

ICC Sustainability Conclave 2024 6th Edition

Sustainable Chemical Manufacturing: Innovations, Integration and Incentives

04-06 December 2024, New Delhi

Key Takeaways



Session Wise Key Takeaways

Day 1 - 5 th December 2024, Thursday	
Day 1, Session 1	
Agenda: Inaugural Session	
Key Dignitaries	<ul style="list-style-type: none"> Welcome Address - Mr. Kartik Bharat Ram, President ICC & Joint Managing Director, SRF ICC Perspective on Sustainability - Mr. Ravi Kapoor, Chairman - Sustainability Committee, ICC & Managing Director, Heubach Colour Pvt. Ltd Chief Guest Address - Smt. Anupriya Patel, Hon'ble Minister of State for Health & Family Welfare and Chemicals & Fertilizers, Government of India Global Perspective on Sustainability - Dr. Volker Fitzner, Global Chemicals Leader, PwC Statement from UNEP - Mr. Ludovic Alain Bernaudat, Head - Knowledge and Risk Unit, Chemicals and Health Branch, United Nations Environment Programme (UNEP) Vote of Thanks - Mrs. Ramya Bharathram, Vice President, ICC & Managing Director & CFO, Thirumalai Chemicals Limited
Key Takeaways	<ul style="list-style-type: none"> The chemical industry plays a pivotal role in transforming multiple sectors from Agriculture to Healthcare and Transportation to Construction. Chemicals & Petrochemicals sector continues to be the cornerstone of the Indian Economy and with over 80,000 chemicals, the growth of the sector becomes pivotal for India's Industrial Self Reliance. Contributions from domestic players are very critical for making domestic industry competitive and environmentally responsible at the global level. Currently, the Indian Chemical Industry is valued at more than 250 USD Billion and is expected to surpass 300 USD Billion by 2025 and touch a mark of 1 USD Trillion by 2040. The rising demand for Chemicals and Petrochemicals is driven not only by industrial needs but also by ever growing population needs. Hence, focus should also be on sustainability on every aspect of industry's operation and expansion to balance economic growth. Government initiatives such as PCPIRs and dedicated chemical parks are key in driving both sustainable investments and sectoral growth. Currently, the domestic industry is undergoing a significant shift towards sustainability propelled by the efforts to decarbonize, adopt green technologies, and embrace digitalization The global shift from oil to chemicals coupled with transition to green hydrogen opens substantial opportunity for advancing sustainability. With respect to global initiatives, EU has taken a regulation driven approach to adopt sustainable manufacturing, while the US has approached a tax driven investment incentive approach. Developments are undergoing on the path of net zero on the global scale but collaboration with all the stakeholders in the ecosystem is essential India has pledged for net zero carbon emission by 2070 and reduce carbon intensity by 45% by 2030 from 2005 level. In light of these commitments, the industry needs to be committed to the adoption of sustainable practices, decarbonization, and circularity. Collaborations with Global Chemical and Petrochemical Industry is also required to achieve common goals through the exchange of best practices and by implementing ecofriendly alternatives optimizing energy efficiency. The journey towards sustainability is challenging and requires a multifaceted approach that requires collaboration across the value

	chain fostering innovations and a steadfast long-term commitment from all the industry stakeholders. This industry transition will not only help to protect the environment but also to enhance the sector's resilience, its competitiveness, its ability to meet the evolving regulatory standards and consumer expectations.
Day 1, Session 2	
Agenda: Thematic Presentation by Knowledge Partners	
Moderator	Mr. Sandeep Mohanty , Partner and Leader - Climate & Sustainability Strategy, PwC India
Key Takeaway	<ul style="list-style-type: none"> Historically, India has been a fossil fuel-based economy. Hence, majority of the feedstock used in chemical sector is fossil based leading to significant emissions. Innovation is considered to be the cornerstone of sustainability in the chemical sector. Hence, to enhance reliance & drive sustainable transformation in this sector, the government has allocated INR 190 Cr worth funds towards innovation in the sector. Evolving consumer demands and stress on natural resources has generated a need for greener process replacing traditional energy with renewable energy and embedding circular economy principles to minimize waste and natural resources Given the right policy push, the right innovation, capital and scale up would become economically viable and can also lead to significant resource saving as well. Embedding Green Chemistry in R&D and manufacturing processes, the Chemical Industry can achieve a balance between performance, cost efficiency, and environment responsibility. Sustainability doesn't stop at production itself; it extends to supply chain as well. Hence, the industry has been increasingly focusing on creating integrated, more transparent, and traceable supply chain network. In addition, the focus is also on adopting circular economy principles which can lead to transformation shift in the sector ensuring reduced dependency on natural resources, maximize reuse and recycle of chemicals.
Day 1, Session 3	
Agenda: CEO Panel Discussion on Sustainable Chemical Manufacturing (Innovation, Integration, and Incentives)	
Moderator	Mr. Ravi Kapoor , Chairman - Sustainability Committee, ICC & Managing Director, Heubach Colour Pvt. Ltd
Key Panelists	<ul style="list-style-type: none"> Mr. Alexander Gerding, Managing Director, BASF India Limited Mr. Deepak Jain, CEO & Managing Director, Jubilant Ingrevia Limited Mr. Vinod Paremal, CEO & Managing Director - Evonik, Indian Subcontinent Ms Jenny Davis Peccoud, Partner Founder, Global Sustainability & Responsibility Practice, Bain & Company
Key Takeaway	<ul style="list-style-type: none"> The speed of adoption of the sustainable products will vary according to the utilization of the products in a particular industry, by the customers, and in a country. Bain and Company's survey with top B2B customers highlighted that 36% of the customers would prioritize sustainable products compared to current products while 80% of these customers are not satisfied with current sustainable solutions. In addition, government support would also be required in terms of initiatives and incentives for decarbonizing the Indian Chemical Industry and embracing sustainability BASF plans to adopt a market-based approach for their sustainable initiatives and measures while maintaining their existing net zero targets. As global chemical demand has shifted from Europe/America to Asia with Asia constituting ~70% of the global chemical market, BASF has also planned to shift their

	<p>production units and implement sustainability measures from Europe/America to closer proximity of the major demand centers (i.e. Asia particularly in China and India)</p> <ul style="list-style-type: none"> Jubilant Industries has been focusing on sustainability for the last 20 years. They anticipate satisfying 35 - 40% of their energy requirements through renewable sources by 2025. They have also planned to set up a boiler in Bharuch (Gujarat) which could intake up to 50% biomass for steam generation. In addition, 50% of their current water requirement is recycled across all plants and anticipate increasing to 80% in the next 3 to 4 years. Also, 90% of the waste generated in the plants is recycled and they have expectations to increase it to 99% - 100% in the next few years Evonik on the other hand has organized sustainable innovation investments in 3 major areas including Precision by Solutions, Energy Transition Acceleration, and Enabling Circular Economy and anticipate generating a revenue of 1 Billion EUR additionally in the next ten years through these investment areas.
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Day 1, Session 4

Agenda: Decoding the Complexities of Decarbonization - Technologies and Solutions

Session Chair	Shri Deepankar Aron, IRS , Joint Secretary - Chemicals, Department of Chemicals & Petrochemicals, Ministry of Chemicals & Fertilizers, Government of India
Moderator	Ms. Apurba Mitra , Partner and Lead - Climate Change and Nature, KPMG India
Key Panelists	<ul style="list-style-type: none"> Mr. R Mukundan, Managing Director & CEO, Tata Chemicals Ltd. Mr. Samir Somaiya, Chairman and Managing Director, Godavari Biorefineries Dr. Raja Kaliappan, Head - R&D, Godrej Industries Ltd (Chemicals) Mr. Rajat Arora, R&D VP - Head of South Asia & Asia, Unilever, Chair WG – Material Transition, Resource Efficiency and Circular Economy Industry Coalition
Key Takeaway	<ul style="list-style-type: none"> Defining clear strategy related to sustainability is essential in decarbonizing the Chemical sector. Tata Chemicals has adopted 3 prompt approaches to deliver on decarbonizing the sector by delivering on carbon, circularity, and biodiversity. Due to limited availability of gas in India compared to Middle East and West, Tata Chemicals also focusses on utilizing and blending bioresources (both terrestrial and marine resources) as an essential route towards decarbonization Converting batch processes into continuous process, carrying out reactions using enzymes, utilizing electrochemistry, etc. are few modern ways of manufacturing chemicals that offer multiple sustainable benefits compared to traditional processes Challenges are observed in developing a sustainable substitute to a fossil-based chemical compound with similar properties because the end users don't prefer to pay higher for products with similar properties but prefers an enhanced version of the similar fossil based compound with additional properties even if its costlier than the base compound

Day 1, Session 5

Agenda: From the States - Sustainable Chemical Infrastructure Challenges and Way Forward

Session Chair	Dr. Rajeev Ranjan IAS (R) , Former Chief Secretary, Tamil Nadu
Moderator	Mr. Manas Majumdar , Partner and Leader - Leader Oil & Gas, Fuels & Resources, PwC India
Key Panelists	<ul style="list-style-type: none"> Kongalla Ranjith, Andhra Pradesh Economic Development Board Ms. Ritu Sain, IAS, Investment Commissioner, Govt of Chhattisgarh Mr. Vikram Singhal, President, Gulbrandsen Technologies, Inc.
Key Takeaway	<ul style="list-style-type: none"> Effective management of the by-products from the Chemical Industry is essential in reducing the environmental impact from the industry. It becomes essential for the State & Central governments to contribute to reducing the impact by

	<p>providing legislation for policy development, infrastructure support and creating proper systems for streamlining the approval process and transparent monitoring</p> <ul style="list-style-type: none"> • Andhra Pradesh visions to create 20 million jobs out of which 5 lakhs would account to the manufacturing sector alone and become a 2.47 Trillion USD economy by 2047. With respect to the Chemical Industry in the state, it is blessed with good geographical positioning, 6 ports (4 more under development), and 6 airports (6 to 7 more upcoming). The state has also come up with various policies to develop the sector, some of which are - Industrial Policy, Public Private Park Policy, Electronics Policy, MSME policy, and Food Processing policy based on the principles of developing the state as a global manufacturing hub, providing product perfect value creation, green energy transition, and port-based value addition • For the chemicals business in Gujarat, the state provides quick land acquiring process, ease of acquiring the required permissions for business operations, feedstock availability, and qualified manpower which are essential for the success of a chemical company in any state. But the state still needs to work on its logistics and effluent treatment infrastructure • In case of Chhattisgarh, the state provides power availability 24*7 at competitive rates, has no history of labour union disputes, lowest wage rates, and has access to natural resources & ingredients crucial for the Chemical Industry
Day 1, Session 6	
Agenda: Creating Sustainable Growth in Chemicals (AI & Digitalization Strategies)	
Moderator	<ul style="list-style-type: none"> • Mr. Ajay Deshmukh, Partner, Climate & Energy, PwC India
Key Panelists	<ul style="list-style-type: none"> • Mr. Umesh Sathe, Vice President and CEO - Process Automation, Siemens Limited • Mr. Mithilesh Kumar, Lead - Advanced Technology Center India, Chemicals & Natural Resource, Accenture • Mr. Ankit Aggarwal, Director, R&D - IT, PI Industries Ltd
Key Takeaway	<ul style="list-style-type: none"> • Energy reduction, utilization of various feedstocks, and managing circularity has been the 3 major challenges of the Chemical Industry for embracing sustainability. Through adopting various AI/ML technologies in the sector such as digital twins, companies can run the processes effectively, thus reducing significant energy consumption. Companies can use technology to find optimal methods to utilize various feedstocks, reducing number of experiments to be carried out followed by decrease in number of failures. Companies can also keep a track of the life cycle of the plants and its products using various technologies for effective monitoring of the organization's circularity • AI/ML & Digitalization can also aid in organization's sustainability performance monitoring and predicting impact of a disruption in the operational processes • However, adoption of AI/ML or other digitalization technologies should not be a compulsion if the technology is available. It should be implemented only if it is making sense for the organization's needs, meeting the objectives in an efficient and consistent manner. • Companies are facing challenges with respect to implementation and with respect to not having the right foundations for adopting AI/ML or other digital technologies. Implementation challenges contribute only 20% of the overall challenges, while the major share is contributed by the absence of the right foundations in the organization for effective adoption of various digital technologies.

	<ul style="list-style-type: none"> • Data Integration, Cyber Security, and Workforce Compatibility are among the few challenges with respect to right foundations that are creating a resistance for technology adoption for the domestic companies • With respect to MSME enterprises, successful adoption of digital technologies would require analyzing core processes on which enterprises success is dependent and digitalized only those processes. Apart from the major processes, enterprises should also focus on developing digital competency, monitoring & controlling digital initiatives, and developing a value creation plan
Day 1 – Session 7	
Agenda: CEO Roundtable Conference	
Key Dignitaries	<ul style="list-style-type: none"> • Shri Deepankar Aron, IRS, Joint Secretary - Chemicals, Department of Chemicals & Petrochemicals, Ministry of Chemicals & Fertilizers, Government of India • Mr. Kartik Bharat Ram, President ICC & Joint Managing Director, SRF • Mr. Ravi Kapoor, Chairman - Sustainability Committee, ICC & Managing Director, Heubach Colour Pvt. Ltd • Sothi Selvam, Director General of ICC • Dr. Pranav Tripathi, Head of Responsibility Care and Sustainability Initiatives, ICC • Shraddha Rane, Secretary General, ICC • Janardhanan Ramanujalu, Vice President, SABIC • Mrs. Ramya Bharathram, Vice President, ICC & Managing Director & CFO, Thirumalai Chemicals Limited • Samir Somaiya, Chairman, Godavari Biorefineries Ltd • Umesh Sathe, Vice President and CEO -Process Automation, Siemens Limited. • Mr. Alexander Gerding, Managing Director, BASF India Limited • Mr. Vinod Paremal, CEO & Managing Director - Evonik, Indian Subcontinent • Rupark Saraswat, CEO, India Glycols • Deepak Jain, CEO, Jubilant Ingrevia • Vikram Singhal, President, Gulbrandson Technologies • Rahul Navar, Professor, IIT B, Chemical Engineering • Dr. Achana Danait, Dean, Strategy and Industry Partnership, Somaiya Vidyavihar University • Kartikeyan K S, CEO, Proklean • Anand Srinivasan, Managing Director at Covestro India • Vivek Shetty, Chairman, Viswaat Chemicals • Dinesh Chopra, Chairman, ICC Industry Academia Committee • Mr. Manas Majumdar, Partner and Leader - Leader Oil & Gas, Fuels & Resources, PwC India • Mr. Sandeep Mohanty, Partner and Leader - Climate & Sustainability Strategy, PwC India • Mr. Mukund Devnani, Partner - Chemicals Practice, PwC India
Key Takeaways	<ul style="list-style-type: none"> • Responsible Care (RC) company is an initiative in the Chemical Industry for the companies to demonstrate their commitments towards protection of health, safety, and environment. Such affiliations have aided companies in achieving other certifications such as ISO, SEDA, etc. Many multinational chemical companies observe it as a management information system which helps the top management of an organization to understand the performance of the company effectively. However, adoption of RC in small size domestic companies are still minimum. Hence, awareness & education about the initiative and the benefits it

	<p>provides is required through discussions among these companies for increasing RC adoption.</p> <ul style="list-style-type: none"> • Ratings and Certifications with respect to ESG norms have developed into a service-based businesses across the globe with multiple companies providing various types of services. These ratings and certification identify a company as a green company. Multiple companies also acquire such ratings due to a common industry practice and to ensure trust among its customers that the company is undergoing environment friendly practices. • Major global investors are focused on investing in sustainable sectors. Thus, chemical sector being a hard to abate sector is expected to receive less investments compared to other sectors. Hence, it becomes important for the chemical companies to implement and adopt relevant and value adding ratings and certifications with respect to their customers and investors • The domestic industry is currently unregulated by the government promoting sector's growth based on market forces. Currently, the Indian government doesn't impose any major regulations, but it becomes important for the industry to implement foreign regulations since the domestic industry is a significant part of the global supply chain. • The foreign companies also face challenges in the domestic industry with respect to land availability, environmental clearance, and cost competitiveness compared to China. The domestic industry consists of trained & skillful resources and provides ease of setting up chemical plants, but the cost of business operation is high. • Hence, for the development of the sector, the Department of Chemicals and Petrochemicals have been undergoing brainstorming sessions with Niti Aayog regarding carbon related sustainability goals (mostly related to decarbonization). The government has also started an initiative to train hazardous units of domestic chemical companies undertaking training programs for 50 hazardous unit per program and targeting to conducting 50 - 60 training programs in the next five years. The government has also developed 13 Center of Excellence (CoE) across the country with special emphasis on Biopolymers, Bio-chemicals, and Green Chemistry • In addition to the initiatives undertaken by the government, a proper framework for policy formulation is required with increased engagements with the industry stakeholders. There is a need for comprehensive and dynamic chemical policy which needs to be contemporary and future oriented. Growth of the domestic industry will be based on creating knowledge-based organizations and deliver sustainable business models. • Currently the industry cluster is concentrated in Gujarat. To shift cluster to other parts of the country, the government proposes for white papers on comprehensive analysis with respect to infrastructure gaps, policy gaps, industry experience, and government policies among the states providing clarity on policy development. • Key industry stakeholders expect 4-5x growth in the industry in the next 10 years with major focus on developing strategic ways for cost competitiveness and integration in the value chain
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Day 2 - 6th December 2024, Friday

Day 2, Session 1

Agenda: Opening Session

Key Dignitaries	<ul style="list-style-type: none"> • Sothi Selvam, Director General of ICC • Welcome Address - Mrs. Ramya Bharathram, Vice President, ICC & Managing Director & CFO, Thirumalai Chemicals Limited • The event so far: Way Forward - Mr. Ravi Kapoor, Chairman - Sustainability Committee, ICC & Managing Director, Heubach Colour Pvt. Ltd • Address by Chief Guest - Smt. Sukriti Likhi, IAS, Chairperson, National Authority Chemicals Weapons Convention (NACWC), Cabinet Secretariat, Government of India • Vote of Thanks - Mr. Rupark Sarswat, Northern Region Chairperson - Indian Chemical Council, CEO -India Glycols Ltd
Key Takeaway	<ul style="list-style-type: none"> • The Chemical Industry has made significant strides towards sustainability and there is a strong emphasis on reducing environmental impact by the industry by adopting cleaner production methods, lowering greenhouse gases emissions, and energy consumption. • The move towards sustainability is an opportunity towards growth and innovation. Hence, more and more companies today are focused on waste minimization and resource optimization by adopting energy efficient manufacturing processes and recycling & reusing materials wherever possible. • Steel Industry is exploring Green Hydrogen to reduce the carbon footprint showcasing how chemical companies can lead the way in adopting sustainable practices. Another development is the rise of synthetic biological Green Chemistry. Innovations in this field is revolutionizing chemical production enabling processes that minimize waste and reduce pollution and are more energy efficient.

Day 2, Session 2

Agenda: UNEP Session Global Frameworks on Chemicals

Session Chair	Shri Deepak Mishra (IFS) , Joint Secretary (Petrochemicals), Department of Chemicals and Petrochemicals, Ministry of Chemicals & Fertilizers, Government of India
Session Co Chair	Shri Ved Prakash Mishra (IRS) , Joint Secretary, Ministry of Environment, Forest and Climate Change, Government of India
Moderator	Ms. Apoorva Arya , CEO, Circular Innovation Lab
Key Panelists	<ul style="list-style-type: none"> • Mr. Ravi A. Shroff, Managing Director, Excel Industries Ltd • Mr. Ludovic Alain Bernaudat, Head - Knowledge and Risk Unit. Chemicals and Health Branch, UNEP • Dr. Debabrata Rautaray, Vice President - Chief Product Development & Innovation Officer - DCM Shriram Chemicals • Mr. Karthikeyan KS, CEO, Proklean Technologies
Key Takeaway	<ul style="list-style-type: none"> • Global Framework on Chemicals initiative offers standardization on major chemical processes and operations for embracing sustainability at the Global Chemical Industry level which are adopted by every country resulting in a common industry goal & similar stakeholder involvement. This leads to effective & productive communication with global chemical players. • Successful implementation of the framework in the domestic industry will require engagements and cooperation between the Industry and the Government and act responsible and committed towards acting upon the governmental regulations and compliances.

	<ul style="list-style-type: none"> The framework offers an implementation program which works as a platform for discussing the key challenges faced by the industry and providing best practices in resolving them thus providing a platform for collective discussion about the development of the domestic industry
Day 2, Session 3	
Agenda: Mastering the Art of Selling Sustainability - Engaging Stakeholders	
Moderator	Mr. Sambit Patra , Partner, Bain & Company
Key Panelists	<ul style="list-style-type: none"> Mr. Kartik Bharat Ram, Joint Managing Director, SRF Limited Mr. Ravi Kapoor, Chairman - Sustainability Committee, ICC & Managing Director, Heubach Colour Pvt. Ltd Ms. Jenny Davis - Peccoud, Partner Founder, Global Sustainability & Responsibility Practice, Bain & Company
Key Takeaway	<ul style="list-style-type: none"> Growing divide in sustainability expectations between supplier and buyer has been observed because most B2B supplying companies are lagging in understanding and identifying their customer's sustainability importance, sustainability needs, and how the solutions offered are satisfying customer needs. Companies are also observed to lag in identifying major elements of the sustainable products which are contributing significantly on their customers' needs. According to a Bain's survey with Global B2B suppliers, only 25% of them, take out time to understand the sustainability needs of their customers, while 40% of them understand the sustainability benefits of the products that they are selling, and only 15% of them provides incentives for sales of sustainable products. However, commercials are still the final decision-making parameter during B2B sales and sustainability element comes into the picture for decision making only when the rest of the parameters don't exhibit major differences. With respect to the sales approach, sustainability element in business strategy and profitability of the business has to be tailored with respect to the particular country, customer, application and the product to be offered. One thumb rule cannot be implemented in all geographies, customer types and product portfolio. The awareness and necessity of sustainable products procurement is mainly a CEO-to-CEO discussion. Hence, sales of sustainable products should be initiated at the CEO level and gradually transferred to the procurement level. A procurement person would emphasis more on the commercial element rather than sustainability, hence CEO to CEO discussions are necessary and expected to carry out multiple times (5 to 6) throughout the year.
Day 2, Session 4	
Agenda: Harmonizing the Complex Landscape of Product Safety and Chemical Regulations	
Moderator	Mr. Manpreet Singh , Partner, ESG Strategy and Transformation, PwC India
Key Panelists	<ul style="list-style-type: none"> Dr. Vishal Choudhary, Scientist F, Office of the Principal Scientific Adviser, Govt. of India Mr. Willi Muenninghoff, APAC Director Health Science, Ramboll Korea Mr. Vijay Srivastava, Chief Operating Officer, Whole Time Director, Jubilant Ingrevia Dr. Jayachandran Nair, CEO, Global Product Compliance
Key Takeaway	<ul style="list-style-type: none"> Compliance & Regulations aid in reducing/limiting the harmful effects of toxic chemicals regulating their impact on the environment. Regulation compiles companies to innovate thus acting as a driver towards sustainability According to global regulatory milestones, global companies are committed to compliance driven emission reduction targets. Hence, there existing a direct

	<p>connection between compliance and trade. Compliance also acts as an enabler, harmonizes standards, establishing fair trades and prevention of barriers. Compliances allows companies to sell in regulated countries and establish trust in buyer and seller</p> <ul style="list-style-type: none"> • There is need to align domestic regulations with global regulations. Since, India is facing a lack of uniformity between domestic and global regulations, domestic companies are finding it difficult to export to certain markets where regulations are not uniform with Indian Chemical Safety Management Regulations • Currently most of the domestic consumers lookout for products which are more economical and have reduced footprint. Also, a survey among them resulted that, 60% of the consumers are willing to pay a premium for a more sustainable product. Hence, it becomes vital for domestic companies to comply with required regulations. • Major companies mostly comply with the regulations, but challenges exists with MSMEs as they are required to be aware and educated about the benefits of the compliance and regulations. Hence, to make the MSME companies' product competitive with respect to price and quality, the Indian Government has established Science and Technology Clusters (a consortium of research institutions and major domestic companies) over the country providing technical solutions and required information for MSME sector
Day 2, Session 5	
Agenda: Responsible Care - Product Stewardship and Circularity: Design, Development, and Delivery	
Moderator	Dr. Volker Fitzner , Global Chemicals Leader, PwC
Key Panelists	<ul style="list-style-type: none"> • Mr. Rupark Sarswat, CEO, India Gylcols Ltd • Dr Ashok Menon, Director Sustainable Strategy APAC, Site Head SABIC Research and Technology Centre • Prof. Abhishek Sharma, Dr. Ramdas Pai Professor Chair, Professor, Department of Biotechnology & Chemical Engineering, Manipal University Jaipur • Mr. Balaram Khot, Wholetime Director and Head of PTSE, LANXESS India
Key Takeaway	<ul style="list-style-type: none"> • For sustainable product stewardship, many companies are leveraging digital twin technologies to build digital models, develop digital replica of physical process and process plants, to carry out simulation and optimizations even before the plant is installed and operated providing advantage in eliminating costly prototypes and resources for experiments thus decreasing energy consumption, raw material consumption and waste generation • With respect to manufacturing phase, digital products such as Machine Learning, AI tools, Predictive Maintenance Monitoring and Advanced Process Control technologies are aiding in monitoring data in an effective and efficient way thereby increasing overall efficiency and productivity of the plant. In addition, companies are utilizing new recycling technologies for handling end of life of chemical compounds breaking down complex compounds into simpler ones