. This will be adopted by 2030 and BPCL focus will be to make Scope 1 emissions zero with use of above technologies by 2040. CCUS technologies are still in a nascent stage and ever evolving.

Conclusion

With all the challenges and energy reduction plans mapped above, Digitalization is always at the helm of sustainable refining operations. Advanced Process Control (APC), Digital Twins and Real Time Optimizers (RTO) are helping us to ensure efficient unit operations. BPCL Mumbai refinery has consistently demonstrated its skill and its ability to perform. Energy conservation efforts will remain one of the key focus areas at BPCL MR, both in terms of improvement in operational excellence and development of new projects for making efficiency and sustainability a hallmark of our refining operations. ■

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Avaada Group signs MoU for Rs 40,000 crore Green Ammonia plant with Rajasthan government

New Delhi, India: Avaada Group, an integrated energy enterprise has signed a Memorandum of Understanding (MoU) with the Department of Industries and Commerce, Government of Rajasthan, on August 24th, 2022 to set up a Green Ammonia facility and a Renewable Energy power plant in Kota, Rajasthan. In backdrop of India's green push, Mr Vineet Mittal, Chair, Avaada Group, said, "Green energy transition is vital to the country's Atmanirbharta and will pave the way towards net-zero goals. Aligning with the nation's vision of self-reliance, at Avaada, we aim to make India energy independent by focusing on green energy security."

In regards to the clean energy, Mr Mittal further explained that the biggest advantage of Green Hydrogen is that it burns clean, leaving only water vapour behind. He further said, "For industries that require high-temperature heat, such as foundries and glass and steelmakers, this could be ground-breaking as it will not only replace fossil fuels with renewable sources but also produce green ammonia and a substitute for gas."

GACL commissions expansion of caustic soda plant at Dahej

Gujarat, India: Gujarat Alkalies and Chemicals Ltd (GACL) has commissioned expansion of caustic soda plant at Dahej Complex successfully and started production from recently commissioned facility.

The Board of Directors of the GACL had earlier approved the expansion of caustic soda Plant of Dahej Complex from 785 TPD to 1310 TPD and installation of 65 MW coal based power plant at Dahej Complex.

Archit Organosys commissions expansion projects

Ahmedabad, India: Archit Organosys Ltd (AOL) has announced expansion / diversification, backward and forward integration of its existing manufacturing facility located at Bhavnagar and also at Naroda GIDC, Ahmedabad, integration will be at its existing factory plot located at Bhavnagar and Naroda GIDC.

The expansion projects are now fully operational in Bhanvagar unit and stabilized. Over next few years, AOL is planning to invest around Rs. 60 Crores (around 8 million USD) in products like Ethyl Acetate, Butyl Acetate, Propyl Acetate and Acetaldehyde, simultaneously catalysing India's path to becoming Atmanirbhar.

Gensol Engineering secures orders for building 55.8 MWp solar power projects

India: Gensol Engineering has received purchase orders for the development of solar power projects with a combined capacity of around 55.8 MWp in the states of Gujarat, Jammu & Kashmir, Punjab, Rajasthan, Tamil Nadu, and Telangana.

Out of the seven deals closed by Gensol, five of them are based on full turn-key EPC model, while two are balance of system (BoS) projects.

Whereas, four projects are to be erected over land, while the other three will be constructed over the rooftops of the industrial facilities of its clients.

The total value of these projects is Rs. 153.15 crore (around 25 million USD)

Chhattisgarh's first ethanol plant to be set up in Kabirdham

Kabridham, India: The Kabirdham district administration has identified 35-acre of vacant land adjacent to the factory for setting up the plant. The ethanol plant will be set up under the Public Private Partnership (PPP) basis. It will have a capacity of 80 klpd.

The state government had considered all micro issues before allotting the work after floating a tender at the national level. A contract has been inked between Bhoramdev Cooperative Sugar Factory and NKJ Biofuel, a subsidiary of Chhattisgarh Distillery. The ethanol plant will be constructed be with hybrid technology.

While the construction work is planned complete by the end of the 2022.

Indian Oil Subsidiary Invites Bids to Set Up Green Hydrogen Unit at its Chennai Refinery

Chennai, India: Chennai Petroleum Company (CPCL), a bunch firm of Indian Oil Company (IOCL), has issued an expression of curiosity (EoI) for the design, manufacturing, and commissioning of the electrolyzer and associated objects for the manufacturing of green hydrogen at its refinery at Manali in Chennai, Tamil Nadu. The final date to submit the bids is September 29, 2022. Bids will probably be opened on September 21st, 2022.

The unit must be designed to run a minimal of 8,000 hours per year at 100% capability on a steady foundation (24 X 7) utilizing renewable power and water electrolysis technique to attain a manufacturing capability of 1 to 5 kilo tons every year (KTPA). The inexperienced hydrogen manufacturing capability could be thought of in three designs – 1 KTPA, 3 KTPA, and 5 KTPA.

The scope of labour consists of engineering, fabrication and meeting, providing of electrolyzer modules/stack

together with rectifier and different equipment and spares, particular instruments, and tackles. The availability of Stability of Plant for hydrogen manufacturing of 99.99 % purity at 25 kg/cm2 is a part of the scope. Bidders have to be engineering, procurement, and building (EPC) contractors/ EPC administration consultants with expertise in finishing industrial initiatives within the discipline of energy, oil & fuel or chemical or petrochemical or hydrocarbon or fertilizer, or metallic over the past ten years.

Balaji Amines completes Phase 1 of greenfield project (Unit IV); Phase 2 Capex is Rs. 200-220 Cr (27 million USD)

Solapur, India: Balaji Amines Limited has announced commissioning of a greenfield project along with construction of 2 new plants. As of now the Phase 1 of 90-acre Greenfield Project (Unit IV) has been completed and the Di-methyl Carbonate (DMC)/Propylene Carbonate (PC) and Propylene Glycol (PG). Unit IV i.e., the Phase 1 plant will be ready to commence commercial production by the end of September 2022.

Estimated annual production capacity will now be 15,000 tons of Di-methyl Carbonate (DMC)/Propylene Carbonate (PC) and 15,000 tons Propylene Glycol (PG). It will provide a strategic advantage of being the sole manufacturer of Di-methyl Carbonate (DMC) and Propylene Carbonate (PC) in India. Current annual domestic demand of DMC is about 8,000 to 9,000 tons with main usage in pharma among others while of PG is 170,000 to 180,000 tons & PC is about 3,000 to 4,000 tons, all these are completely met by imports.

The company has also started construction in Phase 2 of the Greenfield Project (Unit IV) for rest of the 2 plants. The environmental clearance for the same has been received well in advance. Balaji Amines Ltd. expects to start operations at the commissioned state-of-the-art manufacturing facilities around the closure current financial year.

L&T Wins Contract from Indian Oil Corporation

Mumbai, India: The Hydrocarbon-Onshore division of L&T's Energy Business has secured a Multi-million INR contract from Indian Oil Corporation (IOCL). IOCL is implementing the Panipat Refinery Expansion (P-25) Project to enhance refining capacity from 15 MMTPA to 25 MMTPA to meet the growth in demand of petroleum products and to increase their profitability and competitiveness in the long run. The engineering, procurement, construction, and commissioning (EPCC) contract is for setting up a Residue Hydrocracker Unit (RHCU) for this P-25 Project. The RHCU is licensed by Axens (France) with a capacity of 2.5 MMTPA and will upgrade the Vacuum Residue (VR) to high-value commercial products

(mainly diesel). The contract is awarded through international competitive bidding on a Lump Sum Turnkey (LSTK) basis. L&T earlier bagged a significant EPCC Contract for setting up DHDT Unit (5.0 MMTPA, licensed by Shell) under the same P-25 Project of IOCL at Panipat-Refinery.

Commenting on the win, Mr. Subramanian Sarma, Whole-time Director & Sr. Executive Vice President (Energy) said, "We are very delighted to be part of this large expansion project of IOCL-Panipat. I would like to thank IOCL for having trust in our capabilities. We are fully committed to delivering the complex process units with high standards of HSE and Quality."

Cairn Oil & Gas's prolific Mangala oil field enters 14th year of production

New Delhi, India: Cairn Oil & Gas's Mangala oil field in Rajasthan is India's largest onshore oilfield and is playing a driving role in leading India towards achieving energy "Atmanirbhar." Celebrating the occasion, Prachur Sah, Deputy CEO, Cairn Oil & Gas, said, "We are happy to announce that Mangala oil field has completed its 13th year of production. The field has been instrumental in supporting India's domestic crude production and we are confident that the field will remain relevant in the coming years as India charts its path towards energy "Atmanirbhar." The field has been home to some of the finest global partnerships that have propelled innovation in technologies of oil and gas exploration and production.

The field has also witnessed crucial innovation in Enhanced Oil Recovery (EOR), use of Alkaline Surfactant Polymer (ASP) technology and being home to the Mangala pipeline – the world's longest continuously heated and insulated pipeline that traverses ~705 km carrying crude from the fields of Rajasthan to refineries in Gujarat. The Mangala pipeline is now switching to solar energy and will be powered by solar panels installed across the length of the pipeline. The celebrated pipeline has been a testimony of industry leading practices, and its conversion to solar power is setting a precedent for the oil and gas sector. ■

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

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