



# Sustainability Makes Economic Sense

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In a changing landscape for the Indian chemical industry

**2<sup>nd</sup> edition of ICC Sustainability Conclave**

*Released on 20 January 2021 for 2nd Edition of ICC Annual Sustainability Conclave*



# Acknowledgements

ERM would like to thank the Indian Chemical Council (ICC) for collaborating with us and inviting us as a knowledge partner for the 2nd Annual ICC Sustainability Conclave, January 2021.

We are thankful to Dr. Rakesh Kumar, Officer-Sustainability, Environment & Regulatory issues, ICC NR, Mr. P S Singh, Secretary, ICC NR, Mr. Kumaresh C Mishra, IAS (Retd.) Director, ICC and Mr. Kunal Jain, Deputy Secretary, ICC for their constant support and guidance.

Shivananda Shetty, Jaydeep Sathaye, Pranav Sinha, Avinash Kumar, Rati Bhattacharya, Debanjan Bandyopadhyay, Rutuja Tendolkar, Swaroop Banerjee, Shubha Shanbhag and Sanjukta Biswas authored this paper.

We would also like to thank The SustainAbility Institute, WBCSD and the global ERM technical community to have provided us with thought leadership insights that are referenced in this paper

We thank Tanvi Katti and Siddhartha Ganguly for their design support and Sreemoyee Bhattacharrya from the service development team for her support.

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# Congratulatory Message



सत्यमेव जयते

प्रधान मंत्री  
Prime Minister

## MESSAGE

It is heartening to learn that Indian Chemical Council (ICC) is organising the second edition of 'ICC Sustainability Conclave – Sustainability makes economic sense'. The assembly of various stakeholders at the Conclave reflects the importance attached to promote sustainability in every sphere of activity.

A harmonious co-existence with nature has always been an integral part of our way of life. India's value systems accord topmost priority towards caring for our surroundings.

Our traditional practices have always laid emphasis on optimum and responsible use of resources with a sense of sustainability. Our Government has constantly furthered this spirit with various initiatives aimed at strengthening our resolve towards cleaner environment and thriving biodiversity.

From transformative use of technology to emphasis on zero effect on nature, we remain steadfast in our efforts to build a new and self-reliant India, while adopting an inclusive and participatory approach towards development. Efforts such as leveraging renewable sources of energy, eliminating single use plastics and converting waste to wealth and waste to energy reflect our sincerity for an even better planet for the coming generations.

I am sure the Conclave will present the participants from the chemical industry and allied sectors a platform to deliberate upon various issues and chart out a roadmap towards adopting innovative and effective measures furthering sustainability.

I wish the deliberations at the Conclave all success.

(Narendra Modi)

New Delhi

पौष 29, शक संवत् 1942

January 19, 2021

**Shri Ravi Kapoor**

Conclave Chairman

Sir Vithaldas Chambers, 6<sup>th</sup> Floor

16, Mumbai Samachar Marg, Mumbai

Maharashtra- 400001

# Message of Encouragement

के. विजयराघवन

भारत सरकार के प्रमुख वैज्ञानिक सलाहकार

**K. VijayRaghavan**

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## Message

India is gearing up to become the world's economic growth engine. However, this can be pragmatically achieved only when the focal point of sustainable development is also located in the country.

In order to fulfill the shared vision of making India a \$5 trillion dollar economy by 2025, the industry needs to reimagine our relationship with nature and reprioritize our R&D goals on how we create impact, on the environment and society that we all are a part of while continuously improving manufacturing processes.

Sustainability is really a mother lode of organizational and technological innovations that yield both top line and bottom line returns. Environmental and social governance, efficient and effective resource optimization strategies, sustainable product innovation, transparent and trackable value chain are topping the charts for organizations as a means to minimize risks and reset growth in the next normal.

India Inc.'s growth story is also underpinned by the core value creation and protection principles of sustainability - increased business resilience, competitive advantage, new revenue streams and improved access to capital. The key players are viewing their sustainability agenda as opportunities to minimize business disruptions, create value for the community and enhance their shareholders' trust.

One of the key contributors to India's growing sustainability story is the Indian Chemical Industry. Recently, India's chemical exports rose by 7.43% to Rs 2.68 lakh during April'19 – Jan'20 making it the top exporting sector in the country.

As the 6<sup>th</sup> largest in the world and 3<sup>rd</sup> largest in Asia, this sector is expected to become the economy's 'growth anchor' in the near future. Accounting for 7% of the GDP, 14% in overall index of the industrial production, and employing over 2 million people this sector, it is not only aiming for economic revival but also positioning India to become a resilient, sustainable and stable growth engine for the world.

Top companies are realigning their sustainability goals as absolute must-haves in their business's resilience strategies and rebound plans. By transcending beyond compliance boundaries, these organizations are reprioritizing their sustainability programs to deliver materially better outcomes - mitigating environmental and social risks, integrating the principles of resource efficiency, product stewardship and circularity in their operational excellence goals, developing robust corporate governance mechanisms and instilling digitally agile transformation across the value chains.

I heartily congratulate the ICC for organizing the second edition of Sustainability Conclave, to have planned such a timely and comprehensive thought leadership forum that highlights how sustainability is an integral value enabler for the Indian chemical industry, now and into the future. This Knowledge Booklet shall provide the readers with strategic insights, knowledge and actionable intelligence to carve out a sustainable roadmap for the Indian Chemical Industry.

Let us work together to make India the vanguard of sustainability.

  
(K. VijayRaghavan)

Dated : 15<sup>th</sup> January, 2021

# Message from ICC Leadership



## **RAVI GOENKA**

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**President – Indian Chemical Council**

Chairman and Managing Director, Laxmi Organic Industries Ltd.

If there is anything that this past year has taught us, then it is to think and act more responsibly towards the environment and provide for a more sustainable future. Despite the recent downturn witnessed by the entire global economy, India still remains one of the fastest growing emerging market economies with a burgeoning innovation and business ecosystem. Hon'ble Prime Minister has given a clarion call of making India a 5 Trillion-dollar economy by 2025. This would mean that the chemical industry must grow from USD 125 Billion in 2018 to USD 300 Billion by 2025, and that too in a sustainable manner using innovative technologies to make economic sense from waste.

On one hand we are witnessing rise of India's stature in the world of chemical manufacturing, and on the other hand India is committed to the UN Sustainable Development Goals (SDGs). Aligning these two themes, increasing chemical manufacturing and achieving UN SDGs, ICC Sustainability Conclave 2021 has been curated to include illustrious speakers to discuss and brainstorm a myriad of important subjects on Sustainability. The theme of the Conclave, "Sustainability Makes Economic Sense", could not be more apt and thought provoking, given the state of world we currently live and occupy. This conclave, in its digital avatar, would enlighten, educate and open our minds to new innovations and discussions around sustainability in the chemical sector.

The Indian Chemical Council team deserves much admiration and support for conceptualizing this Conclave. ICC being the apex national body representing the Indian Chemical Industry and all its facets, has collaborated with Ministry of Chemicals & Fertilizers, Govt. of India; Ministry of Environment, Forest and Climate Change, Govt. of India; United Nations Environment Program (UNEP); and International Council of Chemical Association (ICCA) for organizing this Sustainability Conclave 2021 on 20-21, January 2021 on a virtual platform.

Indian Chemical Council (ICC) and Environmental Resource Management (ERM) have jointly created this knowledge paper to proliferate best practices and principles on sustainability; and aide the members of the Indian chemical fraternity to take environmentally responsible actions and profitable decisions.

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## Message from ICC Leadership



### **VIJAY SANKAR**

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**Immediate Past President-Indian Chemical Council**  
Deputy Chairman, The Sanmar Group

The Indian Chemicals and Petrochemicals industry is widely regarded as an industry-of-industries with a combined turnover of over US\$ 170 billion. It is in a sweet spot of unrealized potential and tremendous opportunity. It should witness significant growth this decade driven by rising disposable income, young population, rapid urbanization, shifts in production and consumption, the customer shift towards a healthier life style and growing export opportunities.

Currently, a large part of the domestic demand for specialty and downstream chemicals is served via imports—offering large headroom for local production. In addition, changing geopolitics offers the opportunity for India to emerge as a global production & export hub.

As the premier Chemicals Industry association, ICC continues to actively work with both the Industry and the Government to ensure that the chemical industry contributes its fair share and plays an important role in the country's economic revival post COVID-19. This sustainability conclave exemplifies ICC's commitment to promote the cause of sustainability even while focusing on the growth potential for the industry.

I am happy that the foundation laid by ICC in Nov'19 with the first edition of the conclave is being successfully followed this year despite the unforeseen challenges that we are facing today. Growth shall not be on any ethical compromise and it shall and should on sustainable path by considering society as the focal point. This year's sustainability conclave is second in a row and I am glad that our efforts every year are bringing all the like-minded people together.

The prosperity of business becomes closely interlinked with sustainability due to increased focus and awareness on the environment and people front. Sustainability for the Industries has become the pillar for growth and has been the key focus area for ICC with promotion of Responsible Care (RC) in the country. RC not only fosters safe production of chemicals but also nurtures environmental sustainability, security of chemicals and taking care of well-being of their employees and their surrounding communities.

I am confident that ICC will endeavour to follow up and support the implementation of outcomes emanating from deliberations of this conclave.

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# Message from ICC Leadership



## **BIMAL L. GOCULDAS**

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**Vice-President - Indian Chemical Council**

MD & CEO, The Dharamsi Morarji Chemical Company Ltd.

The world we live in has changed substantially in the past 12 months. There is global economic chaos, and until the vaccine is distributed in all nations, the risk of depression looms large. The Indian economy also took a hit, especially in the first two quarters, but the strict lockdown combined with the inherent immunity of Indians, and the superhuman efforts of medical professionals and pharmaceutical companies has allowed India to control viral numbers. The Indian Chemical industry has also played an important role in providing key ingredients in the fight against COVID-19.

With this backdrop, the need for economic recovery is even more urgent. The Indian Chemical industry is well placed to play an anchor role to bring GDP growth back to 10% and above. Being a significant employer, and a major contributor to the Indian economy, the Indian Chemical industry can utilize the intellectual prowess, human resources, and materials available in the country to ensure growth that is both deep and wide.

What is even more important than growth, however, is Sustainable Growth. We cannot destroy the environment for short term material gain. The Chemical Industry can utilize the latest technologies and innovative processes to ensure that we leave the world a better place even as we ensure employment for our 1.3 billion people and economic growth for our country. With conventional approaches and end-of-pipe treatment, protecting the environment was viewed as an added cost.

But this need not be the case. We can make money while still protecting the environment. A change in perspective is needed to convert waste into wealth. In order to facilitate an exchange of ideas and bring awareness of eco-friendly possibilities, the Indian Chemical Council (ICC), India's premier association for chemical manufacturing companies, has organized the second annual Sustainability Conclave 2021 titled "Sustainability Makes Economic Sense". This conclave is supported by the Ministry of Chemicals and Fertilizers, the Ministry of Environment and Forests, the United Nations Environmental Program, and the International Council of Chemical Associations.

The wealth of knowledge of the speakers and the great platform, albeit online, for exchange of ideas will surely make this conclave a "must-attend" for anyone in the chemical industry or associated with it in any way

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## Message from ICC Leadership



### **RAVI KAPOOR**

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**Chairman, Sustainability Committee - Indian Chemical Council**  
MD, Heubach Colour, India

It is a pleasure and privilege to usher in the second edition of the sustainability conference this year. It's regrettable that we are not able to do this in person but in keeping with the present situation and requirement of social distancing and preventing any spread of the virus, we are glad that we are able to bring to you this year's conference virtually which has an interesting title "Sustainability Makes Economic Sense".

It is a fact that the chemical industry is growing in leaps and bounds and we can see from the valuations in the stock market the value that is placed on the chemical sector. Some of the best performing companies in the market today are from our segment and when you look closely, a common thread is observed, and that is the deep commitment to sustainability and sustainable practices by these companies. The growth of the industry is inevitable, however one of the potential pitfalls is to lose focus is on the principles of Responsible Care while we are growing at a frantic speed. There are two clear goals and motivational incentives to be a sustainable company, the first, to ensure the present level of business and the regular growth of the company and the second, to ensure that there are no impediments to grow at an even faster pace while ensuring an economic viability which is short, medium and long term, bringing about a value to the company which will ensure its success.

Our theme this year is to stress that being sustainable does not mean being more expensive or spending money on unproductive and non-return areas, on the contrary showing that ensuring sustainable practices for existing and growing companies results in short-, medium- and long-term success of the company.

ICC is glad to collaborate with ICCA, UNEP, ACC and Cefic to bring about this event where we have long list of illustrious speakers both from government and industry, India and abroad. We hope you find this a useful and value adding event and our team at ICC will strive to continue to bring you similar events.

We thank you for your participation and solidarity with the cause of sustainable practices which is a key to development and growth of the chemical industry in India.

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# About ICC



Indian Chemical Council (ICC) is the apex industry body founded in the year 1938 for promoting the interests of the nascent Chemical Industry. ICC represents all segments of the Chemical Industry such as Organic & Inorganic Chemicals, Fertilizers, Agrochemicals, Pesticides, Paints, Dyes & Dye-intermediates, Drugs & Pharmaceuticals, Fine & Specialty Chemicals, Plastics & Petrochemicals, and Petroleum Refining etc. Over the years, ICC has taken a lead role in developing a robust base for Indian chemical industry. ICC website is: [www.indianchemicalcouncil.com](http://www.indianchemicalcouncil.com) which provides details of national and international activities of ICC.

Apart from taking up critical issues faced by the industry, with stakeholders, Government of India, various state governments, ICC also encourages Research & Development, State-of-the-art Technology, Energy Conservation and Quality Consciousness. ICC also monitors and contributes to the framing of industry specific Government Legislation, and to have formal interaction with the concerned Government Ministries regarding policies, tariffs and excise matters. It also helps in monitoring, procuring and disseminating information relating to topical developments on safety, health & environment, to promote Responsible Care Initiative.

One of the key initiatives of ICC is Responsible Care (RC), a global voluntary initiative of chemical industry has been initiated by ICC in India to excel and continually improve health, safety and environmental performance and till date, ICC is the only body recognized for RC. RC is a commitment of the chemical industry for a world-class performance for safe, responsible management of chemicals throughout their entire life. RC addresses community concerns about chemicals and its impact on people and environment during processing, transportation and use. ICC encourages members of the industry for complying with ISO standards, committing for Responsible Care - which is a voluntary initiative of the industry. ICC has a policy for assisting units in SSI sectors for practicing Responsible Care initiative in their units through mentorship program. There are 134 companies who are Signatories of RC till date. Industries are permitted to use RC Logo after the due process of peer audit. At present, there are 48 companies who are RC Logo Holders.

Another pioneer initiative of ICC is the Nicer Globe which is ICC's Responsible Care Initiative for Transport Distribution Safety, Emergency Response and Transport Security. The objective is to foster mutual cooperation and collaboration within the industry for responding to transport emergencies and tracking of movement of dangerous goods from GATE to GATE using Geo Positioning Systems (GPS), GEO spatial information system (GIS) and mobile technology. The project instituted in October 2013.

ICC is very actively involved with Ministry of Chemicals & Fertilizers, Government of India and also all the State Government bodies where chemical industry is concentrated. ICC's representatives are always involved with Ministry of Environment, Forest and Climate Change, Government of India; Central Pollution Control Board; State Pollution Control Boards and voices the concerns of the industry regarding incoming legislation.

Chemical Industry today is in a transition stage. India's opportunities in the sector are still to be exploited fully. The investment, trade facilitation, sustainable manufacturing, perception management of the industry are some of the important areas which need regular interactions with the government and regulatory authorities. In its constant endeavor the service the Chemicals Industry to attain its desired level of growth, ICC is committed to work with all stake holders to attain this objective.

# Contents

<b>1. Context</b>	11
<b>2. What is Sustainability</b>	12
<b>3. Changing Landscape for the chemical industry</b>	13
<b>4. Envisioning Opportunities: India Trends &amp; Drivers for the chemical sector</b>	16
▪ The 2030 Agenda for Sustainable Development	17
▪ Sustainable Chemistry and Brand Positioning	19
▪ Climate Change & Low Carbon Economy	24
▪ Evolving EHS Regulatory Requirements in India	25
▪ Circular Economy	28
▪ Safety for Industry 4.0 - Towards building a thriving workforce	31
▪ Emphasizing the 'S' in ESG	36
▪ Digital Transformation	38
▪ Mergers & Acquisitions	41
<b>5. The Journey to a Sustainable Business: Navigating the road ahead</b>	46
<b>6. Additional Resources</b>	50
1. Rate the Raters 2020: Investor Survey and Interview Results	
2. From Promise to Action - Delivering your company's Net Zero Ambition	
3. Investors Push the Pace of Climate Risk Financial Disclosures	
<b>7. References</b>	52
<b>8. About ERM</b>	53

# Context

The global calamity of the pandemic has fundamentally shocked the world. No individual, community or nation has remained untouched. So it is, for all facets of the economy including the chemical sector. Technology, societal expectations, and the very tangible effects of biodiversity loss and climate change, were pushing all businesses toward a more adaptable, sustainable approach in their operations. The pandemic is the once-in-several-generations event in the context of which businesses everywhere had to re-think and innovate on Sustainability. Sustainability quickly became the overarching, acute shock for the world to adapt to. It's effects are still unfolding and will continue to cast a long shadow for years.

So,

- What are the changes brought about by the above drivers, for the chemical sector?
- How have societies' and governments' views and actions evolved due to sustainability concerns?
- How do those views and actions impact the chemical sector?
- What does the digital revolution mean for the sector?

These and many more questions are answered in this paper, which describes the sustainability factors that are critical to the growth of the chemical sector. Fundamentally, we cover the broad aspects of Environment, Social and Governance (ESG). We point out the journey to becoming a more sustainable business. It is for each business to understand where they are on this journey and to determine its future course, in the process benefiting it's bottom-line, society and the earth.

# What is Sustainability?

Sustainability aims at meeting the needs of the present without compromising the ability of future generations to meet their needs. The concept of sustainability is composed of three pillars: covering the economic, environmental, and social dimensions—also known informally as profits, planet, and people.

Economic	Environment	Social
Anti-crime Policy/Measures	Business Risks and Opportunities	Controversial Issues, Dilemmas in Lending / Financing
Brand Management	Climate Strategy	Corporate Citizenship and Philanthropy
Codes of Conduct/Compliance/Corruption & Bribery	Environmental Policy/Management System	Financial Inclusion
Corporate Governance	Environmental Reporting	Human Capital Development
Customer Relationship Management	Operational Eco-Efficiency	Labor Practice Indicators and Human Right
Financial Stability and Systemic Risk		Occupational Health and Safety
Risk & Crisis Management		Social Reporting
Supply Chain Management		Stakeholder Engagement
Tax Strategy		Talent Attraction & Retention

# Changing landscape for the chemical industry

With global megatrends supporting, the outlook for the global as well as the Indian chemical sector is bright, despite the overall economic and human impacts caused by the COVID-19 pandemic. In fact, policy and market imperatives caused by the pandemic may accelerate growth of the Indian chemical sector, by which growth fulfills the promise of the 5Rs (Reduce, Reuse, Recycle, Restore, Recover) of sustainability.

In India, the chemical sector has witnessed double-digit growth in the latter part of the 2010s. The Indian chemical industry is expected to grow from a value of approximately USD 178 billion in 2019 to approximately USD 304 Billion by 2024-25 at a compounded annual growth rate (CAGR) of 9.3%.

1. India today ranks 6th in the world in terms of chemical sales and contributes 3% to the global chemical industry.

2. Factors driving the growth of the Indian chemical sector and challenges

Multiple factors will drive the sustained growth of the Indian chemical sector over the next decade. Some of these key drivers are:

- **Reduction in Feedstock Prices:** Moderation of input feedstock prices have aided the chemical sector significantly, including in India, which relies heavily on imports for base petrochemical stock. Over the medium- to long-term, oil prices are expected to remain subdued, considering the decreasing demand growth on account of the global Low Carbon Economy Transition (LCET).
- **COVID-19 and Trade Conflicts:** COVID-19, together with the US-China trade war has forced approximately 33% of companies with global supply chains to shift suppliers out of China. Multinational companies are shifting (or returning) manufacturing to countries such as Japan, Vietnam, Myanmar, Bangladesh, Philippines and India. This shift provides India, with its existing industry, large pool of skilled English-speaking professionals, and strong R&D capabilities, an opportunity to attract chemical industries to invest in newer manufacturing units within the country, while also increasing the demand for intermediates and specialty chemicals produced by existing units.

- Megatrends, such as a middle class that is projected to grow both in number and in spending capacity, will result in much greater per capita consumption of all manner of goods; all of which depend significantly on the chemical sector.
- As the Government of India (GoI) works towards transforming India into a USD 5 trillion economy and increase its ranking significantly in the World Bank's Ease of Doing Business index, the time is optimal for the Indian chemical sector to reap benefits. India today has the fortuitous confluence of drivers for demand, strong and consistent policy support and a projected increase in foreign direct investment (FDI) 3 for the chemical sector.

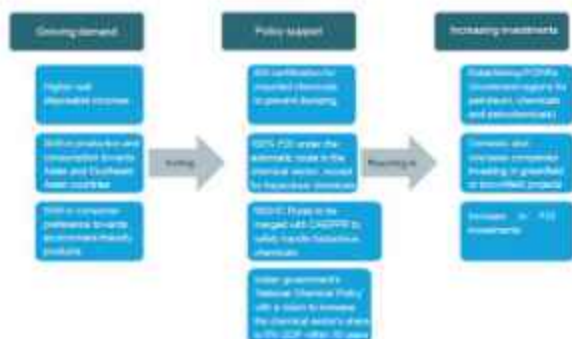


Fig. 1 - India Brand Equity Forum's Report on the Chemical Sector in 2020.

The future for the sector holds significant promise for accelerated and material growth. This presents a very significant opportunity for India to grab chemical manufacturing share in the world and improve its position in the global value chain. The opportunity is significant, as are the risks. This paper presents the priority sustainability-related operational challenges that are increasing in importance now and in the decade ahead. Some of these sustainability-related challenges include the following:

- Thinking beyond Environment and integrating the Social and the Governance aspects in to their sustainability management programs
- Climate change and the LCET
- Increasing scarcity of energy and raw materials and the need to embed circularity into the operational model

## Changing landscape for the chemical industry

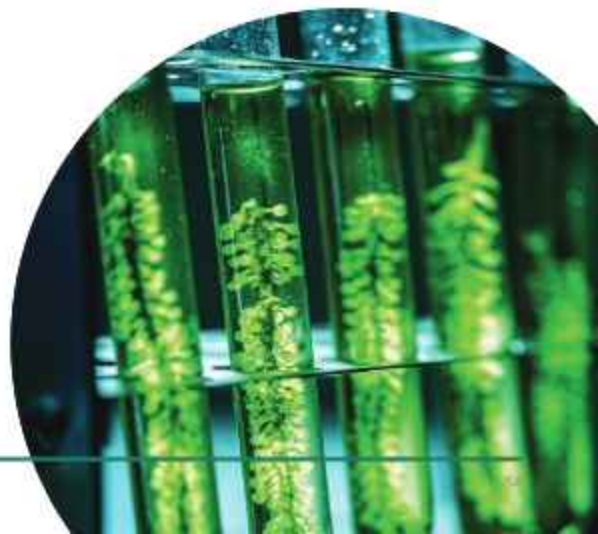
- Reputational issues and the role of multiple stakeholders including civil organizations, regulators and the public
- Rapidly evolving EHS regulatory requirements that place an ever-increasing compliance burden on corporations
- Deriving higher returns from Safety programs
- Digitalization of sustainability initiatives in Industry 4.0.
- In the face of ever-increasing resource shortage and spiraling financial, social and environmental costs of energy, water and key raw materials, circular economy, once a 'fancy' term that few understood, has now become a staple of government policy, ministerial pronouncements (recall 'waste to wealth') as well as business strategies to maintain and enhance profitability.

The ability to manage the various ESG-related risks, and to convert some of these into opportunities, would be the key determinant of success as corporations expand their presence and reach in India. Companies unable to adopt these changing landscapes will likely face the risks of business interruption, material financial penalties and/ or loss of reputation.

### Indian Chemical Industry: Re-prioritizing ESG & Sustainability

This paper seeks to examine some the ESG and sustainability-related themes emerging from the challenges listed earlier. It also presents key facets of the new operational reality that corporations, including the Indian chemical sector, in India, must acknowledge, and adapt to, quickly. We present a roadmap for businesses to assess where they are and then plan the journey to sustainable, performance-oriented operations.

- Corporations' engagement with climate change has shifted drastically in last few years. From a time where voluntary disclosure of carbon and water footprints to investors and other stakeholders was a 'good to have' optional aspect of business, climate change today has become the centerpiece of business resilience strategies, with significant investment already poured into preparing for an uncertain future. Investor-led initiatives and frameworks such the G-20 Task Force on Climate Disclosures (TCFD), Climate Action 100+, UNPRI, and major private investors are now pushing companies to take tangible actions to address the climate change and the low carbon economy transition (LCET).
- Even the UNO's Sustainable Development Goal (SDG) 12 – Responsible Consumption and Production- relates closely to this, even as a slew of other SDGs are unachievable without embedding circularity in our economic model and focusing on product sustainability and stewardship. REACH-like regulations are increasingly being adopted by countries worldwide and even the Gol is considering a similar regulation at present.
- EHS regulations in India are changing at a pace never seen before. This enhanced compliance burden, when coupled with more stringent enforcement by the regulators and judicial activism means that it is no longer feasible for corporations to violate regulations; nor is it cheaper for corporations to pay penalties than it is to comply. Recent judicial orders have made it clear that corporations are liable not just for compliance at their own plants, but can also be taken to task for violations by suppliers and reverse vendors (e.g., waste management contractors). Even with avoidable statutory risks, reputational risks associated with mismanagement and negligence of suppliers and reverse vendors pose a concern to corporations.



## Changing landscape for the chemical industry

- Additionally, with the implementation of a new, science-based framework for ascertaining and assigning environmental liabilities the ambiguity that earlier characterized liability assessment of operational and retired assets has been largely eliminated. Industries must now prove scientifically, using data-driven models that their past or current operations are not causing pollution beyond permissible limits in order to obtain environmental permit renewals and avoid stringent penalties and clean-up obligations.
- Liability estimation is also significant as the ESG and Sustainability liabilities and risks are now being evaluated, formally disclosed, and taken into consideration during large mergers and acquisitions amongst the leading chemical corporations. Recent large transactions (amongst stalwarts of the chemical industry) have seen ESG & sustainability-related liabilities and opportunities being taken into consideration while determining deal value.
- COVID-19 and attendant operational challenges have significantly accelerated the pace at which industries have adopted digitalization of multiple processes. Digital transformation has emerged as one of the key enablers of business continuity, efficiency, and continued profitability during a year that witnessed significant tumult. These changes are here to stay, and can only get further embedded into ESG and sustainability management in this 'new normal' of the post COVID economy.

We can be optimistic of the coming years as CEOs have already taken note of these aspects and significant investments are planned, as evidenced by the PwC's 23rd Annual Global CEO Survey – refer Fig. 2. These could well be the first steps to implementing the UNO's call of 'building back better'.

Fig.2: Excerpt from PwC's 23rd Annual Global CEO Survey

### Exhibit 1

#### Chemicals CEO's see opportunity in Circular Economy

Sustainability/circular economy

Alternative material sources and processes (e.g., bio-based, renewable, ChemCycling)

Digital operations and related technologies (e.g., sensors, digital twin, drones)

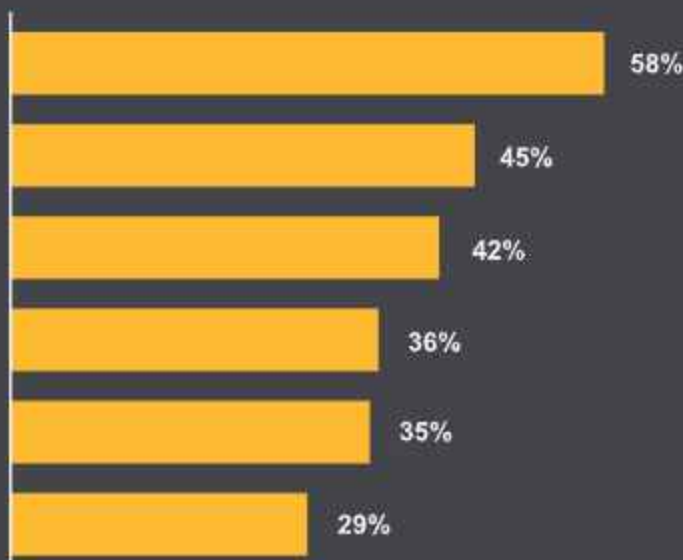
Predictive analytics/artificial intelligence on the customer/market interface


Partner integration across chemicals value chains

New business models (e.g., platforms, data-based services)

### Question

Which of the following opportunities in the chemicals industry will you be prioritising and/or investing in over the next 12 months?



The image features a person's profile in silhouette, facing right, set against a solid green background. A complex network diagram, consisting of interconnected nodes and lines, is overlaid on the left side of the image, extending across the person's profile. The overall aesthetic is modern and technological.

Envisioning Opportunities:

# **Trends & Drivers**

# Sustainable Development Goals: Opportunities and Actions for Chemical Sector to make an Impact

[The 2030 Agenda for Sustainable Development](#), adopted by all United Nations Member States in 2015, provides a shared blueprint for peace and prosperity for people and the planet, now and into the future. At its heart are the 17 Sustainable Development Goals (SDGs), which are an urgent call for action by all countries - developed and developing - in a global partnership. They recognize that ending poverty and other deprivations must go hand-in-hand with strategies that improve health and education, reduce inequality, and spur economic growth – all while tackling climate change and working to preserve our oceans and forests ([THE 17 GOALS | Sustainable Development \(un.org\)](#)).

The chemical sector is interdependent with several other key sectors and chemical sector can play a significant role in achieving the UN SDG goals. According to the Better Business Better World report by the Business & Sustainable Development Commission, achieving the Global Goals could open up an estimated US\$12 trillion in market opportunities in four economic systems: food and agriculture, cities, energy and materials, and health and well-being. They represent around 60 percent of the real economy and are critical to delivering the United Nations Sustainable Development Goals (SDGs). In order to benefit from such opportunity requires the sectors to partner within and across the sectors.

There is growing appreciation across the global business community of the immense potential of the Sustainable Development Goals (SDGs) to unleash innovation, economic growth, and development at an unprecedented scale. This potential was clearly captured by the Business & Sustainable Development Commission's flagship Better Business, Better World report, which points to US\$12 trillion of additional market value that could be unlocked by 2030 if the SDGs are achieved.

## WBCSD Chemical Sector Guide

The Chemical Sector SDG Roadmap (Roadmap) is an initiative led by a selection of leading chemical companies and industry associations, convened by the World Business Council for Sustainable Development (WBCSD), to explore, articulate and help realize the potential of the chemical sector to leverage its influence and innovation to contribute to the SDG agenda. The Roadmap offers a unique and collective vision for the sector on what the key impact opportunities to contribute to its most material SDGs and specific SDG targets are — from product innovation to process improvement through to innovative public-private partnerships. It also outlines tangible actions that the chemical sector may take to accelerate impact in the short-, medium- and long term in the run up to 2030.

## What are the Sustainable Development Goals?

In 2015, the United Nations established a set of goals to end poverty, protect the planet, and ensure prosperity for all. Each of these 17 Sustainable Development Goals (SDGs) includes specific targets to be achieved by 2030. Achieving the SDGs requires the efforts of governments, the private sector, civil society, communities and individuals.

## What do the SDGs mean for business?

Governments have been tasked with the implementation of the SDGs however, this is an agenda that fundamentally will not be realized without strong engagement by the private sector. Business has a critical role to play in helping to realize the ambitions of the SDGs; as an engine of economic growth and employment; as a source of finance; and as a driver of technology and innovation. And there's lots to be gained for companies strategically aligning with the SDGs. The goals provide a new cross-sector global framework to translate the world's most pressing needs into business solutions. Companies that are able to deliver inclusive and sustainable products and services in line with these ambitions stand to open up significant market opportunities.

# Sustainable Development Goals: Opportunities and Actions for Chemical Sector to make an Impact

The Business & Sustainable Development Commission's flagship Better Business, Better World report points to US\$12 trillion of additional market value that could be unlocked by 2030 if the SDGs are successfully implemented, creating 380 million jobs in the process. The SDGs can also help companies to analyze and address operational and regulatory risk, and to secure a strong and enduring license to operate.

## Why an SDG Roadmap for the sector?

The SDG agenda is ambitious, transformative, and universal. It will not be achieved through incremental change and calls upon all actors to go beyond business as usual to tackle complex societal and environmental challenges. Realizing the ambitions of the goals and unlocking the potential they represent is beyond the reach of any one organization and so calls for innovative new forms of partnerships at scale. From a corporate perspective, the SDGs present both opportunities and risks. Realizing SDG-related opportunities and effectively managing risks will require innovation and transformative change that incorporates efforts spanning across industry sectors, with individual organizations working together with their peers to tackle obstacles and scale solutions. In this context, the Better Business, Better World report underlines the importance of drawing up detailed sector "roadmaps" to guide and support specific industries in their shift towards sustainable development in line with the SDGs. Embracing these recommendations, the Chemical Sector SDG Roadmap (Roadmap) is an initiative led by a selection of leading chemical companies and industry associations, convened by the World Business Council for Sustainable Development (WBCSD), to explore, articulate, and ultimately realize the potential of the sector to leverage its influence and drive innovation that will significantly contribute to the realization of the SDG agenda.

The Roadmap identifies areas where the sector can have the most SDG impact and explores key opportunities and pathways to accelerate and optimize this impact on the road to 2030, while also presenting a strong business case for action. The Roadmap is also important as it will provide a means to communicate with potential partners in other sectors and relevant stakeholders on key sustainability activities and initiatives.

## Method and approach

In order to develop this Roadmap, nine leading chemical companies and two industry associations formed a dedicated working group, convened by WBCSD. The group took a leadership role in piloting and refining the three-step framework described in WBCSD's SDG Sector Roadmap Guidelines. The group worked collaboratively with input from external experts to collectively:

- Map perspectives around the chemical sector's current level of SDG impact at the target-level across the value chain and identify priority SDGs for the sector to address;
- Conceptualize where the sector can collectively make the most transformative contribution to the SDGs, and identify key impact opportunities to drive progress towards realization of the SDGs;
- Set out a series of key actions for the industry to pursue in the short, medium, and long term with a view to making these impact opportunities a reality on the path to 2030.

Finally, the Roadmap also communicates the sector's willingness to engage with relevant stakeholder groups to promote sustainability throughout the value chain in support of the SDGs. [Download the full report here](#)

## Priority SDGs for the chemical sector



# Sustainable Chemistry and Brand Positioning

We've all seen it: Product Greenwashing that shatters credibility in the marketplace. How can greener chemistry achieve real sustainability goals and also serve to position a brand in the marketplace? This white paper explores that question and provides benchmarking perspective on implementing a successful program.

## Sustainable Chemistry and Brand Positioning

Neither scientists nor the marketplace offer a consistent definition for sustainable chemistry. That lack of common definition and the corresponding lack of standard protocols for implementing or measuring a sustainable chemistry program can cause confusion and make it difficult to know where to start in designing a sustainable chemistry program. However, this also provides an opportunity to design a program that pertains directly to a company's goals and products.

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***For simplicity, this white paper uses the term "sustainable chemistry" in the sense of the OECD definition. We need to refer to decisions made about the composition of products based upon the potential toxicity of the chemicals they comprise, and/or the potential use of resources or waste generation.***

However, this also provides an opportunity to design a program that pertains directly to a company's goals and products. A brief look at two definitions provides the vocabulary and context for this white paper. One useful definition comes from the Organization for Economic Cooperation and Development (OECD)<sup>2</sup>: "Sustainable chemistry is a scientific concept that seeks to improve the efficiency with which natural resources are used to meet human needs for chemical products and services.

Sustainable chemistry encompasses the design, manufacture and use of efficient, effective, safe and more environmentally benign chemical products and processes." The American Chemical Society offers another perspective, defining twelve principles of Green Chemistry. These principles itemize three chemicals, and less waste and pollution, essential features: lower resource use, less toxic. In practice, however, the working definition of sustainable chemistry depends in part on a company's business goals. Look more closely, and the definition of green chemistry that supports a company's business goals depends on the position of a product within the supply chain, and the aspects of sustainability that are important to stakeholders as a result. Analysis of these factors as described below will lead to the development of a right-sized sustainable chemistry program.

Companies making a variety of products around the globe find themselves grappling with the need to "green" their products as a part of market positioning. Some find the issue vital to their business. Others find that brand positioning may not yet motivate an examination of chemical sustainability.

It is a truism in the world of product sustainability that – informally put – the closer a product comes to our children, the more likely it is that sustainable chemistry goals beyond simple regulatory compliance will drive the product's customer appeal.

## Sustainable Chemistry and Brand Positioning

Consider these recent conversations ERM has had with companies in diverse sectors, which illustrate why some companies focus on sustainable chemistry and others may not.

- A boutique manufacturer of on-trend beauty products sold largely in the North America chose to re-examine their chemical management strategy when the manufacturer realized the extent to which their chemical usage and sustainability metrics affected their shelf space at key retail outlets. In addition, their customer service department heard a steady stream of inquiries that added to the company's motivation. Buying decisions by customers in the Millennial age group, crucial to the company's bottom line, were clearly influenced by perceptions about the "greenness" of the company's products.
- A chemical company based in Asia Pacific heard from two crucial stakeholder groups that sustainable chemistry was increasingly important. The company's customers making personal care products demanded less toxic chemicals that could replace the functionality of certain chemicals of concern. And some investors increasingly demanded that the company improve its sustainability metrics.
- Britain's National Health Service (NHS) didn't like what it found when it analyzed its carbon footprint. NHS set a target for carbon reduction and told its suppliers that this target would influence its supply chain decisions. This drove some pharmaceutical companies to assess sustainability measures in their operations and supply chains, and motivated them to reduce greenhouse gas intensity to retain profit-critical sales.
- While an Executive Order favors contractors for the U.S. government whose products are more sustainable, the Department of Defense has not incorporated that order into certain Military Specifications. As a result, defense contractors working in those areas currently have no brand-positioning motivation to invest in the use of more sustainable chemistry.



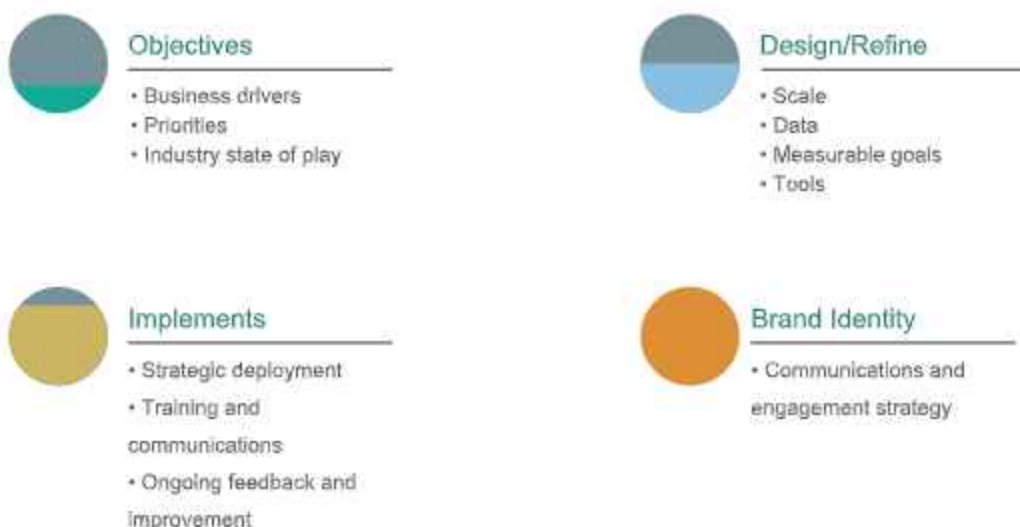
These anecdotes illustrate the range of business value that a sustainable chemistry program can provide. Often, evidence of the potential value is indirect and awareness of such evidence is scattered throughout an organization. The value may surface through customer surveys or scoring systems directed to the Sales Department; Customer Service inquiries from the public; or annual reporting to a Board or private equity firm routed through the Environmental Health and Safety or Sustainability group. If one of the anecdotes above carries a ring of truth, it may be worth a methodical assessment of the potential value of sustainable chemistry to your product line.

### What do best practices look like?

With a topic this broad and poorly defined, how does a company begin to optimize their brand positioning relative to sustainable chemistry? ERM often applies a four-step process to help companies develop an approach to sustainable chemistry. We adapt the general process illustrated in Figure 1 to a company's operations and products, providing benchmarking perspective in each step along the way.

# Sustainable Chemistry and Brand Positioning

Figure 1: Brand positioning using sustainable chemistry



## Step 1: Set Objectives

The first and most crucial step is to set objectives that are aligned with the company's business goals and image in the marketplace. Those objectives can be highly individual and driven by both internal and external factors. For example, some pharmaceutical companies set goals to reduce the levels of toxic substances in their operations; those commitments reflect each company's self-defined identity rather than an externally-defined metric or regulatory requirement. Other companies factor standard indices or scoring systems into their objectives, sometimes dictated by investors or customers.

Table 1: Lists some of the frameworks in common use

Dow Jones Sustainability Index (DJSI)	Provides investors with company ranking by sustainability metrics
Global Reporting Initiative (GRI)	Scoring system used to report company impacts that includes a broad range of economic, environmental and social criteria
Carbon Disclosure Project (CDP)	Disclosure and reporting system focussed on climate change, forests and water programs
Ecovadis	Global supplier of Corporate Social Responsibility (CSR) ratings to support sustainable procurement; scoring system incorporates elements of other frameworks
Responsible Care	Product Safety Code includes, among other factors, that chemical companies consider impacts on public health, the environment, and overall sustainability as they improve their products or develop new ones
Retailer Supplier Rankings	Companies such as Walmart and Target rank suppliers based on sustainability measures

# Sustainable Chemistry and Brand Positioning

## Step 2: Design and Refine

The second step is to design and test a sustainable chemistry program that can meet those objectives. Here, practicality must trump idealism. Practical considerations include:

**Scale:** Grand plans can collapse under their own weight. A more successful approach may be to define a limited focus for the sustainable chemistry program in line with the company's business strategy. Some choose to focus first on a product line that generates high interest or is crucial to the company's profits. Others work initially on building sustainable chemistry into new product development. Or a chemical sustainability program may be phased in over time, with implementation goals tied to target time periods. Focus in one area of a business can allow a team to test ideas and show initial successes that will build buzz and momentum.

**Available data:** Sustainable chemistry decisions require data. And those data – whether on resource usage, supplier formulations, waste generation, or myriad other factors – can be surprisingly difficult to collect and can vary widely in their precision and accuracy. Collecting and managing those data takes time and adds to program costs, which is a practical limitation on the design of a chemical sustainability program.

**Measurable goals:** How will the success of a program be measured: reduced production costs, increased framework scores, increased sales, or some other factors? Over what time period will the company achieve those gains? Setting measurable goals with realistic timeframes enables the team driving the initiative to measure progress and optimize the program over time. Meaningful metrics can have a powerful effect on stakeholders' perceptions of a company's commitment and dispel any hint of greenwashing.

**Available tools** Dozens of tools are available to identify "watch list" chemicals in products, screen for the hazard or risk of substitute chemicals, and measure or report various sustainable chemistry parameters. Each commercially-available tool has advantages and disadvantages. Some companies chose to design their own tools for implementing a sustainable chemistry program. When the customer or retailer does not specify the type of tool that must be used, the choice deserves careful thought to support the company's objectives and goals.

**Reformulation challenges:** Reformulating a product to incorporate more sustainable chemistry isn't always easy. It can require creative resourcing, new process designs, capital investment, and – particularly with respect to highly regulated fields such as food, drugs, and cosmetics – require lengthy regulatory approvals. While these challenges come into play during Step 3, Implementation, it is never too early to anticipate and seek to address reformulation challenges.

With these practical considerations sorted, a company can define its chemical sustainability program in a way that fits the program objective and company operations. Pilot-testing the approach can help to resolve the practicalities of implementation. And, perhaps more important than those practical considerations, early engagement with internal decision makers and creative thinkers can help to build momentum toward the kind of commitment needed to drive a successful program.

# Sustainable Chemistry and Brand Positioning

## Step 3: Implement Program

Implementing a chemical sustainability program requires commitment throughout an organization. ERM often works with multifunctional company teams that include representatives from Environmental Health and Safety, Product Stewardship / Regulatory Affairs, Purchasing, Customer Service, Marketing and Communications, Research and Development, Manufacturing / Operations, and Supply Chain Management. The number of people engaged in a sustainable chemistry initiative can multiply quickly for a multi-national company comprising many business units. At this point in the process, the success of the program depends not on environmental idealism or innovation so much as it does on human factors: communication, training, and a willingness to change, best supported by the visible commitment of senior management. Participation can build when stakeholders recognize the benefits: that sustainable chemistry can reduce production costs; reduce certain compliance costs; decrease some liabilities; and enhance product sales.

## Step 4: Integrate into Brand Identity

As a sustainable chemistry program matures, it becomes part of the brand identity. That image doesn't form overnight and often requires a multifaceted communication strategy. It takes cold, hard numbers recorded in standardized scoring systems to quantify gains for retailers and investors; presentations at scientific conferences increase technical credibility for the initiative; relatable stories crafted by the Marketing and Communications team make achievements accessible to consumers. Taken together, and with a steady and perceptible corporate commitment to sustainable chemistry, these measures can help position a brand with shareholders, retailers, and key customers.

## Conclusion

Making sustainable chemistry a part of a successful business strategy requires a thoughtful approach and steady top-down commitment. The lack of universal frameworks for sustainability programs can make the thought of initiating a program daunting; however, this also allows for flexibility in tailoring the scope and scale of a sustainable chemistry program to a product line and its target markets. A program that is custom built step-by-step to meet company-specific objectives can have a substantial payoff. As part of a brand image, sustainable chemistry can appeal to customers and investors. Done well, a sustainable chemistry program can also position a company ahead of regulatory restrictions. Wise chemical substitution puts process and cost control in the hands of the company, in contrast to situations where a company must react quickly to a new regulatory ban. Real gains in sustainable chemistry – not just greenwashing – can position a brand for business success.

[Download the full paper here](#)

# Climate Change & Low Carbon Economy

Climate change has progressively risen up the agenda in governments in recent years and so has the call for all economic sectors and companies to take concrete action on climate change mitigation and adaptation.

The focus of climate change has shifted drastically in the last few years, from requiring companies to calculate/disclose carbon and water footprints, investors and other key stakeholders are now looking to companies to disclose their strategic approach to address climate change and its implications. Many countries, such as China, South Korea and Japan, are declaring carbon neutrality/zero carbon visions and roadmaps. Further, investor-led initiatives and frameworks such as the G-20 Task Force on Climate related Financial Disclosures (TCFD), Climate Action 100+, and United Nations Principles for Responsible Investment (UNPRI) are pushing companies to take tangible action to address climate change. The Global Risks Report 2020 (World Economic Forum) identifies Extreme Weather, Climate Action Failure, and Natural Disasters as top 5 global risks in terms of likelihood and impact. Many chemical companies have taken actions to initiate changes in their operational boundary to reduce emissions and enhance energy efficiency. However, in order to limit global warming to less than 2.0°C, to meet the goals of the Paris Agreement, rapid reduction in GHG emissions and an accelerated transition to a low carbon economy are required.

Climate change presents both risks and opportunities for the chemical sector. Climate-related risks majorly fall under two main categories, physical and transition risks. Physical climate change risks include increasing incidence and intensity of extreme weather events such as, hurricanes, floods, droughts, heat waves, wildfires and cold waves. The sector being a heavy user of energy will face transition risks such as policy, reputational and legal issues linked to Greenhouse Gas Emissions, pricing of carbon, shifting customer demands, increased compliance costs, risks related to higher costs for low carbon technology transition, amongst others.

On the opportunities side, the chemical sector can play a significant role in the de-carbonization of global economy by contributing to low-carbon technologies and also in climate change adaptation solutions through development of innovative climate resilient materials for the push in renewables, hydrogen, batteries, and extreme weather conditions.

A multi-pronged approach is needed in order for a smooth transition of the chemical sector to the LCET. Some of the key actions include:

## ✓ Risk management

- Leverage existing enterprise risk management (ERM) and risk management processes to increase awareness of climate risks
- Integration of physical and transition climate risks in company's risk register and management programs

## ✓ GHG emission management

- Identification and assessment of carbon footprint – activity data, emission sources within operational boundary and extended value chain
- Identification of potential areas for emission reductions – operational/technology improvements (energy efficiency, waste heat recovery solutions)
- Utilization of renewable energy
- Use of feedstock based on renewable/recyclable materials

## ✓ Research and Development

- Renewed focus on R&D initiatives and pilot projects from climate change perspective

## ✓ Collaboration

- Within the sector and externally, with academia, research universities, think tanks, investors, technology providers on low carbon technologies such as Carbon Capture and Storage (CCS)/ Carbon Capture and Utilization (CCU)

# Evolving Environment, Health and Safety Regulatory Requirements in India

EHS regulatory requirements and enforcement mechanisms are evolving very rapidly in India, keeping up with societal demands and global obligations. These changes can be categorized as presented below. The rapid evolution of regulations and enforcement mechanisms makes it imperative for corporations to shift focus from 'compliance on paper' to 'performance on ground'.

Discussed below are the key changes that the Indian EHS regulatory regime has witnessed in the last decade, but more importantly, in the five years between 2016 and 2020.

## Operational Reality 1: Rapidly Evolving Regulatory Requirements

Since 2016, India has witnessed what is, by far, the largest surge in new and materially amended environmental regulations coming into force. Consider this: in the 45 years from 1970 to 2015, 30 environmental regulations were implemented in India. In contrast, the last five years (January 2016 – December 2020) saw 34 new or materially amended environmental regulations coming into force.

The rapidly changing regulatory landscape allows corporations only a limited visibility of future compliance burden. Consider, for example, the consolidation of over 44 separate Acts and Rules governing labour and employment in India into four distinct Labour Codes.

Three of these Codes namely, Occupational, Safety, Health and Working Conditions Code, 2020; Code on Social Security, 2020 and Industrial Relations Code, 2020 received Presidential assent in 2020. The Code on Wages is expected to receive Presidential assent in 2021.

Further, here can be significant shifts in regulatory requirements within relatively short periods. At least six draft regulations are presently under consideration at the time of publication. Two of the draft regulations with significant bearing on the chemical sector are the Draft Chemicals (Management and Safety) Rules and the Draft EIA Notification 2020. While the former brings product stewardship to Indian laws, the latter will result in chemical industries being required to account regional carrying capacity and cumulative impacts as part of the project siting exercise.

## Operational Reality 2: Regulatory violation is no longer cheap

Enhanced surveillance by India's EHS regulators and more stringent enforcement of EHS regulations by regulators, courts and quasi-judicial agencies such as the National Green Tribunal (NGT) than in the past, mean that 'pollute and pay (if caught)' is no longer feasible for corporations. We present below, three examples to illustrate this.

- Example 1:* In May 2020, the NGT (in case no. OA 73/2020), imposed an interim penalty of INR 50 crores (approximately USD 6.8 million) on a multinational chemical company immediately after a styrene gas leak at their plant in Visakhapatnam. The NGT took suo moto cognizance of the matter and initiated action against the company. The NGT order dated 08 May 2020 relied on the principle of 'Strict Liability' of industries engaged in hazardous processes; the principle of using penalties as a deterrent; and the principle that the penalty must account for compensation towards restoring damaged elements of the environment, in addition to compensation paid to victims. The Order also directed the Central Pollution Control Board (CPCB) to assess overall impact on environment, life and livelihoods, and determine the final compensation owed by the industry.

## Evolving Environment, Health and Safety Regulatory Requirements in India

- Example 2:** In June 2020, in a matter concerning a boiler blast and subsequent fire in a chemical plant at Dahej, Gujarat that caused eight fatalities and injured at least 50 workers, the NGT invoked the principle of Strict and Absolute Liability. In its order dated 08 June 2020 (in case no. IA 237/2020), the NGT ordered the company to make an interim deposit of INR 25 Crores (approximately USD 3.5 million) in addition to any other deposits/payments made in relation to the incident and over and above the compensation payable to victims of the accident and the 4800 persons who were displaced from their homes. As in the previous example, the NGT set up a committee to ascertain the total compensation to be recovered from the company, based on a scientific assessment of adverse impacts.
- Example 3:** On 10 July 2019 the NGT (In case no. OA 1038/2018), had ordered the CPCB and State Pollution Control Board/ Committees (SPCB/ PCCs), to:

  - Shut down, within three months, all polluting industries located in 69 industrial estates across the country that were assessed as being "Critically Polluted" or "Severely Polluted";
  - Estimate the compensation to be recovered from the polluting industries in these 69 industrial estates for the last five years, taking into account not just the cost of damage caused to public health and environment, but also the cost restoration of damaged elements of the environment and a punitive amount towards creating a deterrent for future violations;
  - Collect an interim compensation in advance from all industries, pending assessment of compensation liability (amounts for this ranged from USD 35,000 to USD 150,000, approximately); and
  - Halt setting up of new industries and prohibit expansion of existing polluting industries until environmental impacts in these industrial estates are brought to within permissible limits and the carrying capacity of the area has been assessed.

### Operational Reality 3: Evolution of a science-based framework for ascertaining environmental liability

A new, science-based framework for ascertaining and assigning environmental liabilities is in place. The environmental regulators are increasingly moving away from discretionary decision-making that has often been charged of being 'arbitrary', towards a data-driven model for decisions. Key indicators of this are listed below.

- Introduction of Guidelines on Implementing Liabilities for Environmental Damages published by the CPCB in 2016 provided regulators with a comprehensive framework within which risk could be estimated, and liabilities assigned and valued in a prescriptive manner;
- Use of Comprehensive Environmental Pollution Index (CEPI) to determine Policy: CEPI allocates weightages to various pollutants, ambient pollutant concentrations, receptors (the number of people affected) and other aspects. In 2019, the NGT directly supervised the enforcement of the CEPI criteria by the regulatory authorities. Industrial clusters were categorized under the CEPI as Polluted Industrial Areas (PIAs), which are each ranked as one of the following: (1) critically polluted area (CPA), (2) severely polluted area (SPA) and (3) Other polluted areas (OPAs). The CPCB and SPCBs are working to remediate the CPAs and recover compensation from polluting industries while prohibiting any expansion or development of new industries in these areas.
- Use of Regional Carrying Capacity to drive decisions: The NGT directed the CPCB to assess the carrying capacity of the 69 critically and severely polluted industrial estates as well as 102 cities, including Delhi, where air quality does not meet the National Ambient Air Quality Standards. The NGT requested this data to decide whether to allow new/ expanded industries in these areas.

## Evolving Environment, Health and Safety Regulatory Requirements in India

- Use of Pollution Index for classification and Consent management: In 2016, the CPCB issued Directions for a new model to classify industries and determine the period of validity for Consents, which are key environmental permits. This new model relied on an industry's 'Pollution Index'. Pollution Index (PI) is a function of air emissions, effluents, and hazardous wastes generated. The values of PI range from 0 to 100, with increasing index value based on the pollution potential of an industrial sector.
- Use of mathematical formula to determine environmental compensation: Regulatory agencies now accept (and even expect), data-driven, risk-based criteria for the evaluation of contaminated sites. The CPCB and respective SPCBs/PCCs have relied on an evidence-based, phased approach to assessing priority contaminated areas around the country, as illustrated by use of Site-specific Target Levels for clean-up of contaminated soil and groundwater.

Regulatory agencies are also using a prescribed formula to determine the quantum of environmental compensation to be recovered from polluting industries. This formula is explained below.

### Operational Reality 4: Social license to operate now poses material risks to corporations

Even if a company holds all required governmental approvals, it cannot survive and thrive if it does not win over the community that accords to it the social license to operate (SLO). This cannot be achieved merely by corporate social responsibility (CSR) initiatives – India's chemical sector must be seen to operate in manner that does not impinge on the resources available to the neighbouring communities. A few examples of incidents where industrial operations were interrupted or permanently shut down due to community dissatisfaction are provided below.

- *Example 1: SLO Withheld* – In July 2020, the proposed development of a mega hydrocarbon complex in coastal Odisha district of Balasore faced protests and push-back from residents over acquisition of land for the complex. The locals also feared that the industry will adversely impact soil fertility and agricultural yields.
- *Example 2: SLO Revoked* – In February 2020, residents of Kharghar-Taloja protested against air pollution caused by the industries located in the region. They demanded that the state government must replace the polluting chemical industries with non-polluting categories of industries.
- *Example 3: SLO Withheld* – In February 2019, farmers of Ratnagiri, in Maharashtra protested against the development of a petroleum refinery and petrochemical hub. The farmers refused to surrender land and withheld SLO, fearing that the proposed industry could cause significant damage to the region, famed for its Alphonso mangoes, cashew plantations and bountiful catches of seafood.
- *Example 4: SLO Revoked* – In January 2016, two NGOs had challenged the Environmental Clearance (EC) given to a chemical company to expand its sodium cyanide and mandala nitride manufacturing plant in Olpaad Taluk of Gujarat. The petition filed in the NGT argued that EC was granted to the company without considering the expert appraisal committee (EAC) recommendation on the outcome of public consultation and public hearing; it added that the effluent released by the company was causing severe land and water pollution in neighbouring villages. The NGT set aside the EC for expansion of the manufacturing unit.

For the chemical industries to thrive amidst the fast-changing regulatory and enforcement regime that prevails today in India, it is imperative for them to acknowledge the operational realities described above. They must embed sustainability into their business strategy. Corporations must proactively move away from a culture of 'casual compliance' as well as from the culture of 'paper-based compliance'. Instead, corporations must indicate a culture of performance.

# Circular Economy

The chemical industry touches us all in countless seen and unseen ways. From life-saving healthcare devices and personal care goods to food, transport and clothing, around 100,000 chemicals are used in the world today, affecting every aspect of our daily lives. Chemicals are present in 95 per cent of manufactured goods, from simple everyday items to hi-tech applications. From wind turbines to electric vehicles, the chemical industry plays a crucial role in producing technologies and solutions to create a carbon-neutral, resource-efficient and circular society.

The principle of a circular economy offers recommendations to policy makers to help businesses become more resource efficient over time while simultaneously being sensitive to the fact that products containing hazardous substances require particular attention before being recycled or reused.

Meanwhile, multilateral or global alliances (e.g., the Alliance to End Plastic Waste, the Ocean Plastics Leadership Summit, Alliance for Water Stewardship, CEO Water Mandate and other multi-company organizations) have presented a range of improved practices for chemical companies aiming to transition to circular economy operations. These practices revolve around:

1. Sourcing of raw material that generate minimal environmental impact and increase safety for producers and consumers alike
2. Treat internal manufacturing pipelines as sources of reusable material
3. Refurbishing of fixed asset parts and machinery and their return to active use rather than discarding them
4. Form trade partnerships to exchange waste products for renewable resources
5. Make safety and regulatory compliance as a part of core company culture

## Application of Circular Economy on Chemicals/Products/Equipment

One of the most challenging aspects of applying the principle of a circular economy to the chemical sector is the evolving knowledge of the properties of chemicals and their hazards. For instance, it is not possible to assume that any virgin material put on the market and considered safe at that time can still be considered safe later in its life cycle. This challenge needs to be overcome so that consumers can have confidence that products placed on the market at any given time are safe in light of the most up-to-date knowledge regarding hazardous chemicals, irrespective of whether they are made of recovered or virgin material.

In addition, while the Registration, Evaluation, Authorization and Restriction of Chemicals (EU REACH) has increased the number of chemical substances that are identified as being of concern for health or the environment, questions remain over what should happen to those chemicals that are already circulating.

The chemical sector, as an integral part of the supply chain, is responsible for chemicals management from product development to disposal (product stewardship). To minimize risks to human health and the environment throughout a product's life cycle, cooperation with other stakeholders in the supply chain is essential. The following key actions are required to make the circular economy consistent, predictable and effective:

- A move to non-toxic products, thus removing problems in recycling.
- Regulators and industry work towards eliminating chemicals of very high concern (e.g., EU REACH SVHC) as soon as possible and substitutes are identified rapidly.
- Companies should take a forward-looking approach when designing products, avoiding chemicals likely to be restricted in the future. Better information flow on hazardous materials in products, and controls on chemicals in imported products.

# Circular Economy

- The supply chain, including consumers and recyclers, should have easy access to information on identity and properties of hazardous chemicals in products.
- Imports should be subject to the same restrictions and information requirements.
- Assessments should balance the value of the resource and the hazard of the chemical, with a default of no recirculation of hazardous substances.

## Application of Circular Economy on Water and Wastewater Management

The business case for adopting circularity in the chemicals industry is also becoming more compelling due to limited availability of water, shifting demand from both consumers as well as key downstream markets, including utilities, transportation, textile and apparel, electronics, cleaning products, food and agriculture, and cosmetics and beauty. The current trends indicate water demand projections to increase significantly and hence exceed sustainable supply by 40% by the year 2030. Businesses, world over, have recognized water as one of the top ten risks in terms of likelihood and impact (World Economic Forum's Global Risks Report published, 2020). Water-related challenges are particularly prominent in India where sustainable business growth is not optional or something that can be postponed. India is categorized as a water stressed country with a water availability of 1427 m<sup>3</sup>/capita/year and faces multi-pronged challenges to secure its water resources in the face of freshwater depletion and degradation. Water risks come in various forms such as lack of availability, inadequate quality, variability, ever changing and stricter regulation related to water usage and discharge and conflicts with stakeholders and other users. Water, in a way, has become a major risk driver to business continuity.

Water is essential in manufacturing and delivering products for the chemical sector. It affects all companies through water scarcity and quality risks which manifest in financial, reputational, operational and regulatory risks.

Circular economy (CE) principles offer a unique window of opportunity to decouple business production from aforementioned water risks and shift towards resource recovery and minimization of freshwater use and wastewater discharge.

This will benefit in the allocation of this resource for other critical water users in the country. However, the opportunity also comes with challenges especially in chemical sector where water use within the system is more likely to be influenced by the chemicals used in the processes. CE in water sector emphasizes on efficient water use and wastewater management using the strategy of reduce, reuse, recycle, and recover but is yet to be harnessed in terms of water and wastewater management in the industrial sector in general. Herein lies the opportunity to develop a comprehensive and integrated framework of CE with a particular focus on water use in chemical sector. Not only will it free up a significant amount of water required by the chemical sector, but also it is also likely to contribute in reducing the chemical load in effluent discharge, and reduce input and operational costs.

The five (5) main principles of water circularity as defined by the International Water Association (IWA) are based on 5Rs approach to water management. The principles are reduce, reuse, recycle, restore and recover:

1. **Reduce:** Decrease in the consumption of freshwater within the processes by implementing water efficient technology and reducing leakages, which eventually reduces wastewater generation.
2. **Reuse:** reuse water, with minimal or no treatment, within and outside the fence for the same or different processes
3. **Recycle:** recycle resources and wastewater (treated by membrane or reverse osmosis to a very high quality) within and outside the fence
4. **Restore:** Replenish the water resources through artificial interventions (e.g., managed aquifer recharge, rainwater harvesting, afforestation, rejuvenation of water bodies)
5. **Recover:** Extraction of valuable resources (e.g., energy, chemical) from wastewater.

## Circular Economy

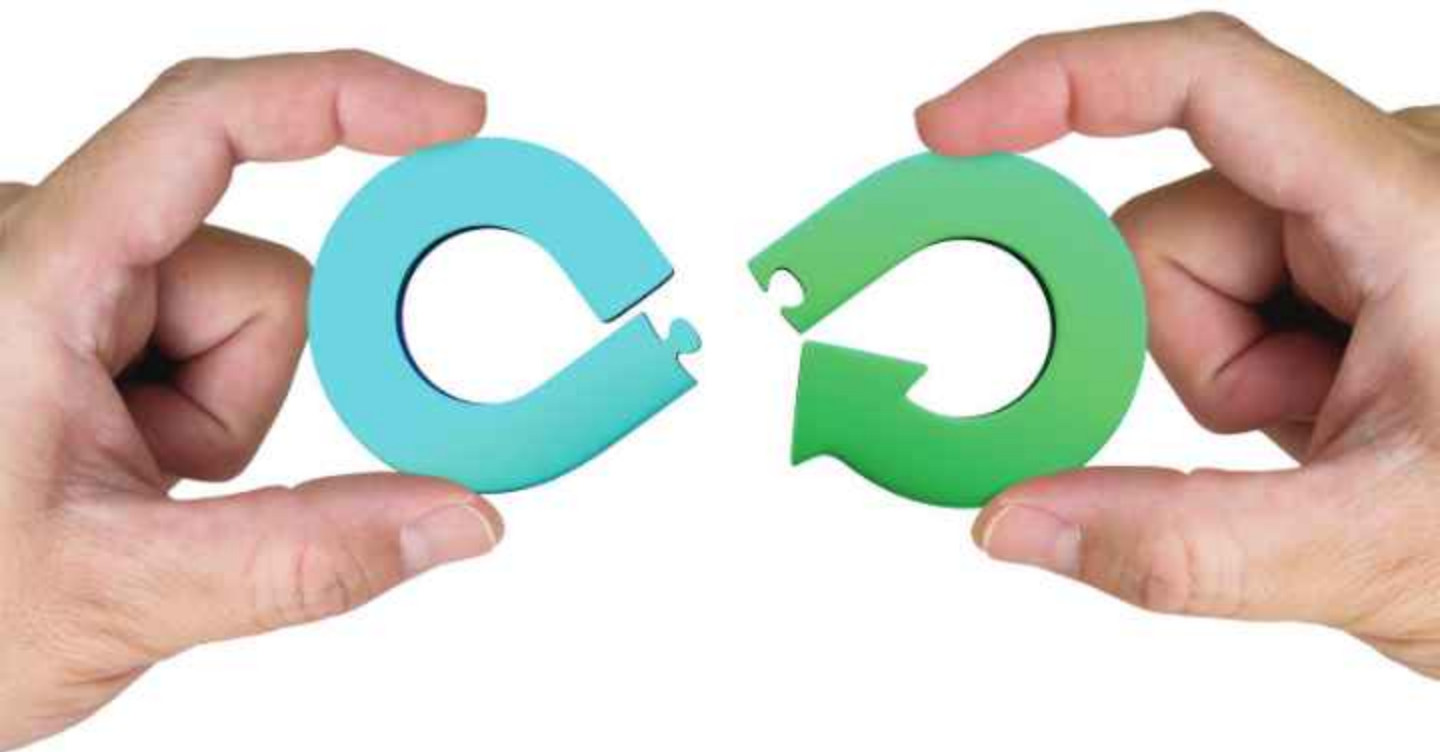
These principles are part of the larger guiding principles such as systems thinking, value optimization, innovation, collaboration, stewardship, and transparency (BS8001:2017) to achieve the implementation of CE practices in organizations that can be applied to water sector.

In addition to striving to meet the UN's Sustainable Development Goals (SDGs), some chemical majors are collaborating with downstream clients, universities and startups to co-design and implement products and circular economy business models.

Overall, chemical industry as a whole today recognizes the need to shift to a circular economy – but this shift cannot happen without creating an ecosystem that serves as an enabler to a set of companies seeking this transition.

Therefore, it is important to emphasize the idea of 'Industrial Symbiosis' whereby independent companies exist in mutually dependent systems and drive each other's success.

It is an ecosystem in which it is possible, for example, to turn a waste product of one industry into a resource for one or more industries. There are already numerous examples of this approach becoming standard practice in India, but more can be done to make this a pervasive business practice. This virtuous cycle and enabling ecosystem will require the government to create a regulatory environment that drives these changes.





Safety trends for the chemical industry:

# **Towards building a thriving workforce**

## Towards building a thriving workforce

Chemicals are essential to perform a wide variety of functions in society and contribute significantly to economic growth and our well-being. They play a substantial role to create added value along supply chains across all industrial sectors.

Safety is an essential part of Sustainable Development. Any new chemical plant, modifications to existing plants, new product development needs to bring together raw material sourcing, research & development, design, manufacturing and sustainable engineering concepts in an integrated form. Interwoven through this is the consideration of sustainability risks in every aspect. This means every chemical company shares global responsibilities towards responsible consumptions of the world's finite resources; sensitivity to their impacts and associated environmental, safety and risk considerations and the application of circular economy principles to their activities.

Companies cannot be sustainable without successful safety and risk management systems. Over the last 12 months, there has been an increase in industrial accidents, which has brought the spotlight to the chemical sector and raised questions on the the resilience of occupational health and safety culture in this sector. Many businesses have suffered momentous setbacks as a result of Covid and there is an understandable eagerness to restart operations to return to productivity and earnings. However, the financial and social demands to resume quickly could mean that an essential element of risk management, is overlooked or compromised.

In its recent second Global Health & Safety Survey, ERM engaged with 273 Function Leaders from companies globally (chemical sector representing 14%) to delve into and provide deep insight on a range of topical themes on health and safety which we believe are of greatest interest (and concern) to organizations at this Covid impacted time. These companies together employ over 12 million people across the globe with combined revenues of US\$6.6 trillion. ERM focused on in-depth, structured conversations and a series of roundtable engagements.

The study has produced some quite fascinating insights which we have set out under 9 headings:

### Performance improvement failing to keep pace with rapidly changing expectations

92% of the Function Leaders believe expectations of all stakeholder groups on health and safety will ratchet up in the next three years, and especially in Asia and in Europe. Regulatory drivers, the growing importance of ESG, investor pressure, intense focus on health and safety during the global pandemic and increasing societal expectations are underpinning these changes. Tolerance of risk has declined in most, though not all, organizations, over the past two years. 78% reported improving health and safety performance and only 8% reported declining performance. However, 60% reported fatalities since 2018, and 28% reported multiple fatalities in the past two years, a deterioration in performance on fatalities since 2018. The participants anticipate increasing impacts on business and on business leaders from health and safety over the next three years.

### Game-changing insights from the global pandemic

The global pandemic has shed light on the changing nature and scale of challenges in health and safety and has provided insights on a number of blind-spots to the Function Leaders. They shared seven valuable insights they have extracted from the global pandemic. C-19 has provided the participants (and the world at large) with an understanding of the scale of impacts health and safety can have on business and how organizations can respond to these challenges. It gives us a measure of a field in rapid transition into a new phase (heightened concern and new challenges) and an appreciation of what 'good' looks like in terms of leadership, processes and their efficacy, the role of corporate offices and empowered leadership down the line, together with insights on how the function can deploy new ways of working in the post-Covid world.

## Towards building a thriving workforce

### Evolved approaches deliver results: Putting the 'why' back into health & safety

Companies are actively managing away from a singular focus on lagging indicators, part of a broader shift in approaches to Health & Safety that occurred over the past two years. The participants in the study identified nine different 'evolved approaches' that they have deployed, and which have delivered broad-based benefits. An increasing number are also engaged in overhauling their established H&S processes to bring a more people-centered approach to them. The participants cited a surprisingly wide array of benefits from these initiatives. A number of key challenges with the execution of these approaches were also identified by the Function Leaders. Valuable perspectives shared by them will help guide organizations as they take on the enormous challenge of driving real cultural change to meet rising expectations in health and safety.

### Changing role of H&S functions demands new capabilities: Bridging the gap

Changing stakeholder expectations, the uptake of evolved approaches in health and safety, together with new challenges and opportunities arising from responses to the global pandemic are stretching H&S functions. However, few organizations have developed robust, integrated capability development models to properly equip their health and safety professionals to address these diverse and changing needs. Only 4% of respondents said their health and safety professionals are "fully equipped" to address the changing needs of their stakeholders in the new operating environment. The Function Leaders are aligned on the need for robust technical capabilities (a fundamental) and the need to complement these capabilities with skills in communication, coaching, influencing, data analysis, root cause analysis and leadership. The participants provided deep insight on the challenges they face as they strive to equip their health and safety professionals to succeed in this new operating context.

### Success and pitfalls in harnessing data and technology

The application of data and technology in health and safety have become core elements in the toolbox of H&S functions and operational teams as they strive to improve their H&S performance and increase operational efficiency. Companies have significantly increased investment in these aspects and they are planning further increases over the next three years. Digitalization of core health and safety processes and implementation of management information systems are the most frequent target for investment and will continue to be in future. The application of virtual and augmented reality technologies and learning management systems are being harnessed to enhance the efficacy of health and safety training. Remote observation tools, robotics and wearable devices and other solutions are being deployed to de-risk operations. Over 90% of the participants felt their investments in data and technology met or exceeded their expectations, but failures in execution, when they occur, can be extremely costly. The Function Leaders shared seven key insights on avoiding these pitfalls to ensure investments in data and technology deliver on their promise.

### Five key challenges call for advanced leadership development methods

A new generation of senior executives who see a clear link between H&S, a thriving workforce and business performance are leading the way in transforming the extent and quality of engagement on health and safety in their organizations (cited by 19% of the participants). Visible, purposeful leadership is paramount and we found Function Leaders identify it as the most powerful means of delivering improvement in health and safety performance. Senior leaders are engaging more on health and safety (89% agree), which positively correlates with increased risk aversion and higher levels of investment in H&S. However, 80% identified deficiencies in leaders' ability to translate engagement on safety into impact on the culture, behaviors and performance. They identified five key challenges that call for advanced leadership development methods.

## Towards building a thriving workforce

### The persistent challenge with contractor safety performance

The increasing use of contractors, an established trend for many years, will continue for the foreseeable future. However, the rate of increase in use of contractors is slowing and 13% of the participants are expecting to reduce their use of contractors in the next three years. Contractors perform higher-risk activities, and the participants believe managing contractor safety is more challenging than managing safety for their own employees. All these factors imply a further concentration of risk in the contractor base and, potentially, increased likelihood of incidents. Risks are greatest with short term, transient contractors and in locations where safety-competent vendors are in short supply. The Function Leaders identified five key areas of concern related to contractor safety. They also shared insights on actions they are planning to take to address these challenges. 67% of the participants are planning to improve their contractor H&S programs in the next three years.

### An escalating crisis on mental health in the workplace

Concerns about mental health in the workplace have been growing with a steady rise in cases over a number of years. Data from the UK indicates that over 50% of days away from work in 2019 were a result of work-related stress, depression or anxiety.

A number of different factors have underpinned the growth of these issues including employee burn-out, relentless organizational change and an 'always switched on' working culture. Issues with mental health have increased throughout the global pandemic and 90% of the participants reported increasing concerns about mental health in their companies. Features of 'the new normal' in the post-Covid-19 world will act as stressors for mental health. Mental health is, perhaps, becoming the number one threat to organizations enjoying the benefits of having a thriving

workforce. Most organizations have implemented programs to address mental health but there are concerns about their efficacy and how well leaders are equipped to recognize and respond to mental health issues in their teams. Only 4% of respondents said they were fully satisfied with the benefits they are deriving from their mental health programs. The participants provided useful insights into the challenges with their programs.

### Increasing cost of H&S and changing investment priorities

Increased stakeholder expectations are driving increased investment in H&S. Investment in H&S is expected to rise by 17%, having grown 21% over the past two years. The top three priorities for investment are technology, mental health and leadership culture. Other areas of growing concern such as fitness for work and occupational exposure to chemicals will also be targeted. Investment in contractor and fleet safety, identified as key areas of concern by the participants, do not feature on the list of top investment priorities. There is a robust case for each of the investment priorities identified by the Function Leaders. The challenge for the function and for whole organizations lies in ensuring that each of these investments yield the full scale of the benefits they promise and that organizations and their people need. It is clear from the study that attitudes to health and safety have gone through a metamorphosis in the last two years. Changing societal expectations, rising focus on ESG, investor pressure and responses to the global pandemic have accelerated established trends and put the spotlight on a number of areas of growing concern.

**The study has put a spotlight on a new generation of business executives who see the direct link between H&S and business performance. They recognize that protecting the health, safety and wellbeing of their people (their human and social capital and most valuable asset) is integral to them enjoying the extraordinary benefits of a thriving workforce.**

## Towards building a thriving workforce

**They are deploying progressive, evolved approaches to health and safety and increasingly they are harnessing a range of new technologies to de-risk their operations and to better equip their people to engage with the hazards on the frontline.**

This study presents with a unique opportunity to rethink the way sector works for the better.

Building a thriving workforce through evolving approaches as a solution if harnessed, will reap rewards not just in safety, but across all aspects of organizational performance; bringing benefits long into the future by creating more efficient, successful and sustainable operations.

[Download the full report here](#)

## Emphasizing the 'S' in ESG

As companies focus attention on developing corporate-level standards in their sustainability journey from compliance to value creation, a concerted emphasis on the integration of social performance is critical to ensure that policies are implemented.

Within the changing landscape of the global chemical sector, the following themes resonate with its growth and prospects for India:

- **Beyond the fence line:** The 2019 ESG Report Card for the Chemical Sector (S&P Global Ratings) suggests that the key social risks for chemical companies are demographics, safety management (covered subsequently), and the growing influence of consumer behavior. With respect to the former, mega trends linked to urbanization and growth of the middle class provide an opportunity for the rising demand of chemical products. However, risks linked to access to land and resources (during project set up and expansion), community health and safety (related to the manufacturing, transport and consumption of chemical products) and the changing stakeholder sentiments require incorporating the perspective of local communities beyond the fence line into the strategic business aspects of social risk and impact management. Operational reality 4 (EHS Regulations) puts into focus that social license to operate cannot be taken for granted in view of chemical companies facing increasing local resistance to setting up plants in certain locations;
- **Bridging the "workplace" gap:** Focus on social internally has broadened beyond basic health and safety of employees. It now include topics such as creating the right work-life balance, ensuring adequate skills matching, offering new opportunities for personal well-being both at work and for the supply chain and paving a way for a platform of diversity and inclusion in the workspace, i.e., higher accepting of diverse employees, particularly older workers and women.
- **The era of dialogue and transparency:** Social dialogue among governments, employers and trade unions is perceived to greatly facilitate the adoption of effective measures to enhance the sector's ability to attract and retain workers of all ages in a highly competitive demographic context. Such dialogue is crucial to ensuring that the measures adopted in this regard are well suited to the specific characteristics and needs of the industry.
- **Social sentiments towards chemical products and their manufacturing as well as a noticeable shift towards organic farm produce without the use of chemical pesticides or fertilizers pose immediate and long-term challenges for the need to innovate.**

Over the years, various international organizations have developed guidelines to help companies, organizations and even governments improve their understanding and management of social sustainability. These efforts and initiatives are undertaken to improve the stance of social performance standards as a norm in the chemical industry. The UN Global Compact's ten principles asks companies to embrace, support and enact, within their sphere of influence, a set of core values in the areas of human rights, labour standards, the environment and anti-corruption. Based on 10 principles of the UN Global Compact, the UN encourages Corporate Sustainability Leadership with four main axes:

- o **Strategic social investment**, which addresses care of your most precious asset i.e. your employees
- o **Partnerships and collective action**, encouraging companies to join forces with others to maximize expertise and training knowledge.
- o **Stakeholder engagement**, including key external partners such as Trade Unions, NGOs and academia
- o **Transparency and disclosure**, promoting openness as the basis of building trust and effective partnerships.

## Emphasizing the 'S' in ESG

In 2013, ILO formed a forum called the "Global Dialogue Forum on Initiatives to Promote Decent and Productive Work in the Chemical Industry". The mandate of this Forum was to examine initiatives to promote social dialogue for improving the performance of the chemical and pharmaceutical industries, in particular of small and medium-sized enterprises especially in developing countries and emerging economies.

Similarly, Together for Sustainability (TFS) is a joint initiative of chemical companies that evolved in 2011 in order to embed ethical and social standards within the supply chain of 26 global companies, mostly signatories of the UN Global Compact. The focus in the supply chain of the member companies seeks to collaborate by assessing its supply chain through a framework (with a strong focus on social parameters) for conducting assessments and audits and thereafter organization workshops to promote capacity building and change.

Similarly, the ICC is a nodal body pursuing the Responsible Care Programme, a global initiative through the International Council of Chemical

The practices form the basis for sustainable operations and include for example, an employee health & safety code; a pollution prevention code; a distribution code, and an emergency response and communication code; all of which tie to social aspects of running chemical business.

The chemical sector in India will need to regroup and introspect on emphasizing the "S" in ESG through initiatives that cut across boots on the ground up towards the boardroom. These initiatives will need to consider:

- The need for new and existing developments to create inclusive, informed and resilient communities beyond the fence line;
- Proactive adoption of policy commitments to go beyond compliance to credibly support issues for employees, work force and the supply chain on issues such as living wages, diversity, connected safety, ethical standards and social protections; and
- Safeguards that require a proactive mapping of changing stakeholder expectations to



## Digital Transformation

The chemical sector is rapidly going through a transformation. Trends like changing market dynamics, disruptive innovations, circular economy models, transition to sustainable chemistry are accelerating the adoption of digital transformation in the sector.

The key developments that are benefiting the most from digital transformation broadly fall into three themes: 'Connected Safety Excellence', 'ESG and Sustainability', and 'Performance Optimization'. The potential of digital to expand the efficiency and productivity frontier for each of these themes is substantial, given the state-of-the-art developments happening in networks and sensors, data availability and processing. However, despite laying out the potential and scope of a digital transformation among various themes, industry executives must rethink their business models to take advantage of digital technologies.

For example, industry executives must think about how to:

- Define a business case for change, realigning their business models to benefit from new technology
- Define the roadmap for integrating new technologies in existing landscape
- Accelerate the adoption rate across business functions
- Implement technology enablers for leading indicators and pro-active decision-making

**Connected Safety Excellence:** The very nature of chemical industries exposes a range of hazards and risks to its employees, assets and daily operations. The industry has thus been at the forefront of establishing strong operating practices and safety culture. The Covid-19 pandemic has exposed the vulnerabilities of chemical and process industries that persist with siloed systems and require human intervention for their smooth functioning. The business case for creating and strengthening remote management frameworks is thus, very convincingly made. Digitalization offers the only alternate route, with its promise of intelligent automation. Drawing lessons from the unforeseen ways in which business continuity has been disrupted; all

process-heavy industries would be well advised to induct connected safety into their ways of working to ensure a more secure future.

*What is holding back the real impact of digitalization for improving safety?*

Any attempt at successfully moving towards a smarter, connected safety must be preceded by an honest assessment of the current systemic flaws. Some of the common gaps in existing frameworks are:

- Lack of intelligent capture of past incidents, near misses and other challenges.
- Lack of a connected view of leading and lagging indicators and the indicators at the lowest level, as a means to preventing bigger hazards.
- Inability to close the loop for learnings from near misses with changes in equipment and process design, workforce sensitization and trainings
- Lack of digital literacy and digital culture
- Lack of seamless integration: Differing technologies, legacy systems and disintegrated data management infrastructures has led to lack of easy coordination between IoT and Operational Technology solutions.

*How can digital help achieve safety excellence?*

Digital technologies are enabling smart leading indicators and pro-active risk mitigation for chemical industries. Prominent bodies like the US Chemical Safety Board have suggested that smarter technologies, remote management, and connected data sets will help chemical industries mitigate their safety and process risks. Some key industry examples are listed below:

- IoT, connected assets and cloud infrastructure are leveraged to connect physical assets in a plant, which can continuously monitor health of equipment and processes. When this real-time data is fed into software such as a continuous emission monitoring system (CEMS), organizations can then collect, record and report data remotely. This can further alert the operations team on any deviation, leakages or potential threats to safety.

## Digital Transformation

- Wearables and smart personal protective equipment (PPE) is used to detect worker health conditions and body vitals in real-time, alerting supervisors about potential fatigue and stress conditions.
- Data analytics is leveraged for processing millions of safety records to extract meaningful insights. Advanced machine learning techniques and artificial intelligence are adopted to define advanced correlation models for predicting fatality risk.

To summarize, digital technologies like IoT, smart wearables and the application of data science can empower chemicals companies to preempt an incident, significantly reducing human risk.

**ESG and Sustainability:** For some time in India, there has been high expectation for digital transformation to contribute to industries' goals of attaining sustainability and ESG goals. Such prospects are well aligned with the efforts of Indian companies to tap into opportunities offered by rapid digitization to promote resilient infrastructure and assets and drive inclusive and sustainable industrialization, while also fostering innovation with the intent of enhancing efficiency and productivity.

However, arriving at appropriate metrics for assessing sustainability and ESG goals is not easy because of the multiplicity of aspects they have to deal with, often requiring cross fertilization of information between industry operations and its interaction with its larger environment - resource uptake, environmental, social and safety aspects linked to its operations. Common to all this is the significant, multi-dimensional and diverse range of data that has to be consolidated and processed in order to home in to meaningful performance metrics and indicators. Such data may typically range from:

- Raw materials and natural resource use,
- Process attributes and operational parameters,
- Emissions, discharges and waste generation,
- Spatio-temporal variations in environmental and social aspects in and around an industrial facility,
- Safety at workplace and of surrounding communities.

Additionally, the analysis and treatment of such data often require complex algorithms to provide real time and predictive analysis in order to provide appropriate insights to guide effective decision making on these issues

At the same time, rapid advancement in digital technologies including the availability of cloud-based platforms, increase in computational power, enhanced security of data storage and access, new developments in artificial intelligence provide excellent opportunities for industries in India to leapfrog to the next level. It will also help create positive economic, social, and environmental impact for the country while also addressing global sustainability trends. Most importantly, a holistic approach towards digitization and sustainability – two key agenda items that are expected to drive business goals in a post-pandemic world, will enable company management to support smart decisions that lead to enhanced performance on the sustainability and ESG fronts. We will be able to better maneuver through the new challenges and opportunities in the markets while meeting stakeholder expectations, including the financial community.

**Performance Optimization:** Chemical companies' business processes, including manufacturing, marketing, sales, and R&D, present opportunities for performance improvement based on data capture and interpretation. Integrating the technology landscape and their associated data sources will enable new possibilities for optimization by leveraging integrated systems, advanced data science and smart visualizations. This will further enable pro-active decisions and resource savings. In our paper, we will provide examples of how connected systems and data are enabling improved performance management. Data based advances are increasingly seen across the industry, providing various pockets of excellence which can be replicated across other industries. Some key data driven themes and supporting industry examples are listed below:

## Digital Transformation

- Leverage AI and Machine Learning:** With increasing data generated by chemical industries due to newer chemistry and processing requirements, machine will become a critical tool to simplify the processing power and bring agility to the industry. One example of AI and ML in action as seen with global chemical giant BASF which recently launched a 'Chemistry 4.0' platform to optimize production, sales, R&D, supply chain; and increase efficiency. This transformation helped BASF attain sustainable manufacturing and realize its circular economy goals. In another example, a global chemicals company which faced repeated unplanned downtime, used real-time monitoring to extract insights from structured and unstructured data sets (like inspections, trainings, maintenance, past failure investigations etc.) to create cause-impact prediction models. Business results included an 80 percent reduction in unplanned downtime and operational expenditure savings of about \$300,000 per asset.
- Digital Twins for products and processes:** Chemicals companies are increasingly using 3D visualization and virtual reality for training operators and maintenance staff. Digital twins extend the concept of 3D simulation models with real-time data interface and application of advanced data science, which can help chemical plants to optimize process changes, reduce wastages, predict abnormal conditions and avoid major process deviations. For example, BASF managed to reduce the batch time for producing expanded polystyrene by 30%. This was done using dynamic optimization techniques based on kinetic models developed from the data generated during production
- Leverage Natural Language Processing (NLP) for deriving insights from unstructured data sets:** While traditional data analytics techniques focus on quantitative and structured data sets, advanced data techniques like NLP helps in extracting value from unstructured data sets like incident investigations, process failure reports, audit reports, audio, video and even speech based inputs. Application of NLP is helping companies analyze millions of records to plot risk based hot spots and define unknown risks, thereby allowing them to take pro-active business decisions.



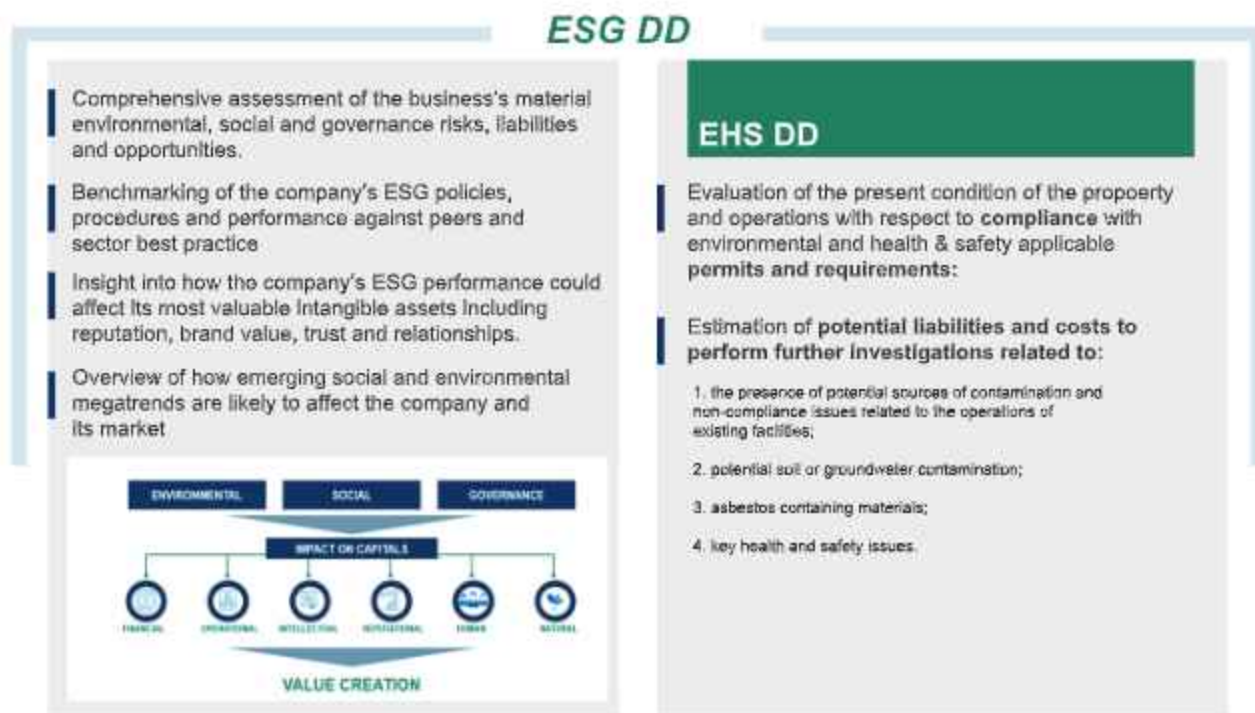
# Mergers & Acquisitions

The business criticality of sustainability issues has never been clearer and the momentum for sustainable performance never been stronger. Several surveys of business leaders across sectors; asset managers, institutional investors, and government regulations, all demonstrate the increasing importance of ESG and climate change issues globally, across societies and industries. The LCET appears well underway and will fundamentally shift the way we live, with advantage going to countries and businesses that lead the LCET. India is amongst those countries to face the greatest disruption from climate change. The ongoing pandemic has brought into sharp relief these factors.

Clearly, ESG and climate change issues present business critical risks, yet also present major opportunities for the chemical sector to play a leading role in. Investors have made significant commitments to supporting companies that meet defined ESG standards, rewarding those that outperform their peers, and eventually pulling out of companies that don't measure up.

What are some of the key sustainability (ESG and climate change) issues for the sector, from the point of view of a buyer or investor, whether trade or financial? How mature is the management in the target company with respect to addressing these issues? What are the potential risk or opportunities; their implications and what actions are needed for corrective action or to develop an opportunity? To answer these and many more critical questions, the old 'EHS' due diligence now needs to be a part of the larger ESG due diligence. Since sustainability issues affect a business across time (short-term and long-term) and across geographies, a 'boots to boardroom' view is essential in the diligence period and in the 100-day or 100-1000 day period after.

Fig.1: Typical Coverage of ESG Diligence vs. EHS Diligence



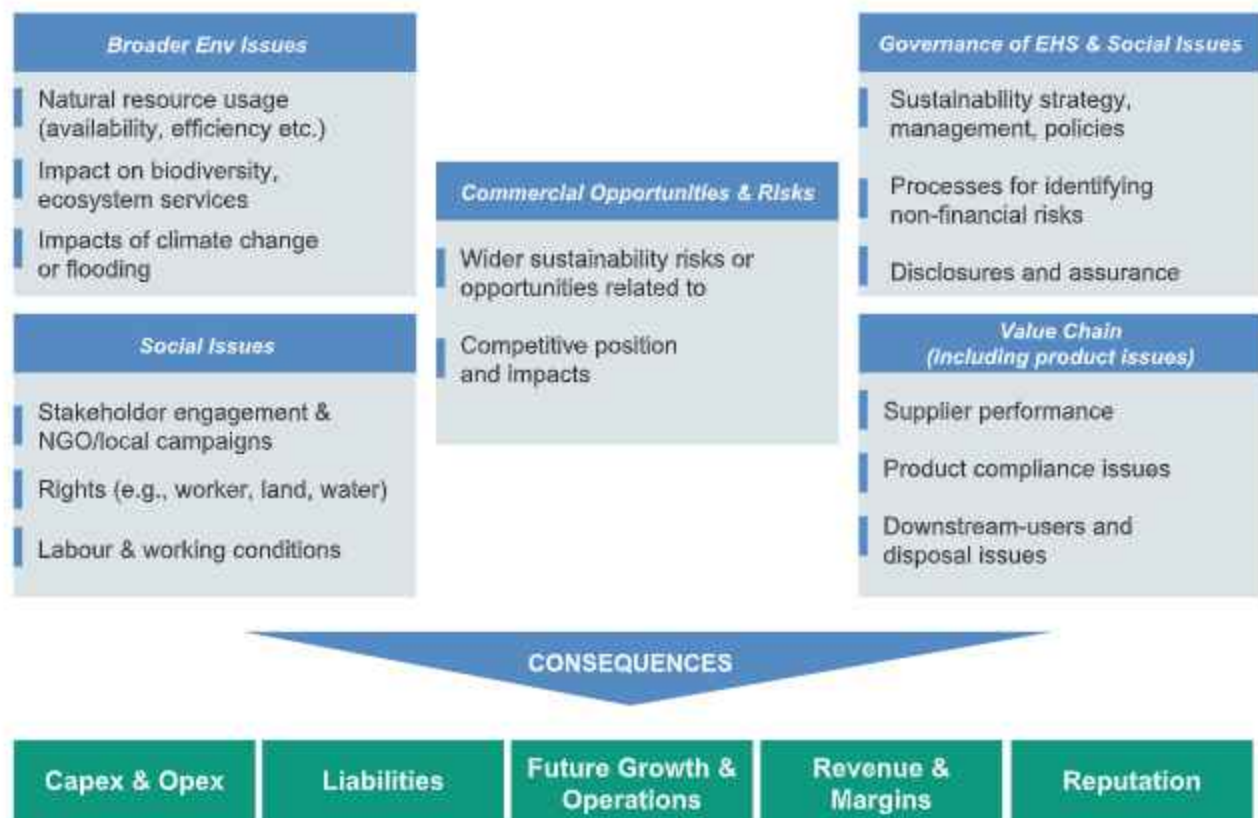
# Mergers & Acquisitions

Investors and buyers increasingly look to a comprehensive assessment of the business's material environmental, social and governance risks, liabilities and opportunities. For example, benchmarking of the company's ESG policies, procedures and performance against peers and sector best practice; insight into how the company's ESG performance could affect its most valuable intangible assets including reputation, brand value, trust and relationships; and, overview of how emerging social and environmental megatrends are likely to affect the company and its market.

The six capitals- financial, operational, natural, intellectual, reputational, and human- must be reviewed, benchmarked, and corrective or improvement actions prioritized. Each capital will have varying importance depending on the context of a transaction. For example, incident risk management, waste management, and GHG emissions may be relatively more important for the chemical sector, compared with, say, customer welfare and product design.

A bespoke ESG due diligence, therefore, protects value and paves the way for value creation. The outcome of the ESG diligence aids in strategic decision-making with respect to capex and opex, liabilities and net debt, future growth and operations, revenues and margins, and, reputation and risk.

Fig. 2: ESG Issues and Business Consequences



# Mergers & Acquisitions

A seller can pre-empt many of the ESG risks and liabilities by performing his own due diligence. Such a diligence allows the seller to provide the commercial context of the ESG issues and in fact, is comprehensible as business issues. The vendor can focus on the solutions in place – for example, forecast budgets, management systems and risk mitigation measures rather than on the issue itself. Thus, the focus is on the business implications, communicating the management solutions, reducing delays, uncertainty and opportunities for price reduction.

Fig.3: Sell side Due Diligence Advantages

## Key environmental issues and a purchaser's concerns

**Environmental liabilities:** environmental law often states that if liabilities are disclosed by the vendor, they pass to the purchaser (subject to contract). Meanwhile, a purchaser will want to understand the need for provision/contingencies, impact upon working capital and forecasts

**Capital expenditure commitments:** new regulations will require material capital improvements to pollution control equipment in many sectors. A purchaser will want to understand if additional capital and/or revenue requirements are included in the financial forecasts

**Management processes:** good control of environmental issues should ensure that they do not present a material risk to a business. A purchaser will seek comfort that management systems are robust.

**Market considerations:** regulatory and customer trends mean that environmental issues are now shaping the market in some sectors. Understanding these drivers for growth and decline (depending upon the sector) can be critical to the valuation process

**Customer requirements:** green corporate procurement means suppliers must meet minimum standards. Recycling obligations upon manufacturers mean suppliers need to provide cost effective recyclable components. A purchaser will want to understand potential implications to supplier contracts, relationships and product pricing

**Business disruption:** issues such as clean-up of contaminated land and removal of asbestos can cause disruption to normal business activities, with a corresponding impact upon revenue earnings

### VENDOR FULFILLS THE SALE WITH INFORMATION PRINCIPLE

Vendor is better placed to make a clean break from historical liabilities

### VENDOR PROVIDES THE COMMERCIAL CONTEXT

Environmental issues can be communicated to a purchaser in their proper context and as more easily understood business issues

### VENDOR COMMUNICATES THE MANAGEMENT SOLUTION

The vendor report can focus on the solutions in place - for example, forecast budgets, high quality management systems and risk mitigation measures rather than on the issue itself

...focussing on the business implications, communicating the management solutions, reducing delays, uncertainty and opportunities for price chipping.

# Post: Mergers & Acquisitions

## Post – Merger Integration

How does a business move from the due diligence phase to operational excellence in the new entity? Creating an integration pathway at the start of the diligence is essential. Every merger/integration effort represents a chance to set a higher ESG performance standard. Applying a strategic approach and best practice for various elements, creates an advantage to create/enhance value.

Fig.4: From DD to Operational Excellence the Road to Bridging the Gap

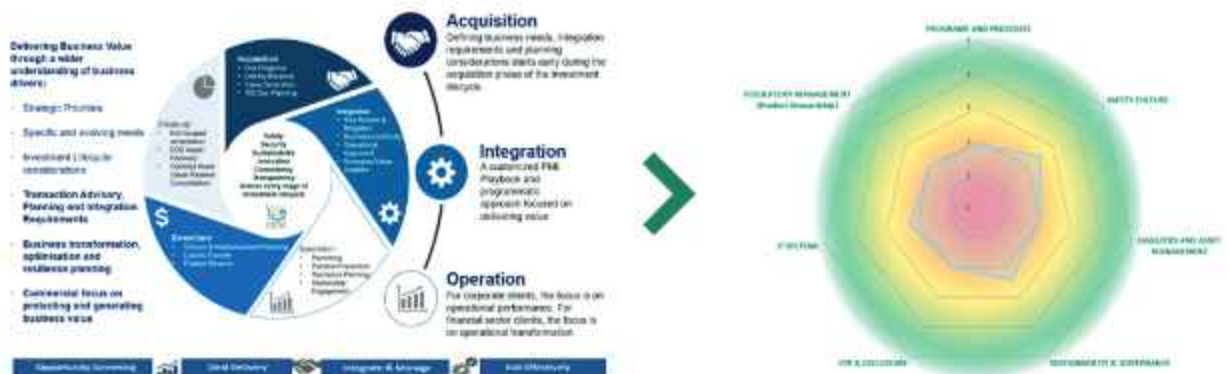
### Creating an integration pathway from the outset

Every merger/ post acquisition effort represents a chance for transformation, an opportunity to set and build capabilities for higher ESG performance standards.

Application of a strategic approach and best practice creates leverage to capture that value.

- Evolve from M&A rational (value protection)
- Introduce holistic approach
- ESG/EHS maturity mapping as a critical path towards value creation

Early transformation planning, PC buy-in, and structured execution enables the identification of synergies and helps overcome business challenges to create transformation opportunities which support sustainable business growth.



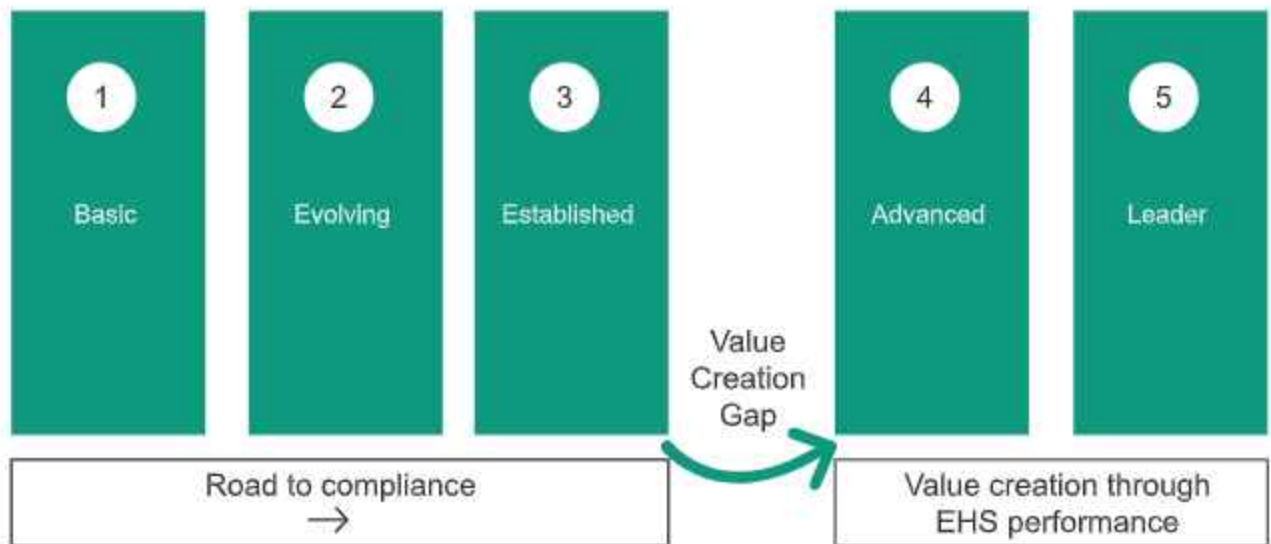
# Post: Mergers & Acquisitions

The post-merger integration (PMI) must address six strategic themes:

- Organization and strategy
- Liability and risk
- Compliance
- Operational excellence
- Growth
- Divestitures and asset retirement

Funding for the integration typically reduces with time; so it is imperative for the Sustainability function to establish EHS/ESG scope and ambition in the new entity; secure funding for long term integration and improvement; ensure EHS is a priority in critical support areas – IT, HR, Legal; and, set realistic performance expectations.

Fig.5: Sustainability Maturity: from compliance to Value Creation





The journey to a sustainable business:

# **Navigating the road ahead**

# The journey to a sustainable business: Navigating the road ahead

From our experience working with clients, we see five stages of sustainability for an organization.

## 1. The Compliance Meters

The companies and/or key individuals that fit into our Compliance Meter segment are squarely focused on meeting the regulatory requirements. Sitting at the foot of our maturity curve, these organizations demonstrate a strong focus on managing regulatory risks by following best practice reporting and disclosure requirements. This is quite a defensive approach. In the most part their strategy is driven by EHS professionals. In terms of their remit the Compliance Meeting companies are more confident than any other of our five segments that their sustainability and commercial goals are aligned.

The Sustainability Maturity Curve



## 2. The Stakeholder Pleasers

Next on the maturity curve are the Stakeholder Pleasers. While the Compliance Meters approach sustainability from a regulatory and internal compliance point of view, the Stakeholder Pleasing organizations (whose strategy is led primarily by sustainability professionals) are heavily influenced by external communities. Yet, despite this optimism and enthusiasm the Stakeholder Pleaser strategy doesn't appear to be having a concrete effect on making sustainability a growth driver for the entire business. In many ways it is quite reactive. This group were the least likely to see a need to make the sustainability team more commercially literate. In addition just a third believe the finance team is stepping up to the plate. This disconnect between sustainability and finance can cause internal divisions and hamper the development of a business-centric sustainability strategy.

Three-quarters of the Stakeholder Pleasers segment feel a tension between different teams. This can also create a dangerous dissonance between what is said to the outside world and what happens in practice. This desire to promote sustainability before it has been integrated into the daily workings of the business can create stakeholder distrust with investors, customers and employees alike.

## 3. The Risk Proofers

Midway along the maturity curve sits a segment we call the Risk Proofers, representing. They already understand the importance for the entire business of mitigating the effects of climate change and other externalities in order to make savings today and reduce potential future costs. This segment also feels investor pressure.

Already, the Risk Proofers are taking material steps to systematically assess and address the long-term impact of climate change on their operations and for their investors. They are most likely to have integrated reporting internally, to have integrated business planning and to be investing in technology to achieve the corporate sustainability agenda. And they are being proactive by already planning to buy or sell company assets impacted by critical sustainability issues by 2020.

The companies in this segment have a strategy that views the business both through financial and non-financial lenses.

Nevertheless, this fairly strict focus on mitigating risk may be hindering the adoption of a more expansive strategy that benefits the entire organization.

# The journey to a sustainable business: Navigating the road ahead

## 4. The Growth Seekers

There comes a time in the sustainability journey when the executive board – often led directly by the CEO – realizes that the real opportunities in sustainable business lie not just in mitigating risk but in realizing business growth.

Contrast this with the first three groups that sometimes struggle to integrate with leadership and strategy. Here sustainability is deeply embedded in business planning and in the remit of operations and procurement. The Growth Seekers see themselves as both early adopters and industry leaders in the pursuit of sustainable business opportunities but it's clear that business imperative drives their decision-making. However, even as companies in this segment look to drive sustainable business growth, they will need to demonstrate Environmental, Social and Governance (ESG), expertise and robust reporting if they are going to convince investors and other stakeholders of its strategic value.

## 5. The Vanguard

Could it be that the pursuit of quick profit isn't the only measure of corporate success? Just a few years ago that point of view would have been seen as heresy in the Milton Friedman-schooled board rooms of most major companies. Not any more. There seems a real mood of change in business towards an admission that creating long-term social value is as important as delivering short-term shareholder returns. It's a school of thought first championed by CEOs like Paul Polman (recently retired from Unilever) and now given fresh impetus by the likes of Blackrock's Larry Fink. This last segment on our sustainability maturity curve embodies many of the principles underpinning what has become known as long-term capitalism. The 18% of surveyed companies represented by the Vanguard segment are motivated by both internal and external drivers – they understand the importance that sustainability now plays in the lives of investors, customers, employees and regulators. They also know that fresh reporting and measurement frameworks can help their decision-making.

## How to move up the maturity curve?

We have sketched out five levels of sustainability maturity currently exhibited by organizations based on our survey findings: Yet, even though we've identified clear differences in the levels of maturity, we acknowledge that different companies can only progress at a pace that is in the best interests of the business as a whole. That will depend very much on their size, their model, their culture and the type of sector they operate in. This often gets focused on the business imperatives of growth, risk management and return on capital. However as the survey findings make clear, as organizations progress up the maturity curve they will need to improve their proficiency in four key areas.

### A. Leadership, strategy and culture

In the short history of sustainable business we have seen that real progress is only achieved when the entire organization buys into the value of sustainability – both for the business and greater society. Invariably, instilling a culture of sustainability is easier when employees see that senior leadership embraces that vision – rather than being preached by the functional team alone. For companies to realize the opportunities, the CEO and executive team must play a central role. This will help shape the strategy and mold the culture where sustainability, finance, operations, marketing and communications all work towards the same business-driven goals that reward investors, employees and greater society.

### B. Better data equals greater knowledge and insight

Of course, rousing words from the CEO aren't going to embed sustainability throughout an organization. What different functions need is information that allows them to understand the business opportunity in a way that is relevant to their role. That involves shaping data analysis and insight in new ways by freeing relevant data that might be siloed in different departments – often because no-one ever thought it might be relevant to the business as a whole. Once organizations have a fuller picture of the business implications of issues like climate-related risk and the opportunities of new products and services they can take the necessary actions like investing in technology and buying and selling assets.

# The journey to a sustainable business: Navigating the road ahead

## C. Measurement and reporting capabilities

Armed with decision-useful data, organizations can start evaluating exactly how issues like climate risk and resource scarcity are impacting the bottom line while also planning new growth strategies. However, providing accurate projections for internal stakeholders as well as investors requires measurement and reporting capabilities that encapsulate everything material to the business. In our survey, while 49% of respondents had either started using the UN SDGs or planned to do so in the next two years, until companies learn how to measure and report on the total impact and value of their operations they'll struggle to execute on sustainable business strategy and answer many of the questions posed by investors.

## D. Partnering for insight

The final area of potential improvement lies in partnering and looking outside of the business for insight. Most organizations that have demonstrated sustainable business success in recent years haven't done it alone. They've realized they are part of a system that needs changing and that expertise can be sought from a range of external partners – whether competitors, NGOs, government or third-party experts. Nearly 60% of our respondents identified finding the right external advisers who deliver business value a problem on some level to the business – ranging from a minor concern to one that is critical. For many companies, looking externally for solutions can be hard but in this new era collaboration is king.

## What should I do right now?

If you're a CEO, or a leader addressing your organization's sustainability challenge, what should you be doing now?

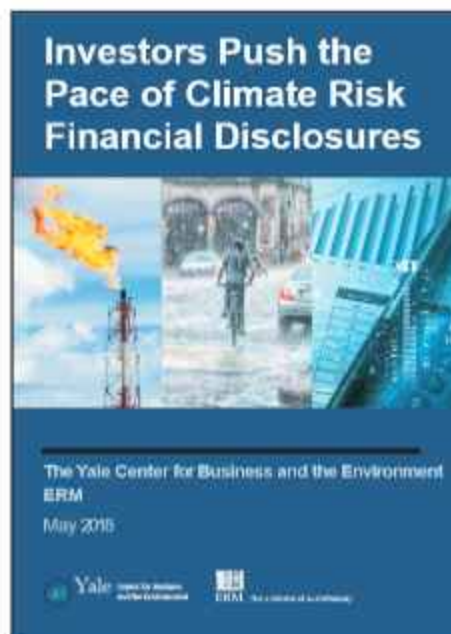
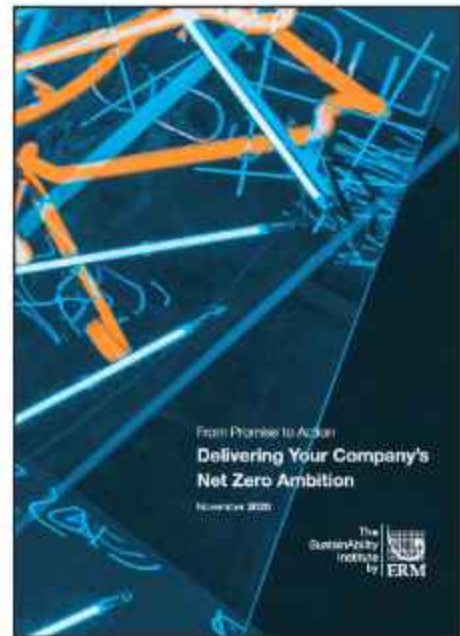
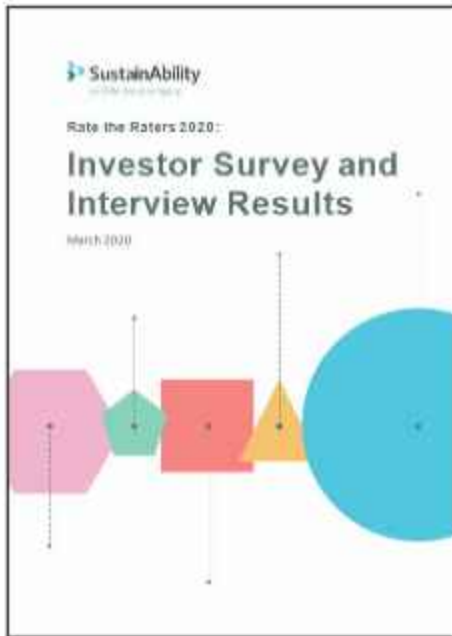
1. Figure out where your organization is on the maturity curve, using verifiable data, not just opinion. Be honest about Corporate Sustainability Dissonance – how big is the gap between what you say you are doing and what is really happening on the ground? This can impact everything from customer and employee attractiveness and retention, to longer term brand issues.
2. Fully understand and have a plan to mitigate the major risks to your firm – depending where you are on the maturity curve and your appetite and ability to move up it.
3. Conversely, understand the potential benefits for your organization in seizing the opportunities of moving up the curve particularly in terms of competitive advantage in areas such as operational excellence, business integrity, and access to market and capital.
4. Ask your investors and policy makers what they want in terms of disclosure now and what should you start addressing to fulfil future requirements.
5. Build a plan for the programmatic change required as sustainability moves up the corporate agenda. At the very least, you will likely have to mirror, or surpass, your competitors to maintain your position in the market.

[Download the full report here](#)

An aerial photograph of a city, likely Denver, Colorado, showing a mix of urban buildings and green spaces. In the background, a range of mountains is visible under a clear sky. The entire image is overlaid with a large, semi-transparent green rectangle. The text 'Additional Resources' is centered within this green area in a white, bold, sans-serif font.

# Additional Resources

# Additional Resources



## References

23rd Annual Global CEO Survey | Trend report ([www.pwc.com/chemicals-trends-2020](http://www.pwc.com/chemicals-trends-2020))

Invest India data (<https://www.investindia.gov.in/sector/chemicals>)

India Brand Equity Forum – Chemicals (<https://www.ibef.org/industry/chemicals-presentation>)

[https://docs.wbcsd.org/2017/06/WBCSD Business Guide Circular Water Management.pdf](https://docs.wbcsd.org/2017/06/WBCSD_Business_Guide_Circular_Water_Management.pdf)

<https://www.sciencedirect.com/science/article/pii/S0301479720309385>

British Standard, 2017. BS8001:2017 Framework for Implementing the Principles of the Circular Economy in Organizations. Guide. The British Standard Institution.

Nikita S. Kakwani, Pradip P. Kalbar, Review of Circular Economy in urban water sector: Challenges and opportunities in India, Journal of Environmental Management, Volume 271, 2020, 111010, ISSN 0301-4797, <https://doi.org/10.1016/j.jenvman.2020.111010>

Opposition to India's biggest hydrocarbon complex in Odisha brews, viewed at <https://www.hindustantimes.com/cities/opposition-to-india-s-biggest-hydrocarbon-complex-in-odisha-brews/story-rwLZMLNFu93xUYJw1JrvN.html>

Kharghar-Taloja residents to protest against air pollution in their region on February 27 viewed at <https://timesofindia.indiatimes.com/city/navi-mumbai/kharghar-taloja-residents-to-protest-against-air-pollution-in-their-region-on-february-27/articleshow/74308021.cms>

Maharashtra to move planned Ratnagiri refinery after farmers protest, viewed at <https://www.livemint.com/industry/energy/maharashtra-to-move-planned-ratnagiri-refinery-after-farmers-protest-1550510108667.html>

Aditi Patil, 2016, 'NGT sets aside Environmental Clearance to manufacturing unit near Surat', viewed at <https://www.landconflictwatch.org/conflicts/ngt-sets-aside-environmental-clearance-to-manufacturing-unit-near-surat>

<https://www.undp.org/content/undp/en/home/blog/2017/8/25/More-than-philanthropy-SDGs-present-an-estimated-US-12-trillion-in-market-opportunities-for-private-sector-through-inclusive-business.html>

[WBCSD Chemical Sector SDG Roadmap](#)



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