



Reaction

**Chemicals, materials and
agriculture inputs magazine**
Thirty-ninth edition

**Success in challenging
times: Resilience and
innovation**

Articles include:

Market outlook: Finding ways
to rebound from recession

Artificial Intelligence:
A powerful catalyst for
chemicals and materials?

Harnessing diversity:
A leader's journey at DuPont

Internal carbon pricing for
chemicals and materials
companies



KPMG in Belgium

kpmg.com

Foreword

Success in challenging times: Resilience and innovation

Paul Harnick, Global Sector Lead, Chemicals and Performance Technologies, KPMG International

Welcome to the 39th edition of REACTION magazine and the last one that I will be editing (more on that below, in what is a more extended introduction than normal).

Firstly however, I wanted to reflect on the CEO round table which I was lucky enough to participate in at the recent World Petrochemical Conference in Houston. The fact that the conference had the largest ever attendance with over 40 CEOs from around the industry I think reflects the huge amount of uncertainty around the industry with the slow pace of economic recovery in the manufacturing sector; ongoing geopolitical concerns including election cycles in many democratic countries this year; and the continuing challenges around responding to climate change — and climate change regulation, some of which is proving to be unhelpful. The overwhelming message to regulators from the industry at the WPC was “leave us alone.” Importantly, that doesn’t mean leave us alone from regulation; but rather, please don’t be over-prescriptive in how we need to respond. The message was: give us the regulation but let us figure out what levers to pull to meet it — this is a hugely innovative industry, and we are confident we will find the right answers.

Another interesting factor in discussions was the vast difference in regional dynamics. One of the things I truly love about this industry is the fact it is global in nature. While that is not going away, we may be entering a period of dislocation with multi-speed regions — US powering ahead driven by robust economic growth and a continued supply of cheap feedstock; China battling long-term structural issues, but buoyed by the continued rise of domestic champions in downstream industries such as automotive, consolidating an “in China-for China” strategy; while Europe continues to face high energy costs and a challenging regulatory environment potentially resulting in a declining industrial base.

It was also great to see the increasing number of senior executives from diverse backgrounds represented at the WPC. As regular readers know, I’m a “girl dad” and have been very vocal about the need for the industry to do more to increase all aspects of diversity across all levels including senior leadership. I’m delighted that the diversity segment returns in this edition, featuring my good friend Ann Giancristoforo from DuPont who talks about her experiences as a senior female leader.



The fact that the conference had the largest ever attendance with over 40 CEOs from around the industry I think reflects the huge amount of uncertainty around the industry with the slow pace of economic recovery in the manufacturing sector; ongoing geopolitical concerns including election cycles in many democratic countries this year; and the continuing challenges around responding to climate change — and climate change regulation, some of which is proving to be unhelpful.

The profile of Ann sits alongside KPMG insight and analysis of some of the key issues affecting the industry today: how to weather the economic challenges of present times that are affecting the entire industry, and rebound into growth; the potential for AI to be deployed in chemicals businesses, and what use cases could be most powerful; and a review of internal carbon pricing not just as a regulatory compliance matter but as a means of supporting the low-carbon energy transition and incentivizing lower emission behavior. I hope that reading these articles will help you think about ways to improve business performance, weather the economic conditions, drive up efficiency, and deliver new innovations.

And finally, after more than seven years as the KPMG International Global Head of Chemicals and Performance Technologies, it's time for me to pass the baton. It's been an honor and a privilege to lead a global team over this period with never a dull moment, from the highs of the last up-cycle and M&A boom to the lows of the global pandemic and the uneven recovery since.

I'd like to thank all of the clients around the world and particularly all of the members of my team for your support and friendship. I'm also particularly proud that REACTION Magazine continues to go from strength to strength — from a concept that was created in the dark days of the global financial crisis to become one of KPMG's longest running publications.

I'm delighted to announce that Gillian Morris will be my successor in this role. I've known Gillian for many years, and she brings over 25 years' experience to the role. She has always been a strong voice for women and inclusion since starting out in the chemicals industry in the late 1980s. I will continue to be extremely active in the industry with my Client Lead Partner roles in the US and will be offering Gillian full support as she transitions into the role over the coming months. I'll also look forward to seeing as many of you as possible at industry events over the coming years. But for now, it's goodbye and over to you, Gillian!

As ever, KPMG professionals are keen to hear your feedback and if there are any issues, you'd like us to cover in a future edition of REACTION, please don't hesitate to get in touch.



I'm delighted to announce that Gillian Morris will be my successor in this role. I've known Gillian for many years, and she brings over 25 years' experience to the role. She has always been a strong voice for women and inclusion since starting out in the chemicals industry in the late 1980s. I will continue to be extremely active in the industry with my Client Lead Partner roles in the US and will be offering Gillian full support as she transitions into the role over the coming months.



Paul Harnick
Global Sector Leader, Chemicals
and Performance Technologies
KPMG International

What's inside

05

Market outlook: Finding ways to rebound from recession

13

Artificial Intelligence: A powerful catalyst for chemicals and materials?

21

Harnessing diversity: A leader's journey at DuPont

27

Internal carbon pricing for chemicals and materials companies



Market outlook: Finding ways to rebound from recession

John R. Arp, Managing Director, Advisory and Strategy, KPMG in the US

Alessandra Domingos, Managing Director, Advisory and Strategy, KPMG in the US

Gillian S. Morris, Principal, Deal Advisory and Strategy, KPMG in the US



Market outlook:
Finding ways to rebound
from recession

Artificial Intelligence:
A powerful catalyst for
chemicals and materials?

Harnessing diversity:
A leader's journey at DuPont

Internal carbon pricing for
chemicals and materials
companies

When 2023 drew to a close, did you find yourself thinking “I’m glad that’s over?” Certainly, 2023 was a tough year for the global economy and, by extension, for the chemicals, materials and agriculture inputs industry. With economic growth in the doldrums, weak demand from key industries impacted sales and profitability. In fact, the industry has hit recession in key markets like the US, with four straight quarters of decline during 2023. Although the chemicals sector broadly had negative growth again, there were several bright spots with volumes increasing in petrochemicals and intermediates, TiO₂, industrial gases and specialty chemicals. Broad consensus we are hearing from clients is that destocking is finally over, and volumes should increase compared to 2023. How then can industry CEOs, COOs and CIOs build on these signs of recovery and rebound into growth? In this article, we’ll look at ways that chemicals businesses can navigate the economic challenges and uncover actionable insights to move forwards on a positive path.

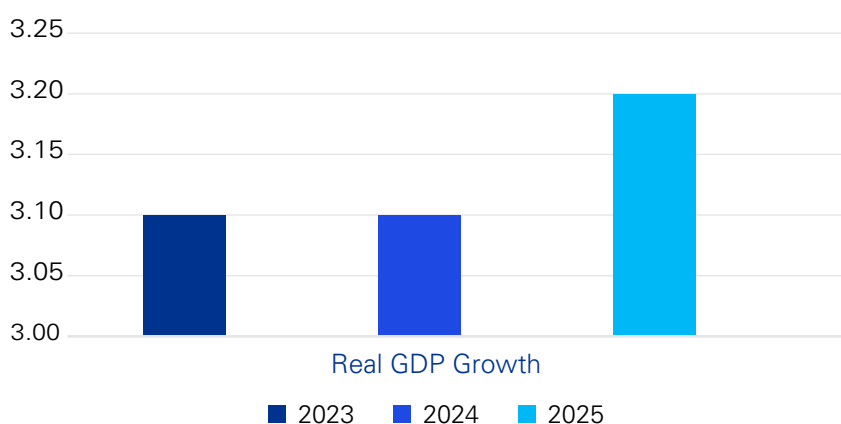
A weak economic forecast

Although most major economies have avoided actual recession to date — and where it has been experienced, such as in the UK, it is shallow and likely to be short-lived — nevertheless there is a general picture of anemic economic performance. According to the IMF’s projections¹, the global economy grew by 3.1 percent in 2023 — well below its historical trend line of 3.8 percent — and the same outturn is predicted in 2024. Regionally, while the IMF is forecasting a slight uptick in the Euro area, from 0.5 percent to 0.8 percent, and in the United States,

At a glance:

- The economic outlook remains in ‘low-growth’ territory with the global economy expected to grow by only around 3.1 percent in 2024, mirroring 2023.
- The chemicals, materials and agriculture inputs industry experienced a difficult 2023 — but there are signs of recovery starting to show through in some segments including Specialty Chemicals, Coatings Additives, Oil Additives and Titanium Dioxide.
- With positivity beginning to come back, we set out a number of levers that chemicals businesses can pull to accelerate their rebound into growth.
- These include doubling down on performance improvement measures, taking an ‘asset-lite’ approach, preparing for M&A and/or new market entry opportunities, and embracing technology including artificial intelligence (AI).

Global GDP Growth projections, percent change



Source: IMF World Economic Outlook, January 2024

from 2.5 percent to 2.7 percent, in other key markets performance is expected to be worse. Latin America is expected to fall, and so too Emerging and Developing Asia which includes the powerhouse Chinese economy. What the IMF describes as “deepening property sector woes” are likely to hold back growth and activity in China,

with a drop from 5.2 percent in 2023 to 5 percent this year.

KPMG’s own Global Economic Outlook² forecasts are generally in line with the IMF’s expectations, although in some areas they are in fact lower: anticipating global economic growth of only 2.2 percent (2023: 2.6 percent) and just 1.6 percent in the US (2023: 2.4 percent).

¹ IMF World Economic Outlook, January 2024

² KPMG Global Economic Outlook, December 2023



However, there are some grounds for qualified optimism. Elevated central bank rates have helped bring inflation down. The IMF notes that it is falling faster than expected in most regions, amid unwinding supply-side issues and restrictive monetary policy. The IMF is therefore cautiously hopeful of a soft landing, adding that risks to global growth are “broadly balanced”.

KPMG global economist observes that in 2023 “the medicine [of high central bank rates] at times felt worse than the illness” — but adds that it “appears to have paid off”, albeit at the cost of economic stagnation for many regions and a continued squeeze on consumer spending.

In short, while the good news is that the global economy should stay in positive territory and avoid

a hard recession, the bad news is that growth will remain scant and some key chemicals markets like the US and China are expected to experience a dip.

Chemicals, materials and agriculture activity lacking fizz

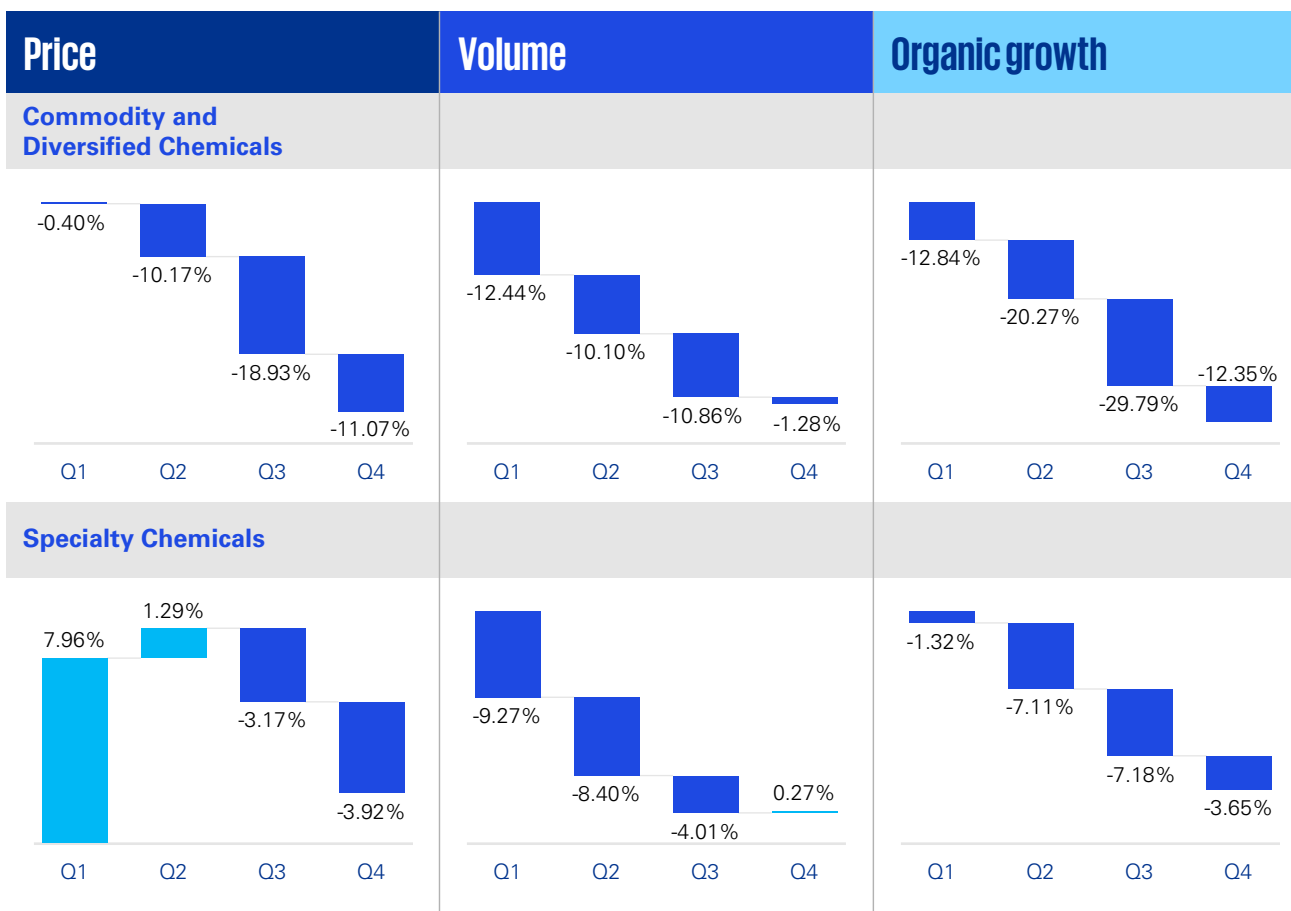
What then of the sector specifically? As we have alluded to, large swathes of the industry experienced what amounts to a recession last year. In Commodity and Diversified Chemicals, globally there were pricing and volume declines in every quarter of 2023. In Q4, there was an average decrease in revenue of -12.35 percent year-on-year, and in Europe this was -16.39 percent. In Specialty Chemicals there was a fractionally better picture, with two small quarter-on-quarter increases

in price in the first half of 2023 and a very marginal volume increase (0.27 percent) in the final quarter. In Q4, there was an average decrease in revenue of -3.65 percent year-on-year.

The index scores companies on a scale of zero to 100, with zero indicating serious distress and 100 being best performing.

In the US, chemicals businesses lived through four straight quarters of organic sales declines. Prices declined across the board and the sector has now given up most (if not all) of the price gains achieved in 2022, with organic pricing down -14.0 percent in Q4 2023.

Chemicals and specialty materials Q4 2023 earnings summary: Global figures



Source: KPMG analysis of Capital IQ Company Filings



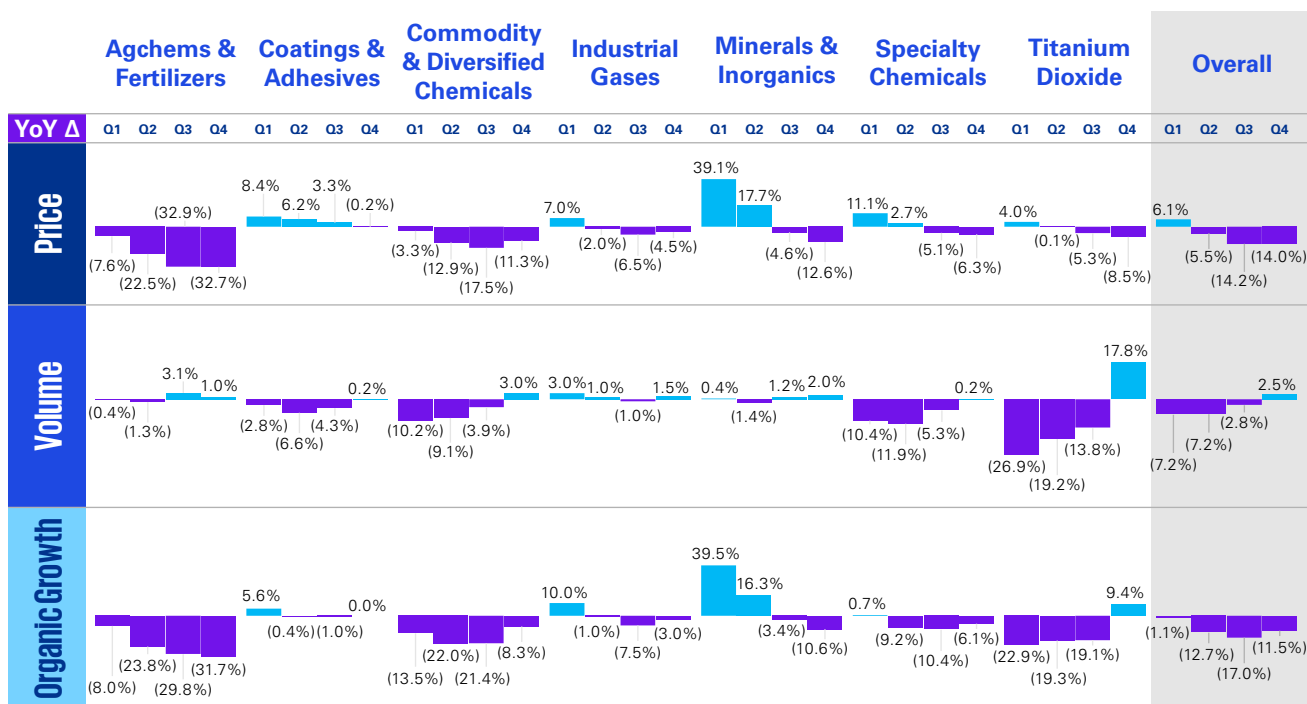
Market outlook:
Finding ways to rebound
from recession

Artificial Intelligence:
A powerful catalyst for
chemicals and materials?

Harnessing diversity:
A leader's journey at DuPont

Internal carbon pricing for
chemicals and materials
companies

Chemicals and specialty materials Q4 2023 earnings summary: US figures



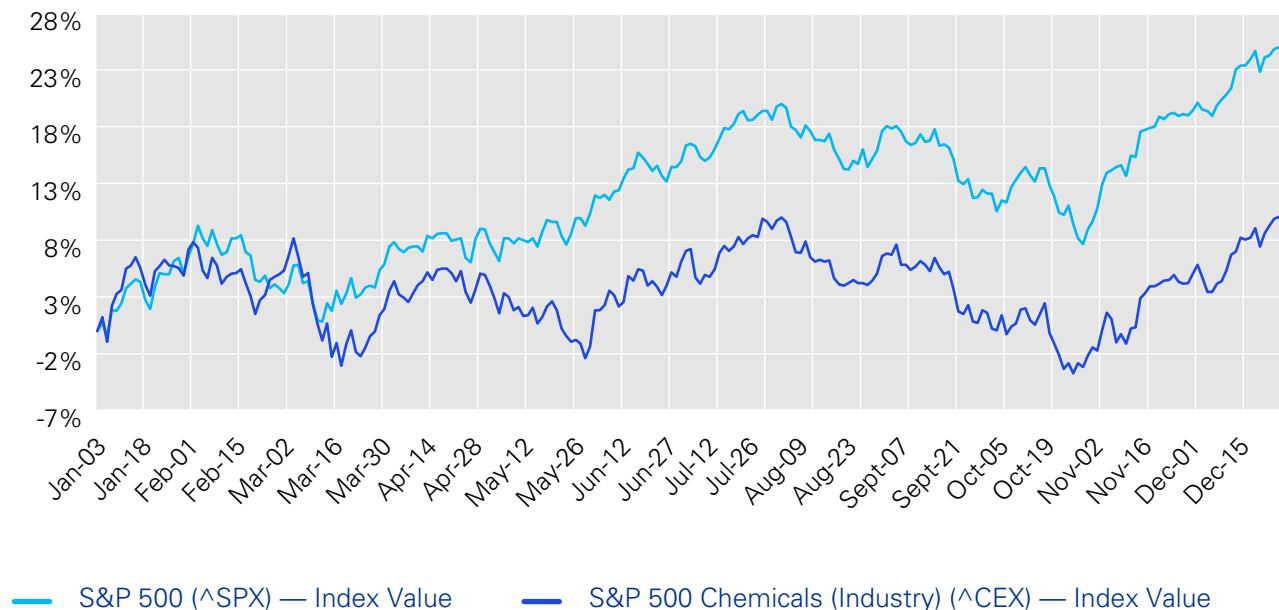
Source: KPMG analysis of Capital IQ Company Filings

If we turn to stock prices, our analysis shows that the value of chemicals businesses' stock in the S&P 500 lags the average — and the gap is widening. In March 2023, there was near parity, but a differential opened steadily through the year and in December 2023 **this had reached circa -15 percent.**

Chemicals trail the S&P in 2023

Industry Price Return — Index Value (Daily)

Price Change (%) Index value



Source: KPMG analysis of S&P 500



Market outlook:
Finding ways to rebound
from recession

Artificial Intelligence:
A powerful catalyst for
chemicals and materials?

Harnessing diversity:
A leader's journey at DuPont

Internal carbon pricing for
chemicals and materials
companies

The reason chemicals, materials and agriculture input companies are feeling the pinch is clear: demand has softened across major customer groups and in key global markets. Whether we look at automotive, aerospace, construction, manufacturing or agriculture, there is a prevailing picture of weak demand, elevated input costs, supply chain and labor challenges, and spending caution that together have created an uphill market for chemicals. In addition, there was a significant destocking at the end of 2022 that continued through most of 2023. There are some significant regional factors at play too. Chemicals businesses in Europe have faced especially pronounced challenges due to the huge jump in energy prices and feedstock costs as cheap natural gas from Russia went off-limits. Natural gas is also a critical feedstock for many European businesses' crackers. The industry has shown its resilience and agility

in pivoting to LNG imported from the US — but nevertheless, the pressure on some businesses remains material.

Green shoots showing through?

However, the better news is that we may be beginning to see the signs of recovery in some segments of the chemicals industry. In Specialty Chemicals global volume trends turned very slightly positive in Q4 2023, even if pricing continued to trend down. Coatings Additives and Oil Additives are expected to pick up in 2024 with robust performance around the prior year level.

There is a similar picture in the US market. There has been a rebound in demand for Titanium Dioxide where volumes rose 17.8 percent. Coatings and adhesives have held steady, with even some increases in pricing.

These green shoots are reflected within the KPMG [Financial Performance Index](#). The chemicals sector experienced a +0.46 percent change in KPMG FPI, from 3Q23 to 4Q23. The KPMG FPI distills a range of market and financial performance indicators into a single index covering nearly 40,000 public companies around the world.³

In our meetings with senior executives in the sector, we are starting to hear a little more positivity, with more volume stability and even, in some areas, growth. The chemicals industry is nothing if not resilient. Those companies who are best able to adapt to market dynamics will have the potential to rebound into increased sales and profitability. The key question is: how?



³ KPMG International. [KPMG Financial Performance Index \(FPI\): An index of corporate financial performance](#). 2024.



Market outlook:
Finding ways to rebound
from recession

Artificial Intelligence:
A powerful catalyst for
chemicals and materials?

Harnessing diversity:
A leader's journey at DuPont

Internal carbon pricing for
chemicals and materials
companies

Mission Possible: Rebounding into growth

While the market landscape is challenging, we see several key levers that chemicals, materials and agriculture inputs businesses can pull to position themselves for a recovery and steer toward growth.

1

Double down on performance improvement

Firms now need to take a more rigorous approach and find pockets of value that have been overlooked, including unrealized synergies from completed acquisitions. Some firms have made scores of acquisitions over the past few years but have not yet integrated them completely. Now is the time to do so, to capture synergies, reduce costs and prepare for potential future acquisitions.

Companies should also ask themselves if they have the right sort and size of support functions across the organization. For example, if you have sold businesses recently, have you resized support functions or reduced legal entities to reflect these changes? If you have acquired firms over the past few years, have you looked for delayed integration opportunities to improve efficiency and costs? Another good question is: do you have the right manufacturing and supply chain infrastructure to best support your country markets?

One area where KPMG professionals are working with clients to help improve performance is through the lens of sustainability and the ESG agenda. Rather than viewing this solely as a regulatory compliance matter, it can in fact become a means of creating value and ROI. We are supporting a major agricultural chemicals business in the US, for example, where our work includes estimating an internal carbon price (ICP) to aid future capital planning, M&A, and emissions reduction efforts. This not only helps meet carbon goals but can reduce operating costs, thereby improving margin. (See page 27 for a fuller exploration of ICP and how it can bring value beyond regulatory compliance.)

3

Prepare the organization and assets for M&A

In view of the general economic environment, chemicals businesses can start preparing now to divest non-core business units when financial markets pick up. Acquirers — particularly PE investors — are not likely to bid on any target where the investment thesis has not been well articulated, and the potential value-creation upside has not been demonstrated. Corporates will likely need experienced M&A teams and advisors — otherwise they may become disadvantaged against financial buyers.

KPMG firms excel at working with corporate M&A teams to provide early advice on financial and operational separation, and then work closely with your teams to get to a successful close. One example is where we provided sell-side financial and separation due diligence and technical accounting support for a multinational's divestiture of their global lubricants business unit.

On the buy side, it is expected to be important to fully understand early in the process the potential for EBITDA improvement and quantify this — particularly important for PE funds that may not have the synergy opportunities that a corporate buyer has. Corporates also need to validate how M&A can support their business strategies and, for selected potential targets, help ensure they have a well-articulated deal thesis, underpinned by due diligence for confirmation of assumptions. One theme we have observed recently is that the divesting of non-core assets often comes with a history of underinvestment or a "Capex debt", which both PE and corporate buyers will likely need to consider as part of their valuation and, ultimately, their decision to move forward in the deal process.

2

Take an asset-lite approach

The focus on performance improvement and efficiency is mirrored in another feature that is increasingly becoming a buzz word in the industry: becoming 'asset-lite'. In a constrained environment, firms should pare back and focus on their products — rather than production. It's this concept that has seen many chemicals businesses exiting the running of chemicals parks by selling the operation of these complexes to third parties. It is something akin to the PE model, moving toward being a 'pure play' chemicals business and leaving the operational aspects to others as a service. The business can then simply buy the off take it needs to make its own products, without being saddled with additional overheads and operational responsibilities.

It's a trend that is also reflected in the growing number of companies who are divesting themselves of non-core parts of their business. Carving these out generates cash, reduces running costs and simplifies the running of the enterprise. One major chemicals organization, for example, has sold its terminal and rail businesses in recent years. Other big players have separated off minority parts of their operations where the opportunity has arisen.

The mantra is to avoid unnecessary complexity and focus on the products and services that are truly strategically important to the business. It's a philosophy of "Do what you do well — and get out of non-value adding activities."



Market outlook:
Finding ways to rebound
from recession

Artificial Intelligence:
A powerful catalyst for
chemicals and materials?

Harnessing diversity:
A leader's journey at DuPont

Internal carbon pricing for
chemicals and materials
companies



4

Consider new market opportunities and assess existing overseas activity

While the economic backdrop is challenging, there remain pockets of dynamic growth in emerging countries with fast-developing chemicals sectors. Increasing numbers of players have established a foothold in China already — but other markets such as India, South Africa and Turkey have begun to attract growing interest.

Entering a new market should be a long-term project with thorough planning and due diligence, rather than jumping blindly in, but now may be a good time to reassess what opportunities exist and start exploring these markets, most likely through distribution arrangements, JV partners or minority stake opportunities in the first instance.

Then there are the overseas markets businesses are already active in — with China and Brazil as good examples. Due to the downturns in many regions and the uncertain outlook, many multi-nationals (across industries) are reviewing what strategies they should adopt to safeguard growth. There are perhaps four broad options:

- **Double down** — In some markets, the decision may be taken to commit significant extra capital funds for investment projects and M&A, with the objective of kickstarting renewed momentum and growing local presence and market share.
- **Carve out** — Another option is to separate the overseas operation into a standalone business and carry out a local IPO so that it becomes a locally listed company, most likely retaining a majority shareholding. This raises capital for investment and reduces geopolitical risks.
- **Joint venture** — Finding an established in-country player to enter into a JV with can help localize the business, inject valuable local knowledge and reduce capital exposure. Another variation here may be the 'asset lite' approach discussed above, where the factories and production facilities in the overseas market are owned or run by a third party, reducing the capital investment needed.
- **Exit the market** — In some cases, the decision may be taken that it is better to exit the market and focus strategic efforts at home and elsewhere. With chemicals an asset class of interest to many PE firms and other investors, a satisfactory deal can hopefully be reached.

5

Embrace new technology and the power of AI

New digital technologies including AI and generative AI can be significant enablers to becoming more efficient and profitable. With the right data infrastructure in place, there is enormous potential to leverage AI for automation and process improvements, and to generate smarter insights that stimulate innovation and productivity. The chemicals sector is perhaps tracking behind other industries in deployment of AI solutions — but the conversations have begun in earnest across boardrooms now and momentum could quickly build. See our analysis on page 13 for an in-depth examination of the topic.

On the risk side, meanwhile, many chemicals businesses run on SAP as their ERP for financial reporting and other core processes — and need to start preparing properly for the migration to S/4HANA given that support for other applications will begin to be withdrawn from 2027. This has the potential to be a technically complex and financially costly project: planning needs to start as soon as possible.

6

Think strategically not reactively

Finally, key to success for any business is to hold a long-term strategy in view rather than being led by short-term results. This applies more than ever in challenging trading environments.

Chemicals firms should avoid reactive moves that simply manage quarter-to-quarter performance, and instead think about a cohesive medium- to long-term strategy. In the current context, it's vital to ask:

- Do I need to refresh the strategy?
- Am I investing in the right products and businesses?
- Can I achieve performance goals with the current strategy?
- Has the business grown overly complex with too many non-core divisions?
- Conversely, are there acquisition or new market entry opportunities that would bring new value to the business?

About the authors



John R. Arp
Managing Director, Advisory and Strategy
KPMG in the US

John has over 20 years of operations, marketing and M&A services experience in base chemicals, specialty chemicals, agricultural chemicals and agricultural biologicals. Prior to joining KPMG in the US, John worked for over 15 years at BASF in global marketing, strategy, business development and operational senior level roles in the specialty and agricultural chemicals divisions. Since joining KPMG in the US, John has led buy and sell side M&A services engagements in the agriculture and chemical sectors covering due diligence and deal execution for large multinational firms.



Alessandra Domingos
Managing Director, Advisory, Strategy
KPMG in the US

Alessandra is a Managing Director in the KPMG in the US Transaction Strategy group and focuses on large, complex transactions in the chemicals sector, with specialized focus in the agriculture space. Her experience working and living in different countries has provided her with the benefit of seeing deals from multiple angles, and the ability to leverage this insight to identify the risks and value opportunities in every transaction. Alessandra's deep experience throughout the deal lifecycle and spanning different types of transactions such as acquisitions, divestitures, spin-offs, carve-outs, mergers, etc. allow her to serve as a trusted advisor to clients and help them achieve success in what is often their most transformative strategic initiatives.



Gillian S. Morris
Principal, Deal Advisory and Strategy
KPMG in the US

For more than 25 years, Gillian has helped publicly held, private equity owned, and family-office owned chemical companies grow profitably through delivering corporate and business unit strategies, performance improvement, and strategic acquisitions and divestitures. She is currently the KPMG in the US lead for chemicals and also commercial diligence.

Market outlook:
Finding ways to rebound
from recession

Artificial Intelligence:
A powerful catalyst for
chemicals and materials?

Harnessing diversity:
A leader's journey at DuPont

Internal carbon pricing for
chemicals and materials
companies

How this connects with what KPMG professionals do

KPMG firms serve clients across the global chemicals industry, helping with strategy, M&A diligence, planning and execution, and performance improvement.

KPMG Elevate is our approach to performance improvement. We help chemicals, materials and agriculture input companies identify opportunities for increased efficiency and EBITDA improvement across all operations and functions.

M&A

KPMG firms have a highly experienced, multi-functional and dedicated chemicals team that supports corporate and private equity clients across all stages of the M&A deal life cycle. KPMG professionals have a mindset focused on value identification and realization. KPMG firms offer wide-ranging, global transactional, operational, and integration and separation capabilities to address today's most complex M&A needs.

Artificial Intelligence: A powerful catalyst for chemicals and materials?

Use cases companies can explore now

Saurabh Bhatnagar, Partner, Industry 4.0 and Innovation, KPMG in India

Sushant Rabra, Partner, Digital Strategy, KPMG in India



Market outlook:
Finding ways to rebound
from recession

Artificial Intelligence:
A powerful catalyst for
chemicals and materials?

Harnessing diversity:
A leader's journey at DuPont

Internal carbon pricing for
chemicals and materials
companies

Reaction 39



Across industries and sectors, artificial intelligence (AI) applications and tools are already being deployed to drive business improvements and value-adding innovation — and the momentum is only increasing. Recently, generative AI has added to the excitement around where artificial intelligence could take us.

The chemicals, materials, and agriculture industry is no exception. AI is being utilized in multiple different ways and has the potential to yield productivity enhancements, cost saving efficiencies and smarter working across the value chain. According to the KPMG 2023 CEO Outlook, nearly two-thirds (64 percent) of energy CEOs agree investing in generative AI is a top priority, with 48 percent expecting to see a return on their investment in three to five years.⁴

However, AI adoption is less widespread and pervasive currently in chemicals than in its industry cousins such as automotive, life sciences or wider industrial manufacturing. But this only serves to underline the enormous potential waiting to be tapped.

AI use cases to explore now

When we consider the principal use cases for AI, it is striking just how widely spread they are across the chemical enterprise. The chemicals, materials and agriculture industry can explore existing 'traditional' AI (as opposed to generative AI) use cases to drive value, including but not limited to:



Supply chain

AI can be deployed to help improve demand forecasting, inventory management and the tracking of transportation across the supply chain. It can be utilized to make the supply operation more agile, efficient, and responsive, placing real-time information and analysis at the fingertips of the business. Optimizations can be driven across the entire supply ecosystem, not just an individual company's operations. Additionally, AI can help with identifying and tracking the provenance of goods — an important aspect with specialty chemicals in particular.



Energy management

Chemicals is an energy-intensive industry. AI applications can analyze energy usage and patterns to enhance consumption, reduce energy wastage and drive up efficiency. The result can be significant cost savings and margin improvements. A chemicals business, for example, uses AI to enhance the use of steam in its chemical plants in terms of the quantity and pressure; this makes the process more efficient and lowers costs — as well as reducing the carbon emitted, helping with the sustainability agenda.



R&D

Integrating AI into processes and operations can help chemicals businesses make faster progress with their R&D and innovation efforts. For example, by creating simulations that be used to model real world effects. For a manufacturing firm, an AI-driven platform simulates chemical syntheses, and the results of reactions are predicted, helping it in the quest to innovate and discover new molecules or materials at speed and with a greater degree of certainty of success.



Safety and compliance

With hazardous chemicals frequently in the mix, chemicals businesses need to manage the operating envelope extremely tightly. AI can assist here too. For example, prominent players in the chemicals industry leverage AI for environmental monitoring and safety, including predictive analytics to show where risks potentially lie.

Traditional AI can also play a significant role in other key areas such as yield improvement from chemical processes, predictive maintenance and reliability, and quality control. In fact, almost anywhere that large amounts of data reside, AI can analyze and generate insights in real time where human-only capacity would find it tough to navigate the volume, velocity and variety of data to draw insights from it.

⁴ KPMG International. 'CEO Outlook 2023.' 2023.

Emerging generative AI use cases for chemicals and materials

And what about generative AI? The general hype around large language models has been immense. Their ability to generate content, whether in text, images, sound or code, holds exciting potential for many different business functions. More specific use cases in chemicals are at a relatively early stage but already there are several areas where it can bring value:



Contract management

Generative AI can be used to ingest the long and complex supplier contracts that many chemicals businesses have, and then find specific information or check supplier performance against contract obligations and at the same time design new ones with specific covenants balancing risk, profitability and business continuity.



SOPs (standard operating procedures)

With chemicals firms often having hundreds of SOPs, generative AI can rapidly locate and highlight relevant information, including for example safety-related guidance for specific procedures or technical specifications parsed in a shape and form which is easy to read, understand and to act upon.



Market research

What's the size of the product X's market in country Y in Asia? With a little help from a generative AI application, this information can be at a company's fingertips along with specific perspectives and prescriptions on best strategy for market entry, forecasted trends and competitive dynamics. This could help firms enter new markets with the products and strategy required to acquire share at speed with marketing budgets supporting profitable business expansion.



Market outlook:
Finding ways to rebound
from recession

Artificial Intelligence:
A powerful catalyst for
chemicals and materials?

Harnessing diversity:
A leader's journey at DuPont

Internal carbon pricing for
chemicals and materials
companies

Implementing a successful AI strategy

With so much potential — but many chemicals businesses still at relatively early stages in the journey — how can organizations ensure they are pursuing a value-oriented, practical, responsible and trusted approach?

No business can operate in a silo of digital seclusion while the rest of the world is adopting and institutionalizing solutions at pace. The AI adoption journey should start with a rigorous process of discovering cases where AI inclusion would either add significant business value or address burning issues which have long since stifled business growth, compromised safety or prevented accelerated innovation. AI should not be a solution in search of a problem. So, it is key to identify the specific use cases that will drive benefits in an individual organization and its associated broader operations. Look across your business, involving all relevant departments and teams, to create an inventory of where AI could valuably be applied and what the outcomes/benefits could be. For example, are there areas or processes where you know that performance is sub-optimal or where value is being lost? This value discovery process is an area where a collaborator such as a KPMG member firm, through our in-depth industry knowledge and extensive experience of how AI is being applied elsewhere, can provide significant support.

Investment will also be needed, and a budget should be set. This investment is typically required for establishing seamless data flows, which is like the nervous system of a human body and hence forms a critical ingredient for success. AI relies on data — it is the fuel that powers it. It therefore follows that businesses must strive to ensure

they have the right data infrastructure and processes in place to make good quality, accurate, secure and granular data available. This is foundational to the AI effort.

Inevitably, AI does carry a cost. However, these costs should be treated on a case-by-case basis with an associated and agreed ROI on the same. In fact, frequently the spend on AI alone may be much lower than the outlay on other items needed for ensuring business continuity. AI can be modularized and then scaled up — starting small and building in scope. There are also many pre-built AI solutions and applications available via Software as a Service (SaaS) providers and technology firms that can be utilized almost off the shelf. Businesses do not necessarily have to build all their own solutions — they can be commercially acquired or co-developed with a third party such as a start-up with point solutions in the space.

Board buy-in is essential

It is also essential that any AI approach is led and supported from the top. The Board needs to be fully behind the endeavor and indeed should clearly establish it as a strategic priority that requires buy-in and engagement through the organization. This needs to be backed up and supported through adequate training and education for staff so that they see AI not as a threat but as a tool that can help them in reconfiguring their role for higher value-added contributions. Research by KPMG in the US Board Leadership Center found that 57 percent of Directors view the new skills and talent required as the most significant disruption facing the company in its adoption of generative AI.⁵



AI does carry a cost. However, these costs should be treated on a case-by-case basis with an associated and agreed ROI on the same. In fact, frequently the spend on AI alone may be much lower than the outlay on other items needed for ensuring business continuity. AI can be modularized and then scaled up — starting small and building in scope.

⁵ KPMG in the US. [‘A Boardroom Lens on Generative AI.’](#) 2024.



This support is key because another critical principle is that AI should not be something that is ‘done’ to the business: the business needs to own solutions for subsequent implementation (with appropriate outside support) itself. Only if people are empowered with the tools and knowledge to experiment with it, will it produce tangible results. There needs to be seeding of a culture of learning fast and failing fast. An appropriate and fit for purpose operating model and governance structure should also be created so that risks are managed and people are supported.

Then there is the question of who ‘owns’ or leads AI activity on an operational (as opposed to strategic) basis. Clearly, the IT function needs to be very closely involved, especially in the implementation of AI solutions into the IT environment. But in chemicals businesses, OT (operational technology) is also critically important. In fact, the OT environment — instrumentation, flow controls, monitors, gauges — is where much of the value of AI can be brought to bear. Many of the larger chemicals businesses have merged their IT and OT teams. In our experience, we have found that the speed of AI adoption is often fastest where this is the case, or at least where IT and OT have a close and collaborative working relationship. Meanwhile, some businesses have established an innovation center where new technologies and ideas can be systematically tested, fostering a culture of continuous improvement and adaptation.

Risks and barriers in the road

Needless to say, there are risks to manage and hurdles to overcome. As we have already observed, a strong governance process is needed to help ensure that risks are controlled. A key principle is that a human should always be in the loop where critical decisions are taken. For example, if

AI is controlling the product mix in a process, this needs to be overseen by a human to avert any safety risks.

Cybersecurity should also be a constant focus. It is likely that as more parts of the operating environment become digitized, automated and/or AI-driven, and as more uses cases requiring external parties to transfer data in and out of company systems are adopted, the cyberattack surface will expand. Recognizing this and continually monitoring cyber defenses and systems is critical for a successful AI adoption journey. This is an area where KPMG professionals, with their deep cyber experience and established processes, helps many organizations across industries including chemicals, materials and agriculture.

All AI models need to be rigorously trained and tested. Businesses need to be aware that the generic code employed in many generative AI applications may not adequately meet their specific requirements — it is likely to require refinement; shortcuts should be avoided. AI is a huge toolkit — businesses need

to find the right parts of it for their purposes, and then ensure that it is properly and robustly adapted to their specific objectives and desired outcomes.

Another key area is that of trust, ethics and responsibility. Stakeholders including shareholders, investors, regulators and customers need to have confidence that the business is using AI in responsible and compliant ways. Otherwise, trust will be eroded. Bias, for example, is perceived by many to be an issue in generative AI algorithms. According to the [KPMG Global Tech Report](#),⁶ 55 percent of organizations said progress toward automation has been delayed because of concerns about how AI systems make decisions. Similarly, 60 percent of [energy and chemicals CEOs agree](#) that implementing generative AI can result in ethical challenges such as plagiarism, data protection, bias and lack of transparency.⁷ Effective human supervision of such decisions and documentation of what data an automated system uses are among ways to help reduce risks from automated decisions.



⁶ KPMG International. ‘[Global Tech Report 2023](#).’ 2023.

⁷ KPMG International. ‘[CEO Outlook 2023](#).’ 2023.



KPMG has a [Trusted AI framework](#) that can help clients navigate these issues.

Values-led



Privacy: AI systems should comply with applicable privacy and data protection laws and regulations.



Sustainability: They should be energy efficient, reduce carbon emissions and support a cleaner environment.



Fairness: They should reduce or eliminate bias against individuals, communities and groups.

Human-centric



Transparency: AI systems should include responsible disclosure to provide stakeholders with a clear understanding of what is happening at each point.



Explainability: They should be developed and delivered in a way that answers the questions of how and why a conclusion was drawn.



Accountability: Human oversight and responsibility should be embedded within AI use to manage risk and comply with applicable laws and regulations.

Trustworthy



Data integrity: Data used in AI systems should be acquired in compliance with applicable laws and regulations and be assessed for accuracy, completeness, appropriateness and quality.



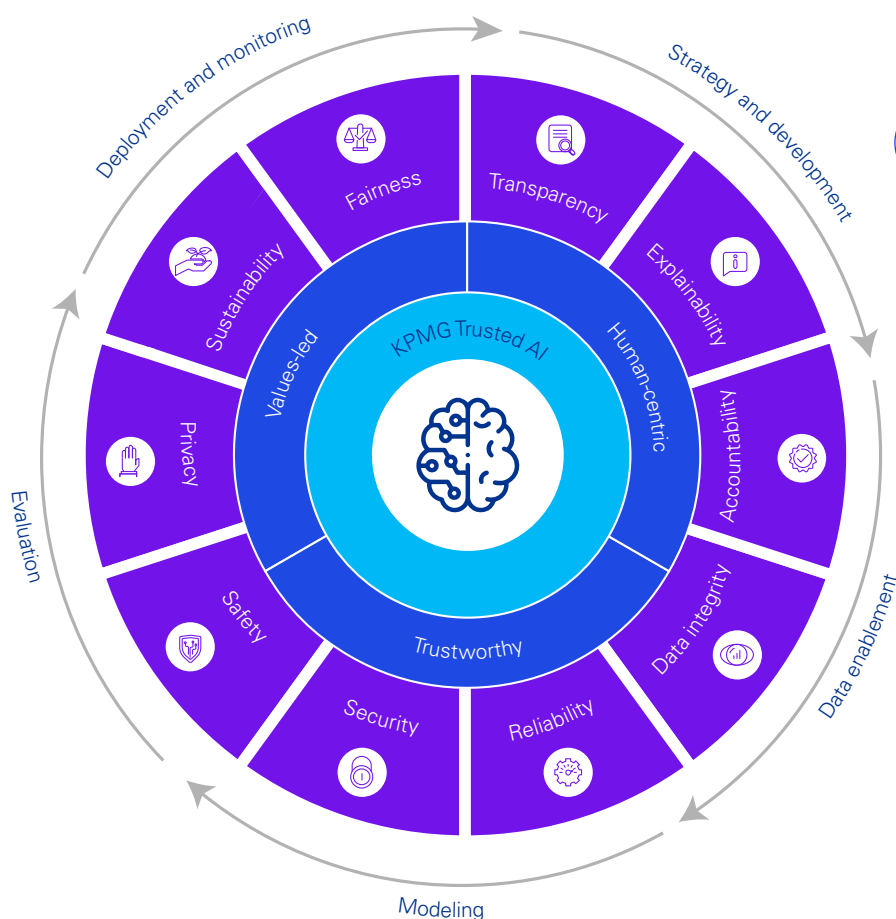
Reliability: AI systems should consistently operate in accordance with their intended purpose and scope and at the desired level of precision.



Security: Robust and resilient practices should be implemented to safeguard AI systems against those seeking to cause harm, misinformation or adverse events.



Safety: AI systems should be designed and implemented to safeguard against harm to people, businesses and property.



Market outlook:
Finding ways to rebound
from recession

Artificial Intelligence:
A powerful catalyst for
chemicals and materials?

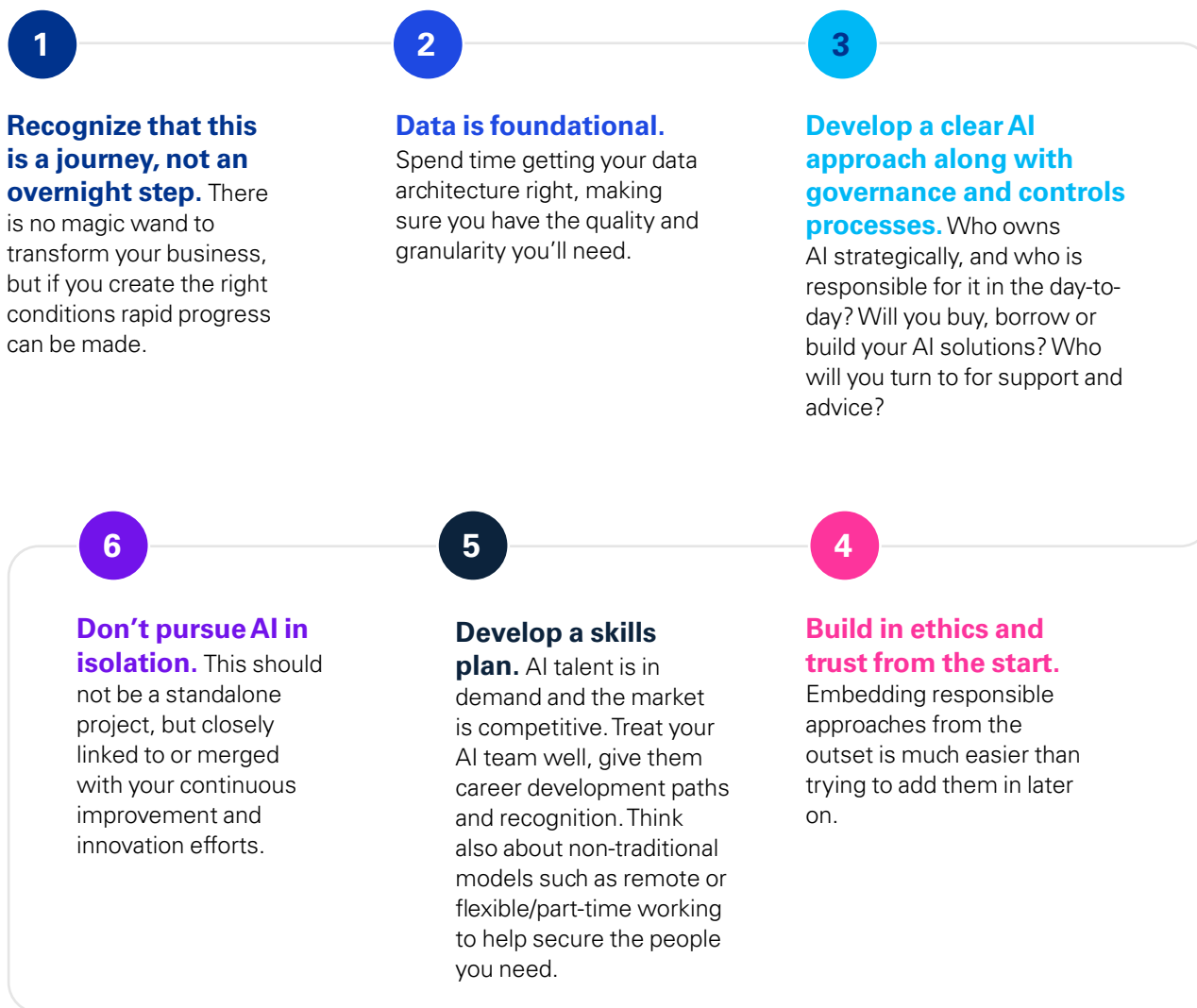
Harnessing diversity:
A leader's journey at DuPont

Internal carbon pricing for
chemicals and materials
companies

How to start your AI journey

Ultimately, businesses have a choice: be a follower or a leader. The risk of opting to follow is that, in such a fast-moving environment, you fall too far behind to ever catch up with your competitors. Undoubtedly, with chemicals a relatively slow adopter of AI, there is an opportunity for the bold to move ahead.

Key principles to aid in success include:



Market outlook:
Finding ways to rebound
from recession

Artificial Intelligence:
A powerful catalyst for
chemicals and materials?

Harnessing diversity:
A leader's journey at DuPont

Internal carbon pricing for
chemicals and materials
companies

About the authors



Saurabh Bhatnagar
Partner, Industry 4.0 and Innovation
KPMG in India

Saurabh is a seasoned consultant with extensive expertise spanning various industries, including bulk chemicals, natural resources, consumer products, and textiles. Currently, at KPMG in India, Saurabh spearheads the Industrial Automation, Intelligence, and Cyber Physical Systems (CPS) practice for India. He has previously served as the India lead for the Metals and Mining Sector and Industry 4.0 practice, demonstrating his adeptness in driving large-scale transformations. Noteworthy projects under his leadership include analytics and industry 4.0 led transformation for a global metals and mining major, ESG transformation of stainless steel manufacturing in India, and capacity enhancement initiatives for leading auto Tier 1 ancillary suppliers.



Sushant Rabra
Partner, Digital Strategy
KPMG in India

Sushant Rabra is a Partner in Digital Strategy, KPMG in India, with a focus in emerging technologies, artificial intelligence (AI), blockchain, 3-D printing, drones, IoT and related fields. He has over 19 years of experience working at various levels of both corporate and government client organizations, across the globe, to drive transformation strategies. He has advised large multinational companies, public sector organizations, SMBs as well as regulators on the application of emerging technology solutions. He has been instrumental in shaping the digital transformation agendas of Fortune 500 companies, utilizing a deep understanding of AI and digital technologies to craft strategies that integrate these technologies into core business processes.

How this connects to what KPMG professionals do

KPMG member firms can help chemicals, materials and agriculture businesses to find the right technologies and partners, as well as support business case development and management of its implementation. We combine industry knowledge with a strong understanding of digital intelligence and automation technologies and how these are used in chemicals organizations around the world. We can help companies explore possible innovations through use of our Ignition centers.⁸ We have collaborations with many of the leading providers of emerging technologies and have access to innovators that can migrate legacy software to modern platforms.⁹ When we cannot join forces, we can build software ourselves. And we can help in getting staff across chemicals organizations to use new technologies, through literacy programs, or helping to reorganize how they work to adopt them.

⁸ KPMG US. '[Start here. Go anywhere. Ignition.](#)'

⁹ KPMG US. '[KPMG and Rhino.ai Announce Strategic Alliance to Accelerate Legacy Portfolio Modernization.](#)' 2023.



Harnessing diversity: A leader's journey at DuPont

An interview with Ann Giancristoforo,
Vice President, Chief Financial Officer —
DuPont's Electronics & Industrial Business



Market outlook:
Finding ways to rebound
from recession

Artificial Intelligence:
A powerful catalyst for
chemicals and materials?

Harnessing diversity:
A leader's journey at DuPont

Internal carbon pricing for
chemicals and materials
companies

This interview delves into the dynamic career journey of Ann Giancristoforo, a seasoned finance executive currently serving as the Vice President, Chief Financial Officer for DuPont's Electronics & Industrial business. With over 25 years of experience, she shares insights on leveraging diversity for growth and innovation. From navigating significant industry transformations to championing diversity and inclusion, we explore her proudest accomplishments, the impact of mentorship, strategies for fostering diversity, and the crucial role of leadership in driving meaningful change.



Tell us a little bit about yourself including your current role and your journey to get there?

“With more than 25 years in Finance, my career has spanned several leadership roles within corporate and business finance, from Corporate Accounting to Internal Audit, and I’ve had the pleasure of working with really talented people along the way. Currently, I’m the Vice President, Chief Financial Officer for DuPont’s \$6B Electronics & Industrial business. We provide

industry-leading innovations supporting global megatrends around next-generation technology that enables connectivity, computing, displays, and much, much more. Prior to that, I was leading a team responsible for advancing our digital and automation strategy within DuPont’s Finance organization. There’s really exciting work being done across multiple

competencies to evaluate opportunities to deploy digital tools to drive efficiencies.

Before DuPont, I spent 12 years with PricewaterhouseCoopers in their assurance practice.

On a personal note, I’m married and mom to a 16-year-old daughter (an exciting age learning to drive and beginning the college search).”



Market outlook:
Finding ways to rebound
from recession

Artificial Intelligence:
A powerful catalyst for
chemicals and materials?

Harnessing diversity:
A leader's journey at DuPont

Internal carbon pricing for
chemicals and materials
companies

What career accomplishments are you most proud of?

"Here at DuPont, I spent about 4 years in Investor Relations during a period of significant transformation for the company. I was part of a team actively engaging with our external stakeholders during a proxy contest and one of the largest mergers in the chemicals industry including multiple business separations. It gave me a new perspective on how our shareholders perceive value, and how they make investing decisions. This experience was pivotal in shaping my future career path from accounting-focused to more of a finance lens."



During your career journey, did you have a mentor or champion for your career growth, and if so, what was the most memorable thing they did to help you?

"I've been very fortunate to have multiple mentors supporting me along the way, starting with my time at PwC and continuing here at DuPont. The mentorship I've received has truly guided my career

path. One of the most important things these relationships have taught me is to advocate for yourself and take ownership of your career, and I continue sharing this advice with those that I mentor

today. In a nutshell, figuring out what you want to be when you grow up is not a simple task but always remember you are in the driver's seat."

What was the most valuable career advice you have received?

"Recognize that every role or task you are given is a learning and development opportunity. Whether you work for a large, mid or small

size company, we are often asked to take on additional responsibilities or transition into a new role. Be open to these experiences, even

if they weren't on your career plan expectations. You may be surprised what you learn and the valuable contributions you can make!"



Market outlook:
Finding ways to rebound
from recession

Artificial Intelligence:
A powerful catalyst for
chemicals and materials?

Harnessing diversity:
A leader's journey at DuPont

Internal carbon pricing for
chemicals and materials
companies

Are there specific things you are doing to support and mentor the next generation of leaders in DuPont and in your community?

“DuPont has both a formal and informal mentoring network for talent within the organization, which I’m proud to be part of. This gives me an opportunity to engage with

individuals both inside and outside the US, from different businesses and functions. This experience has given me perspective on how our folks around the globe think

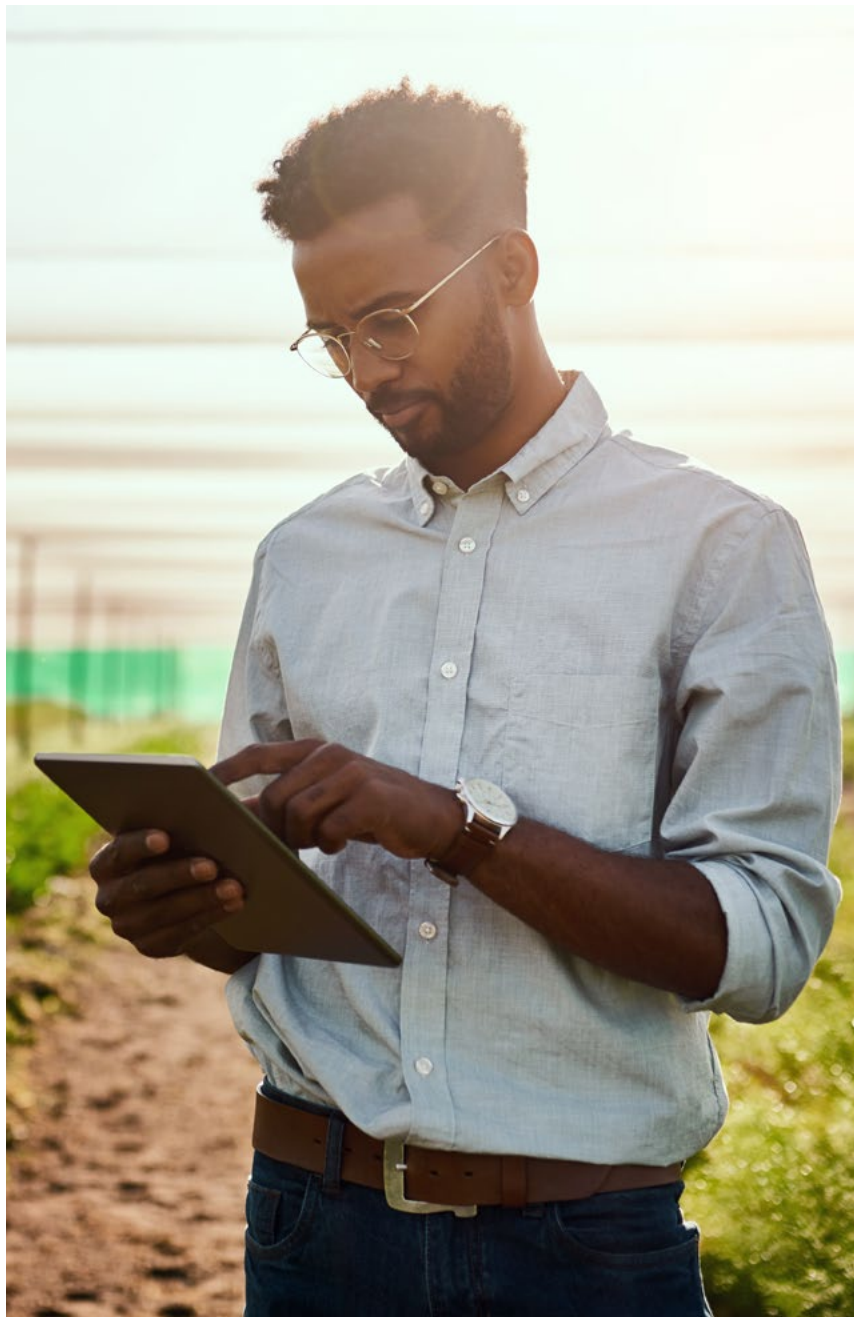
about their career paths within the organization and how I can support their goals whether that be through new opportunities or expanding their network.”

Can you tell us what DuPont is doing more broadly to support diversity and inclusion within the organization?

“Diversity, Equity & Inclusion (DE&I) is central to who we are at DuPont. Our commitment to DE&I reflects one of our Core Values, Respect for People, as well as informing our company’s overall purpose, *Empowering the world with the essential innovations to thrive*. We strive to be a leader in DE&I, creating a diverse, equitable and inclusive culture that engages our global talent and drives creativity, innovation and better outcomes. DuPont has a competency built around DE&I, with fantastic leadership, defined goals and a framework for driving action. We also have a number of Employee Resource Groups, which are employee networks designed to foster inclusion and support representation. They play a critical role in supporting both our DE&I and business initiatives.”

Is there anything else you think is important in improving diversity in the industry?

“Diverse ideas, experiences, and backgrounds enable bold thinking and can be a strategic advantage within an organization. The focus should always be on what we can learn from one another that catapults us forward and makes us stronger because we’re together.”



Market outlook:
Finding ways to rebound
from recession

Artificial Intelligence:
A powerful catalyst for
chemicals and materials?

Harnessing diversity:
A leader’s journey at DuPont

Internal carbon pricing for
chemicals and materials
companies

Could you provide any examples of how diversity within teams has directly led to innovation or better business results within companies you've worked with or observed?

"Championing DE&I at DuPont has been a key enabler for us as we've embarked on a journey to become a premier multi-industrial company. I attribute our success so far to four key concepts:

- **Accelerated innovation** with more perspectives, more ideas, more innovation (and this goes beyond the Research & Development arm and into every function in our company — innovation happens all over).
- **Stronger customer relationships** with an increased ability to understand the needs of our customers and consumers to drive more relevant solutions.
- **A thriving workplace** that attracts and retains the best talent in a competitive market.
- **Greater organizational resilience** through times of change.

A clear example of this is the STEM-focused outreach across many different geographies that is done as part of our community engagement work focusing on getting more students excited about STEM careers. By targeting diverse student population pools, this ultimately leads to larger, more diverse candidate groups for our early career hiring."

In your opinion, what are the main barriers hindering diversity and inclusion and how can these be addressed?

"Believe it or not, the willingness to start the conversation and acknowledge where an organization, function, or team is falling short on diversity and inclusion is difficult and uncomfortable — but a good first step."



Market outlook:
Finding ways to rebound
from recession

Artificial Intelligence:
A powerful catalyst for
chemicals and materials?

Harnessing diversity:
A leader's journey at DuPont

Internal carbon pricing for
chemicals and materials
companies

Can you share any strategies for effectively integrating diversity and inclusion into the culture and operations of a large company?

“Success in this area is dependent on DE&I being core to how you operate and essential to delivering on a company’s goals. DuPont employs a framework, enabled by structure and programs, that holds us accountable through clear metrics and transparent communication. Our Employee Resource Groups have helped

cultivate a culture of acceptance where our employees feel not only accepted, but celebrated, at every level. Each group is actively sponsored by senior leadership, helping model and promote inclusive values and behaviors. We celebrate diversity both within the company as well as the community, recognizing outstanding achievements and contributions of individuals and teams for the advancement of diversity, equity and inclusion.

We have communicated our DE&I goal externally, to become one of the world’s most inclusive companies, with diversity well ahead of industry benchmarks by 2030. In order to achieve this goal, we are actively investing in programs that help our employees feel engaged, supported and encouraged, allowing them to express their individualism and apply their creativity to solving the world’s most pressing challenges.”

How do you see the role of leadership in championing diversity and fostering an inclusive environment?

“It all starts with the tone at the top and driving action and accountability within the organization. Leading by example, not just with words, but with clear goals, planning and execution, is the only way you will champion diversity and inclusion in any environment.”



Market outlook:
Finding ways to rebound
from recession

Artificial Intelligence:
A powerful catalyst for
chemicals and materials?

Harnessing diversity:
A leader's journey at DuPont

Internal carbon pricing for
chemicals and materials
companies

Internal carbon pricing for chemicals and materials companies

Value beyond regulatory compliance: Helping chemicals companies navigate the energy transition

Anjit Bajwa, Principal, Industry Leader for Chemicals, Tax, KPMG in the US

Geoffrey Chiles, Senior Manager, Tax, Economic & Valuation Services, KPMG in the US

Kevin Perry, Senior Manager, Transfer Pricing KPMG in Denmark

Matthew Roling, Director, Advisory, ESG, KPMG in the US



Market outlook:
Finding ways to rebound
from recession

Artificial Intelligence:
A powerful catalyst for
chemicals and materials?

Harnessing diversity:
A leader's journey at DuPont

Internal carbon pricing for
chemicals and materials
companies

With the spread of global tax regimes and policies designed to influence decarbonization, more corporations are adopting internal carbon pricing (ICP) to try to get ahead of evolving regulations. This includes wider ICP adoption among companies in the heavy-emitting and hard-to-abate chemicals sector. Indeed, it has already started in earnest — with nearly half (44 percent) of chemicals companies having or planning to adopt an ICP within the next two years.

Chemicals is the third-largest carbon dioxide emitting industry, amounting to between 5 percent and 6 percent of global emissions.

The pressure to decarbonize only continues to grow as global government and corporate net zero goals look increasingly harder to achieve.¹⁰

Chemicals clearly has a key role to play in reducing carbon given the sector's impact, and has been making strides in doing so across the value chain in recent years. But that role comes with a regulatory burden to carry through the transition to a low-carbon future, as well as a risk: chemicals companies that fail to reduce their emissions today may be left with higher-carbon products that are less competitive in the global markets of tomorrow.

Internal carbon pricing is a strategy chemicals companies can use to not only get ahead of regulated carbon pricing, but also add to their toolkit to help better manage carbon pricing risk, reduce operating costs, and incentivize lower emission behavior.

¹⁰ IEA, Chemicals Tracking Report; Global CO₂ emissions by sector, 2019–2022

Chemicals sector snapshot

3rd

largest emitter amongst industrial sectors

3 billion

tons of CO₂ annually

5%–6%

of global industrial GHG emissions

44%

of chemicals companies use or intend to implement ICP within two years

Source: IEA, CDP, KPMG analysis



Market outlook:
Finding ways to rebound
from recession

Artificial Intelligence:
A powerful catalyst for
chemicals and materials?

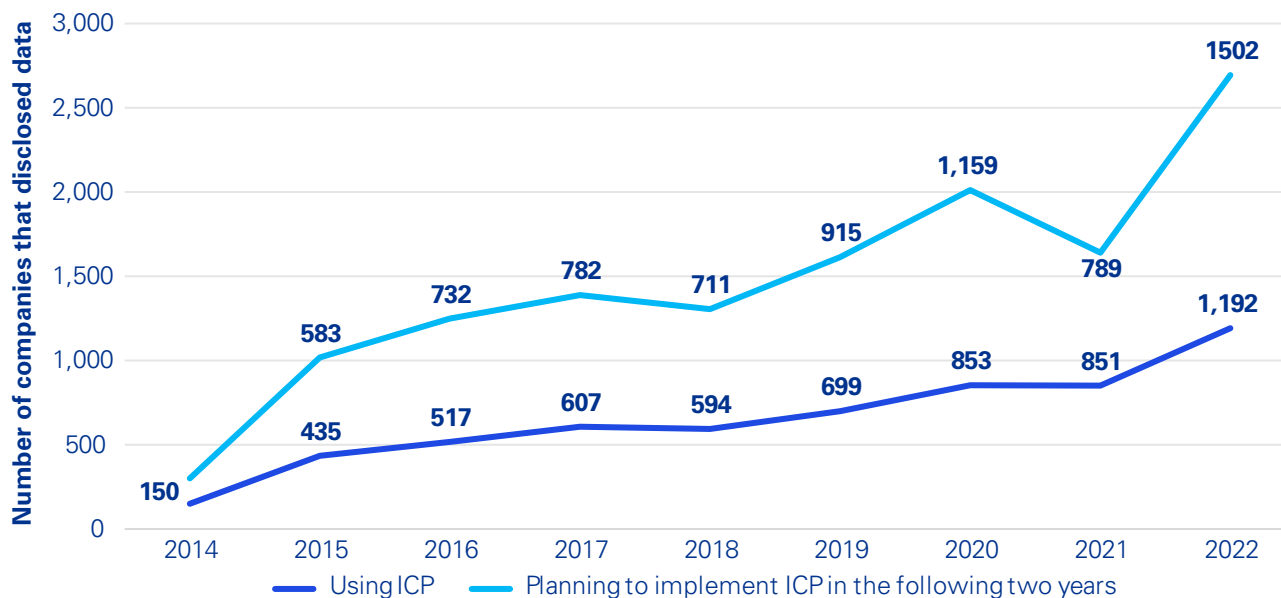
Harnessing diversity:
A leader's journey at DuPont

Internal carbon pricing for
chemicals and materials
companies



More companies are using or planning to implement ICP

Internal carbon pricing places a value on the amount of a company's greenhouse gas (GHG) or CO₂ equivalent (CO₂e) pollution. The number of companies using or planning ICP increased 67 percent in three years through 2022, according to the latest public data from the CDP global disclosure system.



Source: CDP

The overarching goal of carbon pricing

Carbon pricing in general is designed to create a glidepath to help an economy or an organization manage the transition to a low-carbon or net-zero future. Typically, over time, the cost of CO₂ pollution and other GHG emissions (commonly referred to collectively as “carbon”) should be priced to encourage market participants to change their behavior as the price of pollution gradually and predictably marches upward. Funds collected from any charge or tax should ideally be used to help cover the costs required to transition toward lower-carbon solutions.

References to carbon pricing typically fall under two types. Regulated carbon pricing markets can either involve (i) a direct excise tax on emissions (or emissions-generating products), or (ii) an emissions trading scheme (e.g., California cap-and-trade, European Union Emissions Trading System (EU ETS), or UK ETS). Ethylene, ammonia, methanol, PVC, and polystyrene are typically the most

carbon-intensive products in the chemicals and petrochemical industries.

Shadow pricing and internal carbon fees

Within ICP, the two most common forms are shadow pricing and internal carbon fees.

Shadow (or proxy) pricing is an estimated price on emissions used strictly for management purposes to determine impact and identify lower-carbon alternatives.

For example, it can be used to compare the carbon liabilities of competing capital planning or merger and acquisition (M&A) alternatives. The “charge” does not result in actual financial flows or the transfer of cash within the company, but may lead to new processes, changes in the value-chain, or even new IP — which all may have tax and transfer pricing consequences.

An internal carbon fee (also known as a carbon charge) is self-assessed

by the company and can be levied by a business unit or operating activity and typically transferred intercompany to incentivize better behavior and self-fund sustainability activities. This type of ICP impacts the financial statements and taxable profit of group entities, and as such, exerts a higher influence on corporate behavior. For example, a company could levy a carbon charge on electricity usage that feeds a fund to pay for a rooftop solar array. Importantly, as discussed below, an internal carbon fee may have a direct transfer pricing (and tax) impact that should be understood and assessed.

Companies may also retrospectively or prospectively analyze the historical or planned investments made to reduce GHG pollution and use this quantum as a numerator divided by the actual or expected GHG reduction to create an “implicit price.” The implicit price provides organizational visibility into the blended cost of the actual or forecast cost to abate pollution.



ICP in the chemicals sector

As the regulatory and business environment has evolved to achieve lower emissions, the chemicals sector has increasingly implemented tools like ICP. Industry trends supporting greater implementation, and which have helped the chemicals sector reduce its emissions and carbon intensity both in the industry itself and in the downstream industries it supplies, include:

- Increasing use of innovative materials. To reduce carbon footprint and optimize costs, the global chemicals industry is exploring emerging materials such as those used in advanced batteries, as well as nanomaterials and biotechnology.
- A shift toward green chemistry. Companies are trying to minimize the use of dangerous or hazardous chemicals and materials by developing and implementing new processes and products such as recycling technologies, enhanced waste management, and alternative energy resources.
- Sustainability-related dealmaking. More companies in the chemicals industry are exploring M&A opportunities that would add or enhance low-carbon and sustainable offerings in their product and service portfolios.
- Global sustainability initiatives. Countries around the world

are collaborating on multiple initiatives to promote investment and introduce greater sustainability across the chemicals industry value chain.

In the most recent CDP data, 44 percent of chemicals companies report already having or planning to adopt an ICP within two years. Of those, more than 60 percent are using a shadow price to inform capital planning and M&A decisions. A small percentage (7 percent) of chemicals companies are also using an internal fee on carbon to reduce emissions.¹¹

¹¹ CDP, KPMG analysis



Market outlook:
Finding ways to rebound
from recession

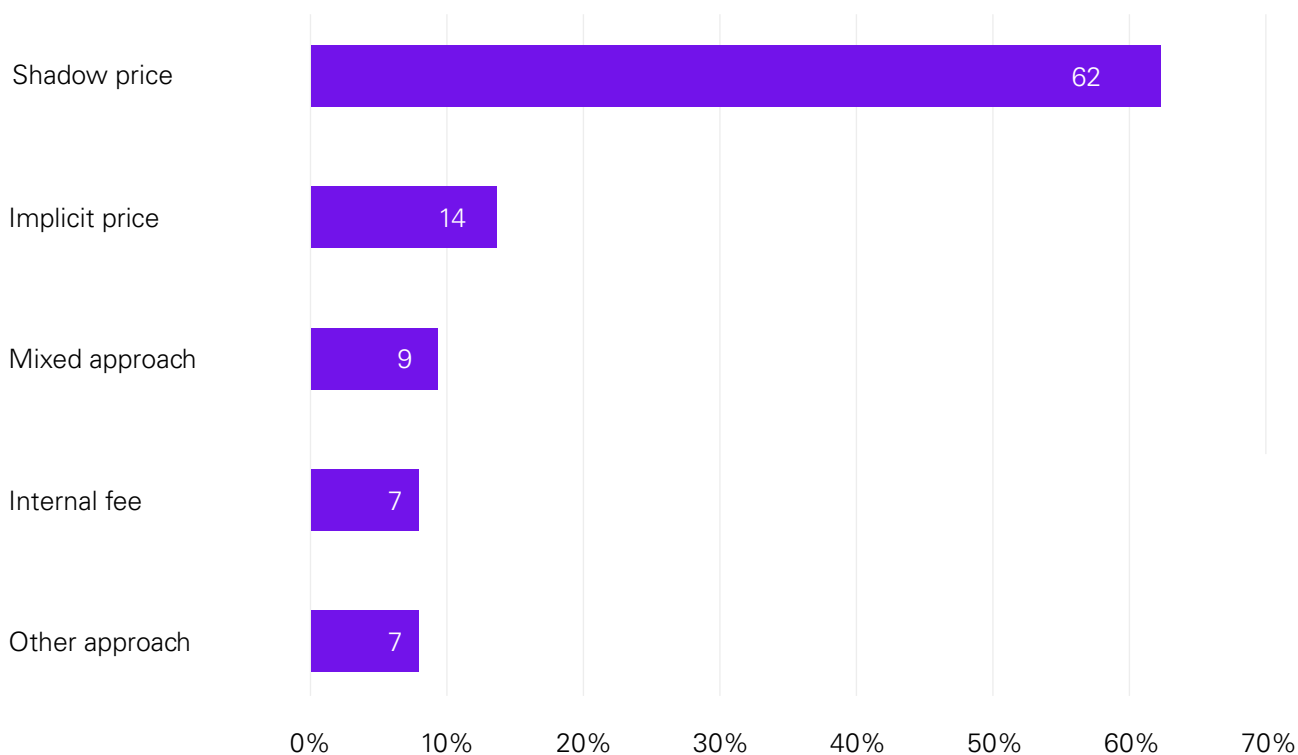
Artificial Intelligence:
A powerful catalyst for
chemicals and materials?

Harnessing diversity:
A leader's journey at DuPont

Internal carbon pricing for
chemicals and materials
companies

Types of internal carbon pricing in use by chemicals companies

More than 60 percent of chemicals companies with ICP use shadow pricing.

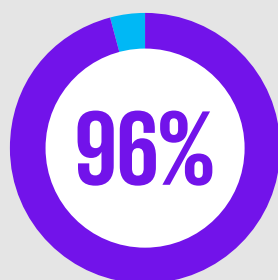


Source: CDP, KPMG analysis

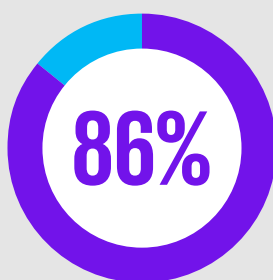
Scope 1 emissions processes or combustion emissions controlled by the entity, and Scope 2 “indirect” emissions associated with purchased energy, typically contribute to both higher costs and higher emissions for chemicals businesses.

Accordingly, chemicals companies are using ICP schemes to drive emissions reductions; more than 85 percent apply ICP to both Scope 1 and Scope 2.¹²

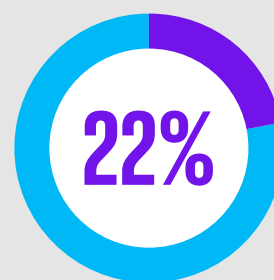
Percentage of companies in the chemicals sector including Scope 1, 2, or 3 in their ICP coverage



Scope 1
Direct emissions that are owned or controlled by a company.



Scope 2
Indirect emissions that are a consequence of a company’s activities but occur from sources not owned or controlled by it.



Scope 3
Other indirect emissions that occur in the value chain of a company’s activities.

¹² CDP, KPMG analysis



Market outlook:
Finding ways to rebound
from recession

Artificial Intelligence:
A powerful catalyst for
chemicals and materials?

Harnessing diversity:
A leader’s journey at DuPont

Internal carbon pricing for
chemicals and materials
companies



Expected benefits of ICP

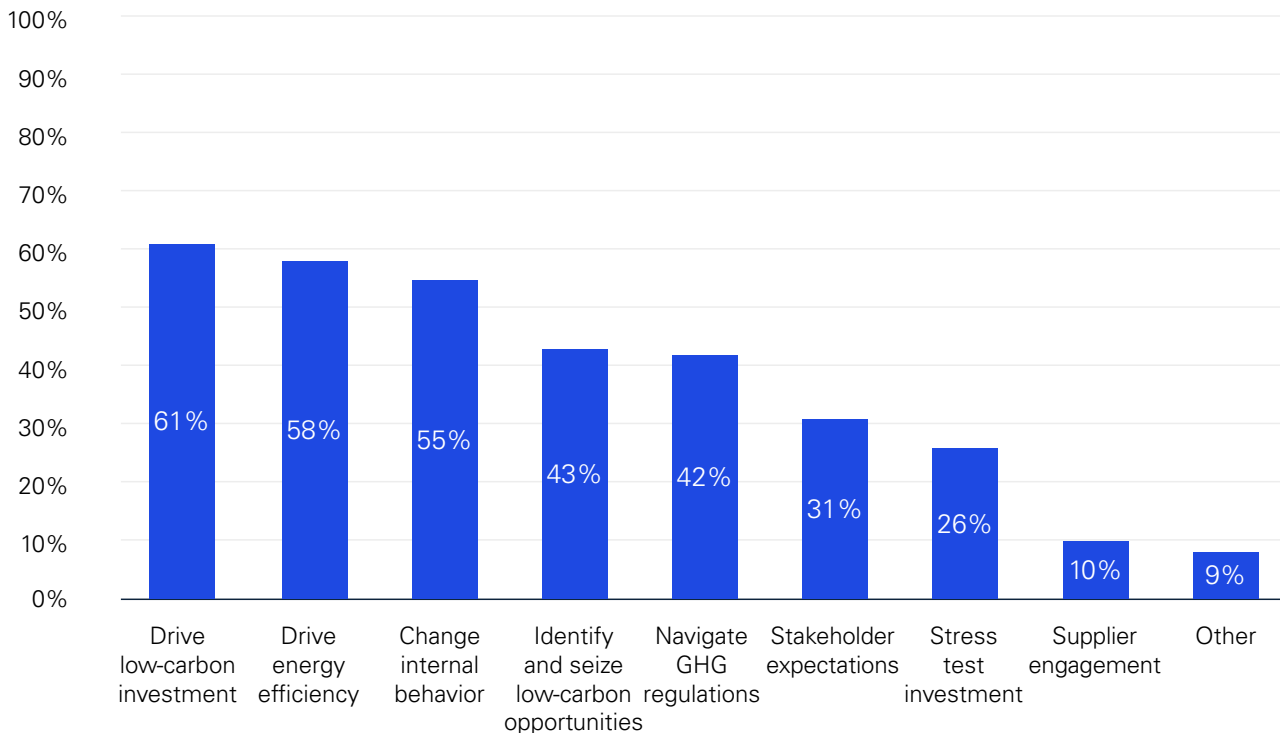
Organizations implement ICP for multiple reasons beyond regulatory considerations. ICP can help chemicals companies:¹³

- Accelerate reduction in their carbon footprints and make progress toward emission reduction targets
- Incentivize lower-carbon decision-making and potentially fund sustainability and energy efficiency initiatives
- Communicate readiness to address climate change concerns and enhance performance on climate disclosure platforms
- Prepare for upcoming climate-related policies and regulations and carbon pricing schemes
- Attract environmentally aware investors and build reputational standing with stakeholders
- Prioritize carbon considerations and risks more centrally to business operations and strategy.

Aligning an ICP with opportunities to help reduce costs or otherwise drive value creation is critical for helping ensure successful implementation. A poorly designed ICP or one deployed purely to address environmental objectives may risk pushback from key stakeholders.

Corporate objectives for using ICP

Most companies across various sectors give multiple reasons for implementing ICP, including goals to drive investment and internal behavior toward lower-carbon alternatives and improve operational efficiencies.



Source: CDP, "Putting a Price on Carbon," 2021

¹³ World Bank, High-Level Commission on Carbon Prices; CDP; World Bank Carbon Pricing Dashboard

New regulations will likely increase global competition and pressure to decarbonize

Existing regulated carbon pricing laws (carbon taxes and cap-and-trade schemes) in California, Canada, the European Union (EU), and other parts of the global economy already include the chemicals sector — although sometimes only partially.

In the EU, although the EU ETS applies to both chemicals and fertilizers, the EU's Carbon Border Adjustment Mechanism (CBAM) initially only covers fertilizers. The broader chemicals industry is expected to be phased in to the CBAM scope from 2026.

Currently in its transitional phase, the EU CBAM, is designed as a supplementary measure to and mirror of the EU ETS. It operates by imposing a charge on the embedded carbon content of certain imports in carbon-intensive sectors — currently cement, iron and steel, aluminum, fertilizers, electricity, and hydrogen — that is equal to the charge imposed on domestic goods under the EU ETS, with adjustments being made to this charge to take into account any mandatory carbon prices in the exporting country. This levels the playing field for EU producers and addresses potential carbon leakage concerns. Carbon leakage means that emissions do not reduce overall as production or purchasing is merely shifted from countries with high tax or regulation to ones with lower controls and lower, or no, carbon costs to take advantage of cost savings.

The carbon content of chemicals will, therefore, become a key factor in value chain competitiveness in the chemicals industry due to CBAM. EU-exporting countries can mitigate the extent to which their products are subject to the EU CBAM charge upon entering the EU market by adopting their own mandatory carbon pricing schemes, which would in turn only serve to further prioritize carbon intensity as a key driver of product competitive advantage.

The introduction of border carbon adjustment mechanisms as a form of carbon pricing is not limited to the EU. Canada launched consultations on border carbon adjustments in 2021; a number of proposals regarding the creation of a CBAM for the United States have been put forward; Australia is currently undertaking a carbon leakage review to assess the feasibility of an Australian CBAM, and Japan and New Zealand have also considered the implementation of their own CBAMs. Behind the EU, the UK is the most progressive of these countries, with its CBAM already scheduled for implementation in 2027.

Meanwhile, climate disclosure reporting rules due to take effect in 2025 and beyond in California (SB-253), the EU, and the United States will likely result in additional investor pressure to decarbonize. The EU's CSRD and the proposed US Securities and

Exchange Commission's climate disclosure rules would both require companies to disclose and describe the adoption and usage of any ICPs. Although neither set of rules require ICP, widespread marketplace adoption may indirectly pressure those organizations without to do so.

The first step toward understanding a company's carbon pricing exposure is comparing the organization's global footprint against enacted and pending carbon pricing legislation, and understanding where in the value chain the business may be directly or indirectly impacted by carbon pricing policy instruments.



The first step toward understanding a company's carbon pricing exposure is comparing the organization's global footprint against enacted and pending carbon pricing legislation, and understanding where in the value chain the business may be directly or indirectly impacted by carbon pricing policy instruments.



Market outlook:
Finding ways to rebound
from recession

Artificial Intelligence:
A powerful catalyst for
chemicals and materials?

Harnessing diversity:
A leader's journey at DuPont

Internal carbon pricing for
chemicals and materials
companies

Important transfer pricing implications of an ICP

Finance and Tax departments have an important role to play in the design and implementation of an ICP.

A chemicals company looking to adopt an internal carbon fee to drive decarbonization outcomes may consider an annual charge-out process for the ICP fees. As the carbon fees are estimated, budgeted, tracked, and (re) charged, the process becomes incorporated into traditional budget and finance processes. To avoid costly delays, finance and tax teams should be involved early in the design process when they can shape the ICP model.

A transfer pricing analysis is relevant to address the following

questions when it comes to ICP models:

- How is the chosen internal carbon price supportable on an arm's length basis and what is the interplay between the company's "total cost of carbon," taking into consideration carbon taxes, participation in regulated carbon markets, and trading on voluntary carbon markets where applicable and the carbon price as a driver of behaviors for the Group?
- Where ICP funds are used to fund decarbonization investments, how can the benefit of such investments be shown to the entities paying into such an ICP Fund? Are the payments into this fund directly linked to the ICP or is an analysis needed to appropriately allocate the payments based on transfer pricing principles?
- When internal fees are charged cross-border to various business units, will those fees be tax deductible how is the benefits test per guidelines from the Organization for Economic Co-operation and Development met and will those fees be tax deductible? The test for deductibility is country specific so would likely require an assessment across different business units.



Market outlook:
Finding ways to rebound
from recession

Artificial Intelligence:
A powerful catalyst for
chemicals and materials?

Harnessing diversity:
A leader's journey at DuPont

Internal carbon pricing for
chemicals and materials
companies

The case for centralized and coordinated carbon management

Integrating internal carbon pricing into business strategy can help chemicals companies to future-proof their products and drive value across their organizations.

Additional opportunities within finance and tax arise when considering the usefulness or necessity of a carbon management “hub.” This is particularly the case for companies in highly regulated, carbon-intensive, global industries like chemicals and petrochemicals that are well suited to benefit from a hub to support broader organizational carbon management. This is even more relevant when those companies find themselves dealing with a variety of carbon costs in different jurisdictions.

A carbon management hub may not only centralize the management of internal carbon fees, but also carbon taxes, participation in regulated cap-and-trade systems (e.g. EU ETS), compliance with carbon border adjustment mechanisms. Where groups have an existing trading function, the

hub may also be able to trade on voluntary carbon markets (VCM). Carbon markets are set to continue their growth, and news such as the Science-Based Target Initiative’s (SBTI) recently announced review of the use of carbon removal credits to offset emissions, as well as the EU Parliament’s approval of the Eu’s Carbon Removal Certification Framework, are expected to support that growth.

The opportunities and complexities around carbon mean that a centralized carbon management function may be highly useful to manage functions, assets, and risks of a group’s external carbon costs and its internal carbon fees. From a transfer pricing perspective, the carbon management hub may control important functions and risks (e.g., carbon price hedging and risk), the value and remuneration of which requires consideration.

Aside from tax implications, chemicals companies must also balance business impacts and

risks when considering an ICP. An internal price that’s set too high can risk cultural “rejection” within the business, while one that is set too low will not lead to any change and may therefore be seen as a failure. An approach can be to start with a price set at the lower end of the range that gradually increases, and to work up over time to create a tailored approach for the organization to manage the energy transition. One approach may also to use differentiated prices per scope of emission, geographies, or organizational areas (e.g. different prices for business travel than for selection of energy providers).

Finally, collaboration and design are critical to help ensure a company achieves the objectives it set for internal carbon pricing, whether that is reducing emissions, saving money, funding projects, or all of the above. Cross-functional teams — empowered with key stakeholder support — create alignment and support effective implementation.

Action plan for effective implementation

Define the vision for the ICP program. Start with the overarching goal of launching the ICP program. For example, if the organization is considering a proxy price on capital investments and M&A activity, how would the inclusion of carbon pricing data inform a go/no-go decision? Or if a firm is considering an internal carbon charge, which decarbonization goal or goals should be prioritized?

Understand the impact of regulated pricing on the organization. An ICP shouldn’t be developed in a vacuum. Estimating how global carbon pricing regulations impact a business and its value chain provides helpful context for ensuring an ICP is set up for success and aligns with the regulatory landscape.

Customize a strategy using ICP price methodology and peer benchmarking. Once the goals of an ICP are established and the regulatory context is defined, it’s important to establish a price methodology (if pursuing a proxy price), consider tax implications (if pursuing an internal charge), and set an approach to operational integration that establishes program boundaries.

Conduct a pilot program and define a roadmap for implementation. Start small, think big. Pilot an ICP with an individual business unit, activity, or lower (but material) price. This gives the organization space and time to work out the kinks and build administrative processes so that when it’s time to launch ICP across the enterprise, the program is easier to scale and more likely to support business objectives.



Market outlook:
Finding ways to rebound
from recession

Artificial Intelligence:
A powerful catalyst for
chemicals and materials?

Harnessing diversity:
A leader’s journey at DuPont

Internal carbon pricing for
chemicals and materials
companies

Case study

With the help of KPMG in the US, a global agriscience and chemicals company developed an internal carbon pricing estimate to support capital planning, M&A, and emissions reduction efforts.



Challenge

A global company in the chemicals sector wanted to use carbon pricing to guide investment in M&A and capital projects, estimate the cost of carbon pricing regulation, and meet its 2030 emissions reduction target. Carbon pricing would primarily provide a baseline estimate for the marginal cost of decarbonization levers needed to meet the reduction target.

The company needed a carbon proxy pricing tool to help its financial planning and analysis team evaluate exposure to future carbon liabilities, and robust analysis to support an appropriate price on emissions.



Response

KPMG professionals worked with the company to estimate an *explicit carbon pricing range* across the company's global operating regions by cataloging current carbon pricing regulation (cap-and-trade and carbon tax schemes) at the country, province, and state levels. KPMG in the US also made note of any policies under consideration or scheduled to be implemented in the near term.

Next, KPMG in the US helped estimate an *implicit carbon pricing range* by identifying decarbonization levers capable of meeting the company's emissions reduction target.

KPMG in the US researched the marginal abatement costs of these technologies and constructed target-aligned scenarios. These scenarios helped the client understand different opportunities for ICP price points.



Expected benefits

- **Investment:** The estimated ICP range can help guide low-carbon capital project and M&A decisions.
- **Optimization:** For specific sites or regions, breakeven analysis informs the choice between paying local regulatory fees or investing in decarbonization.
- **Education:** The company became familiar with decarbonization levers (beyond net savings) capable of meeting its emissions reduction target. The rationale for the marginal abatement costs lever came from third-party sources.
- **Reporting:** The company can disclose its internal carbon price in future reporting and compare to the internal carbon prices adopted by their peers.
- **Flexibility:** Deliverables can be easily adapted and updated in the future to reflect global developments in carbon pricing regulation or investment in specific decarbonization levers that may adjust the calculated implicit carbon price.



Market outlook:
Finding ways to rebound
from recession

Artificial Intelligence:
A powerful catalyst for
chemicals and materials?

Harnessing diversity:
A leader's journey at DuPont

Internal carbon pricing for
chemicals and materials
companies

About the authors



Anjit Bajwa

Principal, Industry Leader for Chemicals, Tax
KPMG in the US

Anjit is a principal based in Houston. He serves as the industry leader for chemicals as well as engineering and construction for the tax practice. Anjit advises companies on value chain planning in the energy and chemicals sector. De-carbonization and business transformation are key current focus areas.



Geoffrey Chiles

Senior Manager, Tax, Economic & Valuation Services
KPMG in the US

Geoff, an Atlanta-based senior manager in the KPMG Economic Valuation Services practice, supports companies in the development of global transfer pricing strategies to govern intragroup transactions. Geoff brings experience from a recent international assignment to Denmark where he collaborated with clients to develop transfer pricing strategies to support decarbonization efforts.



Kevin Perry

Senior Manager, Transfer Pricing
KPMG in Denmark

Kevin is a Copenhagen based Senior Manager in KPMG Acor Tax's Transfer Pricing team. Kevin has worked with a wide range of clients on transfer pricing advisory and value chain projects. He recently supported UK and US multinational enterprises in their net-zero strategies by developing transfer pricing models for their activities of voluntary and compliance markets.



Matthew Roling

Director, Advisory, ESG
KPMG in the US

Matt, a Chicago-based director in the KPMG Energy Transition & Climate Advisory practice, has more than 15 years of experience in the clean energy, corporate finance, and technology commercialization sectors. His practice focuses on helping companies develop and execute value-creating decarbonization strategies and sustainability policies and tools, such as clean hydrogen, carbon pricing, and GHG accounting.



Market outlook:
Finding ways to rebound
from recession

Artificial Intelligence:
A powerful catalyst for
chemicals and materials?

Harnessing diversity:
A leader's journey at DuPont

Internal carbon pricing for
chemicals and materials
companies

How this connects to what KPMG professionals do

KPMG member firms help global companies in chemicals and other carbon-intensive industries on numerous decarbonization and other strategic efforts. We have extensive experience helping companies launch and complete their ICP journeys — including experience establishing our own internal carbon fee to support sustainable decision-making and our commitment to net zero by 2030.

We look forward to speaking with you about your organization's plans to drive value with ICP approaches.



Market outlook:
Finding ways to rebound
from recession

Artificial Intelligence:
A powerful catalyst for
chemicals and materials?

Harnessing diversity:
A leader's journey at DuPont

Internal carbon pricing for
chemicals and materials
companies

KPMG firms are trusted advisors

KPMG Chemicals and Performance Technologies professionals work with companies across the sector to develop and help them to execute their energy transition plans. Our people have helped businesses in the sector assess their opportunities, develop their plans, allocate their capital and report on their achievements. As a result of this experience in assessing and addressing clients' energy transition business challenges, KPMG firms are frequently identified as leaders in various key analyst reports.

KPMG firms achieve first analyst recognition as a global leader in climate consulting

According to the Verdantix report, "KPMG leads in this Green Quadrant for climate risk, opportunity, and adaptation disclosures. KPMG consultants have strong regulatory experience at the entity, portfolio and product level, with experience across both voluntary and mandatory frameworks, as demonstrated by the firm's lead role on the Initiative Climate International (iCI) working group for Task Force on Climate-related Financial Disclosures (TCFD) implementation recommendations under the UN Principles for Responsible Investment (UN PRI)." Read the full report [here](#).

Source: Green Quadrant: Climate Change Consulting 2023, June 2023

KPMG firms again rated most recognized energy and natural resources consulting brand

In a global survey of 325 energy and natural resources executives, directors and senior managers with purchasing power, KPMG firms

ranked first for aided awareness — a measure of how quickly respondents selected firms they are aware of. The study, carried out by Source, asked participants to select three brands from a list of the world's top 15 consulting firms that they would be most comfortable talking about in detail. In addition to being ranked as the top firm for aided awareness in energy and resources globally, KPMG firms were also recognized for strengths in helping clients get future-ready and prepare for expected and unexpected changes.

For more information, click [here](#).

KPMG firms recognized as a 'World's Best Management Consulting Firm' in Energy and Environment by [company]

KPMG firms have been recognized by Forbes as one of the World's Best Management Consulting Firms, receiving stars in all 27 industries and categories, including Energy & Environment. Forbes awarded KPMG Energy & Environment professionals a top five-star rating, for being "very frequently recommended" by thousands of customers and consultants in numerous countries around the globe. The annual ranking recognizes KPMG firms for their capabilities in delivering insights-driven consulting services to commercial and public sector clients across the globe. Business leaders rely on Forbes' annual list to help them evaluate management consulting firms as they seek partners to help drive forward their strategic plans.

For more information and to see the full rankings, click [here](#).



KPMG firms have been recognized by Forbes as one of the World's Best Management Consulting Firms, receiving stars in all 27 industries and categories, including Energy & Environment. Forbes awarded KPMG Energy & Environment professionals a top five-star rating, for being "very frequently recommended" by thousands of customers and consultants in numerous countries around the globe.



Market outlook:
Finding ways to rebound
from recession

Artificial Intelligence:
A powerful catalyst for
chemicals and materials?

Harnessing diversity:
A leader's journey at DuPont

Internal carbon pricing for
chemicals and materials
companies

Acknowledgements

The planning, analysis, writing and production of this report would not have been possible without the collaboration of colleagues around the world. Thank you to Mark Hamilton, Sheenu Chaudry, Nicole de Jager, François Marlier, Lyndie Dragomir, Maria Mallinos, Erin Dodds and Nicole Duke.

Contact

Yann Dekeyser

Partner, Head of Private Equity & Telecom, Media and Technology | Advisory

KPMG in Belgium

E: ydekeyser@kpmg.com

Some or all of the services described herein may not be permissible for KPMG audit clients and their affiliates or related entities.

kpmg.com



The information contained herein is of a general nature and is not intended to address the circumstances of any particular individual or entity. Although we endeavor to provide accurate and timely information, there can be no guarantee that such information is accurate as of the date it is received or that it will continue to be accurate in the future. No one should act on such information without appropriate professional advice after a thorough examination of the particular situation.

© 2024 Copyright owned by one or more of the KPMG International entities. KPMG International entities provide no services to clients. All rights reserved.

KPMG refers to the global organization or to one or more of the member firms of KPMG International Limited ("KPMG International"), each of which is a separate legal entity. KPMG International Limited is a private English company limited by guarantee and does not provide services to clients. For more detail about our structure please visit kpmg.com/governance.

The KPMG name and logo are trademarks used under license by the independent member firms of the KPMG global organization.

Throughout this document, "we", "KPMG", "us" and "our" refers to the global organization or to one or more of the member firms of KPMG International Limited ("KPMG International"), each of which is a separate legal entity.

Designed by Evaluateserve.

Publication name: Reaction | Publication number: 139309-G | Publication date: June 2024