

# Business Breakthrough Barometer 2024

*Chemicals*



World Business  
Council  
for Sustainable  
Development

**BAIN & COMPANY** 



29 October, 2024

# Key messages

## 1/2

- The majority of businesses are not confident that the chemical sector is on track for net-zero, as 50% of business expect chemical GHG emissions to peak after 2030
  - 56% thought the sector was “not on track” for a Paris aligned transition
  - Only half of businesses expect that Chemical GHG emissions will peak before 2030
- Business leaders believe the heterogeneity and complexity of the chemical industry have led to inaction from policymakers
  - The industry emphasizes that no single solution exists for all chemical products, with action required on multiple fronts, including alternative feedstocks, carbon capture and sequestration, and process energy abatement
  - However, most business leaders believe the biggest impact can be achieved through process energy decarbonization
  - Despite these potential pathways, companies report slow progress. The general sentiment is that voluntary demand is low, and regulatory pressure is insufficient to drive change
  - Without economic drivers, businesses remain hesitant to allocate significant capital expenditures for low-carbon technologies
- Electrification remains a focal point for reducing process emissions, but only 7% of the industry’s process energy is currently electrified, with no progress over the past decade
  - Only 7% of the industry’s process energy is currently electrified, with stagnant progress over the past decade
  - The sector views tackling process emissions as a top priority, but energy intensity makes electrification challenging
  - No material progress on electrification has been made past 12 years, companies like BASF and SABIC investing in early-stage efforts to electrify energy-intensive core processes, such as electric steam crackers, which accounts for ~10% of the sector’s primary energy use
  - However, extensive process redesigns are required, involving significant CapEx, and businesses are concerned about the availability of renewable energy
- Alternative feedstock use currently driven by other sustainability trends but will in the future increasingly support decarbonization
  - Some companies are increasingly exploring the use of bio-based and recycled feedstocks, largely driven by demand for circular products
  - Currently the use bio-feedstocks often results in higher lifecycle emissions due to the higher energy intensity of processes; and scaled adoption of recycling constrained by high costs and the scarce supply of high-quality waste required for mechanical recycling
  - Business leaders are more optimistic on the prospects for chemical recycling to increase viability of alternative feedstock use for some production processes but do not expect material progress until after 2030, with only ~150ktpa pilot capacity deployed
  - Companies also anticipate the adoption of green hydrogen and ammonia production, but progress is slow with operational capacity only accounting for 2% of global hydrogen production

# Key messages

## 2/2

- Business leaders consider incentives vital to accelerate carbon capture and storage deployment in a high-volume, low-margin industry like chemicals
  - Carbon capture is currently in place for less than 1% of global primary chemical production emissions, though the pipeline is more promising at around 15%
  - Much of the capture capacity is geared towards chemical feedstock for fuel industries, like ammonia for shipping or power, rather than reducing emissions from existing use cases as producers view the added costs as prohibitive in an already low-margin and globally competitive commodity industry
  - However, U.S. tax credits have significantly increased the viability of CCS for chemical production. Ammonia producers highlight that these credits make it feasible to capture two-thirds of direct GHG emissions, leading to a sixfold increase in FIDs for U.S. chemical point capture projects from 2021 to 2024
  - Full emissions capture would require higher subsidy levels, with ammonia producers citing significantly higher credits required to enable complete capture and sequestration
- On the current trajectory, business leaders predict chemical sector emissions will peak well after what is required for a net-zero scenario
  - Companies are sceptical about the industry's ability to reduce emission intensity, and with new net-zero use cases expected to drive significant demand growth, few believe the sector is on track for net-zero by 2050
  - Sectors leaders are concerned that limited policy attention is causing the chemicals sector to lag behind: over 60% of surveyed chemical companies have low confidence in current policy support
  - Some sector leaders suggest other sustainability interventions – such as the UN Plastic Treaty - could drive greater international action on waste, and thus indirectly address GHG emissions tied to plastic production
  - But the scope and nature of implementation is yet to be defined and there is little else on the horizon other than the EU ETS and CBAM which is likely to incentivise investment
- Companies cite unattractive business case and technological immaturity as top barriers holding back decarbonization of chemical production
- Policy within pricing support, mandates, financing, global collaboration & standards, is cited as top asks from government by chemical producers



# Businesses' confidence in the chemical sector's transition is among the lowest across all sectors



56%

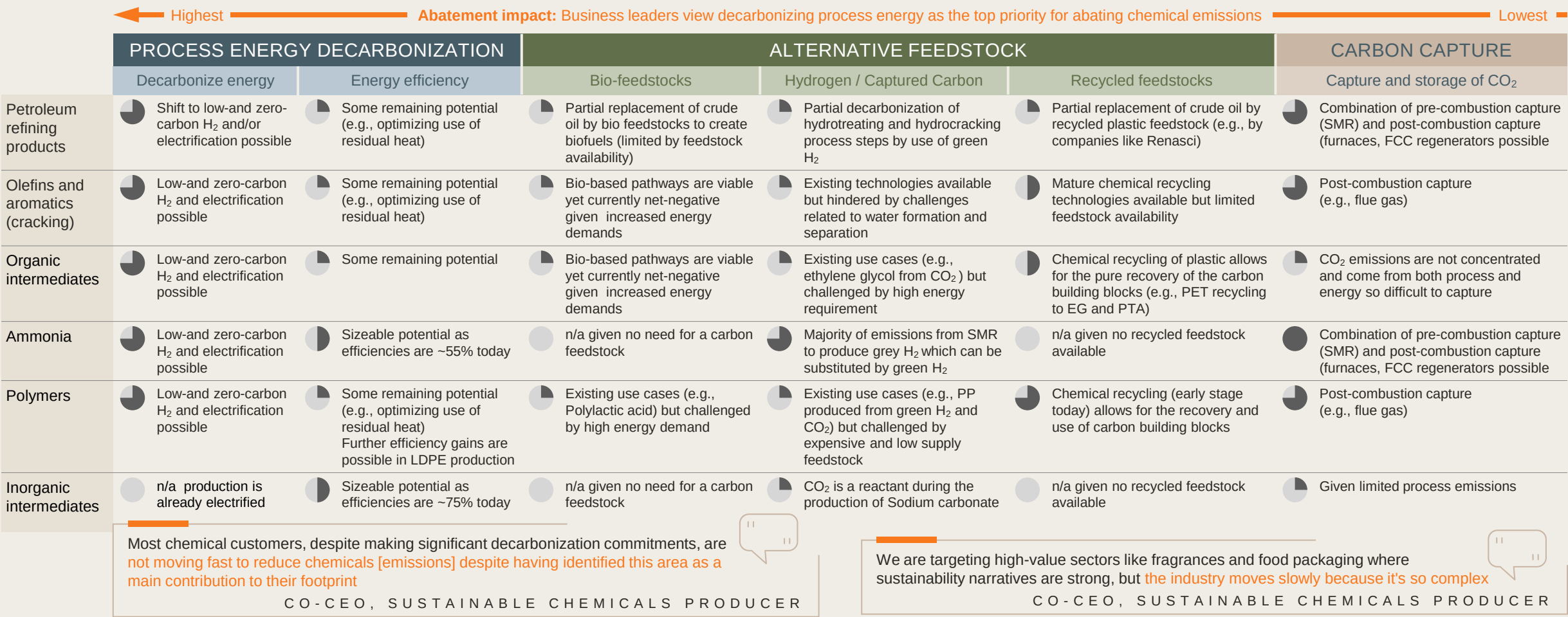
56% thought the sector was “not on track” for a Paris aligned transition

50%

Only half of businesses expect that Chemical GHG emissions will peak before 2030

Source: Business Breakthrough Barometer Sector Survey (N=250); Business interviews; Bain analysis

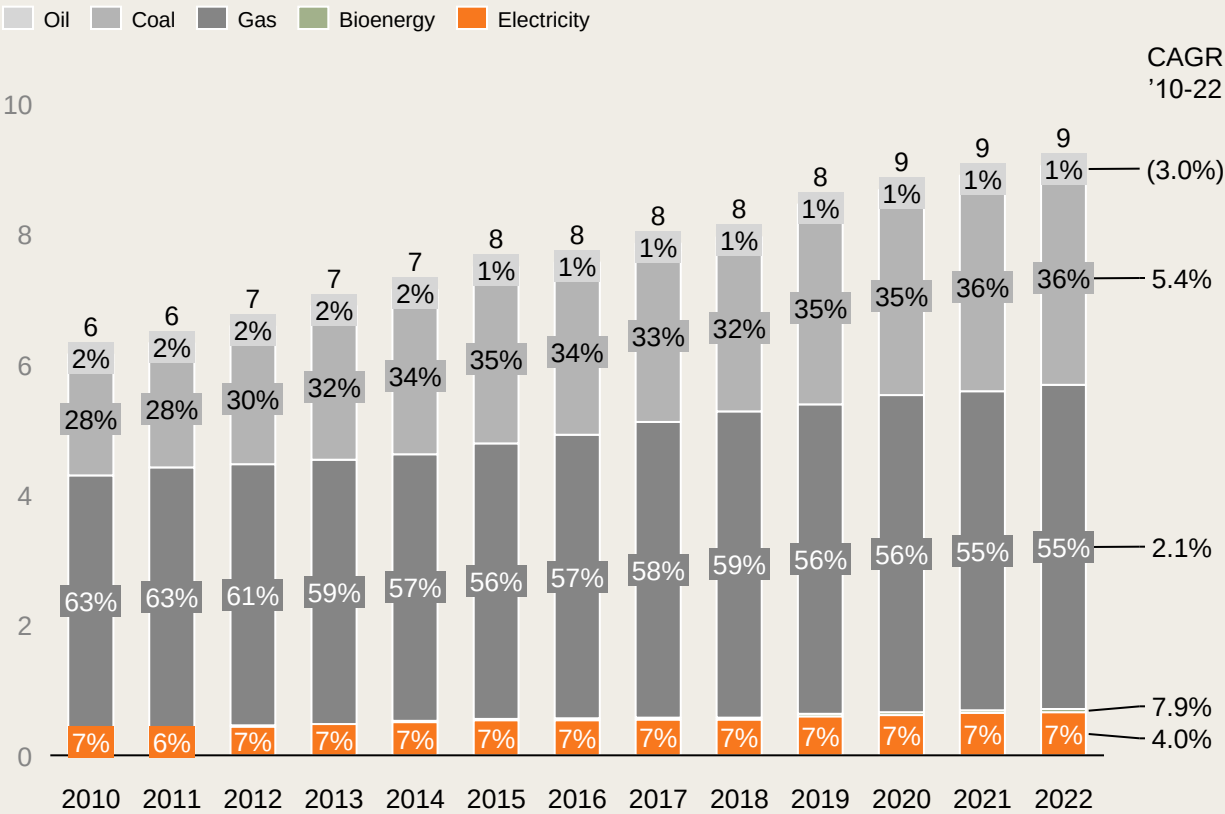
# Business leaders believe the heterogeneity and complexity of the chemical industry have led to inaction from policymakers



Note: 1) Bain assessment  
Source: Business Breakthrough Barometer Sector Survey (N=250); Business interviews; Bain analysis

# Electrification remains the focal point for reducing process emissions, but only 7% of energy use is electrified, with no progress the past decade

Process energy for primary chemical production (EJ, '10-22)



- The sector views tackling process emissions as a top priority, but **energy intensity makes electrification challenging**
- **No material progress on electrification has been made past 12 years**, companies like BASF and SABIC investing in early-stage efforts to electrify energy-intensive core processes, such as electric steam crackers, which accounts for ~10% of the sector's primary energy use
- However, **extensive process redesigns are required**, involving significant CapEx, and businesses are concerned about the availability of renewable energy

Our production require around-the-clock supply of power, heat, and steam. We cannot have power interruptions when the sun isn't shining or the wind isn't blowing. In addition, while renewables generate enough electricity to run some of our processes, **they cannot deliver the high temperatures and high-pressure heat and steam many of our processes require.**

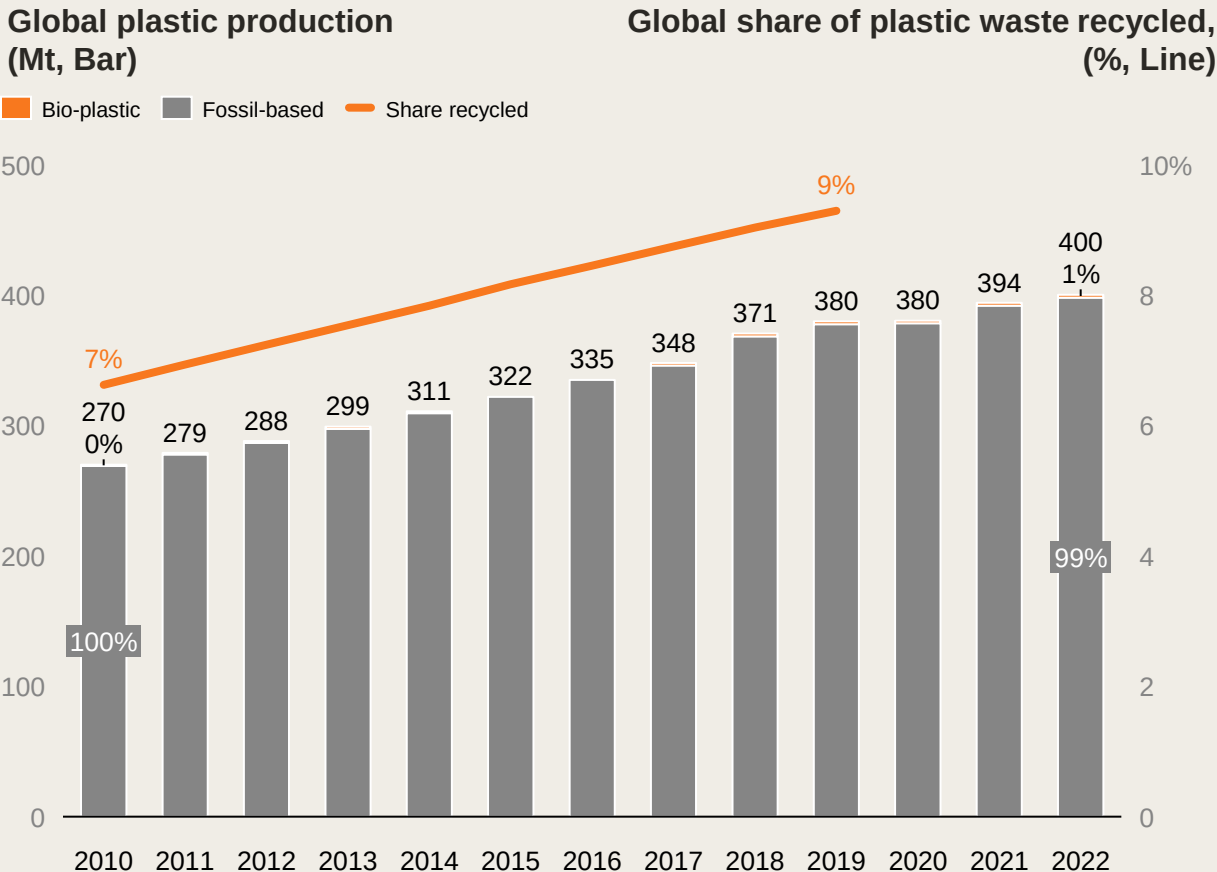
COMPANY STATEMENT, CHEMICALS PRODUCER

We can restructure our internal energy supply to enable us to use renewable electricity natural gas, **but the volumes of electricity the site will need are not yet available in the region** and cannot yet be transported to through the existing power networks.

HEAD OF ENERGY AT FACTORY #1, CHEMICALS PRODUCER

Source: IEA; Business Breakthrough Barometer Sector Survey (N=250); Business interviews; Bain analysis

# Alternative feedstock use currently driven by other sustainability trends but will in the future increasingly support decarbonization



Source: OECD; Ecoinvent; European Environment Agency; GlobalData Hydrogen Plant database (August 2024 update); IRENA; HEIPA; PlasticsEurope; Company websites; Business Breakthrough Barometer Sector Survey (N=250); Business interviews; Bain analysis

- Some companies are increasingly exploring the use of bio-based and recycled feedstocks, largely driven by demand for circular products
- Currently the use bio-feedstocks often results in higher lifecycle emissions due to the higher energy intensity of processes; and scaled adoption of recycling constrained by high costs and the scarce supply of high-quality waste required for mechanical recycling
- Business leaders are more optimistic on the prospects for chemical recycling to increase viability of alternative feedstock use some production processes but do not expect material progress until after 2030, with only ~150ktpa pilot capacity deployed
- Companies also anticipate the adoption of green hydrogen and ammonia production, but progress is slow with operational capacity only accounting for 2% of global hydrogen production

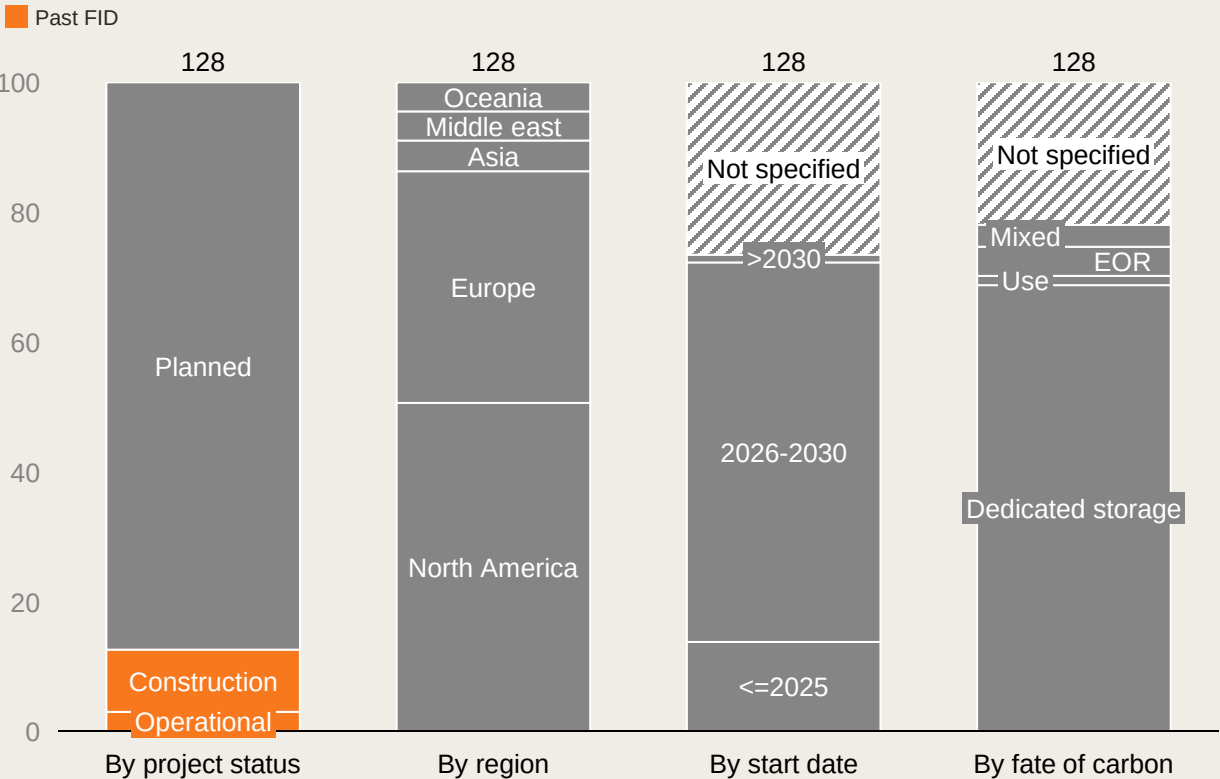
The customer won't take it [alternative feedstocks] if it's more expensive or compromises quality. Right now, sustainability alone isn't enough to sell

CO-CEO, SUSTAINABLE CHEMICALS PRODUCER



# Business leaders consider incentives vital to accelerate carbon capture & storage deployment in a high-volume, low-margin industry like chemicals

Pipeline of CCUS for chemical production  
(capacity, in Mtpa CO<sub>2</sub>)



- Carbon capture is currently in place for less than 1% of global primary chemical production emissions, though the pipeline is more promising at around 15%
- Much of the capture capacity is geared towards chemical feedstock for fuel industries, like ammonia for shipping or power, rather than reducing emissions from existing use cases as producers view the added costs as prohibitive in an already low-margin and globally competitive commodity industry
- However, U.S. tax credits have significantly increased the viability of CCS for chemical production. Ammonia producers highlight that these credits make it feasible to capture two-thirds of direct GHG emissions, leading to a sixfold increase in FIDs for U.S. chemical point capture projects from 2021 to 2024
- Full emissions capture would require higher subsidy levels, with ammonia producers citing significantly higher credits required to enable complete capture and sequestration

In the ammonia and hydrogen sector, we have seen a significant amount of projects decarbonizing existing production passing FID due to the 45Q, providing clear tax credits for carbon sequestration, bridging the gap to willingness to pay for what are essentially globally traded commodities

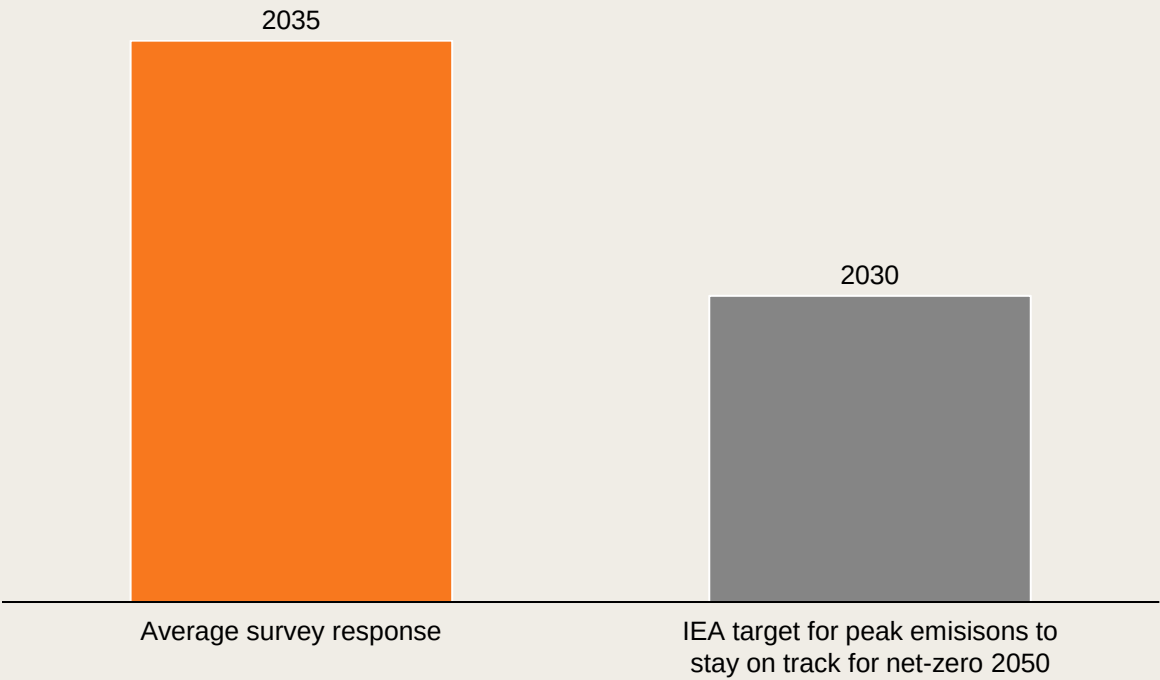
VP PUBLIC AFFAIRS,  
CHEMICAL PRODUCER

Source: IEA; IEA CCUS database (February 2024 update); Business Breakthrough Barometer Sector Survey (N=250); Business interviews; Bain analysis



# On the current trajectory, business leaders predict chemical sector emissions will peak well after what is required for a net-zero scenario

What year do you expect the chemical sector's GHG emissions to peak?



- Companies are sceptical about the industry's ability to reduce emission intensity, and with new net-zero use cases expected to drive significant demand growth, few believe the sector is on track for net-zero by 2050
- Sector leaders are concerned that limited policy attention is causing the chemicals sector to lag behind: over 60% of surveyed chemical companies have low confidence in current policy support
- Some sector leaders suggest other sustainability interventions – such as the UN Plastic Treaty - could drive greater international action on waste, and thus indirectly address GHG emissions tied to plastic production
- But the scope and nature of implementation is yet to be defined and there is little else on the horizon other than the EU ETS and CBAM which is likely to incentivise investment

There is no pressure or incentives to drive low carbon emission [chemical] products

CO-CEO,  
SUSTAINABLE CHEMICALS PRODUCER

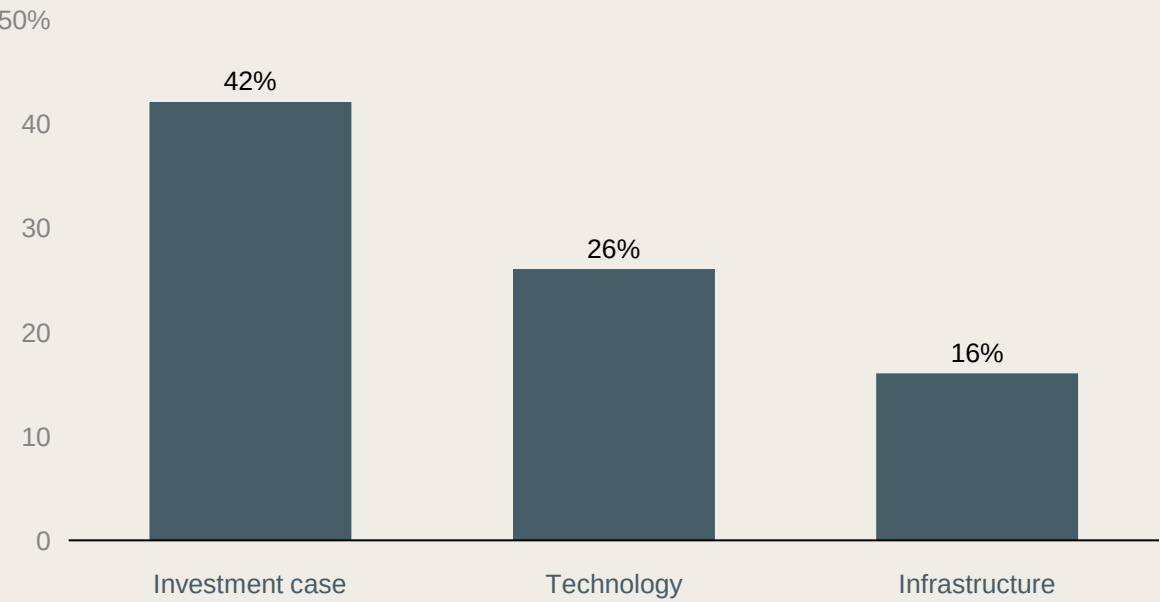
Source: Planet Positive Chemicals (2022); GlobalData; IEA; Business Breakthrough Barometer Sector Survey (N=250); Business interviews; Bain analysis

# Companies cite unattractive business case and tech immaturity as top barriers holding back decarbonization of chemical production

Which of the following do you view as the sector's largest barriers for accelerating investment in the development and deployment of net-zero chemical production?

Please select the top 3 most impactful barriers

Share of survey responding barrier in the top 3 (%)



Note: Survey results for alternative feedstock and process energy decarbonization is aggregated to show overarching top barriers  
Source: Business Breakthrough Barometer Sector Survey (N=250); Business interviews; Bain analysis



## INVESTMENT CASE

- Chemicals is regarded as largely a commodity business with slim margins leading to focus on process efficiency and scale, resulting in significant CapEx required to pivot to low GHG emissions processes
- Companies currently see little voluntary or regulated demand on the horizon, and so few financial incentives to invest in lower emissions technologies



## TECHNOLOGY

- Core processes are highlighted energy intense and difficult to electrify
- Expanded use of alternative feedstocks requires developments in novel feedstocks, like low carbon hydrogen and captured carbon, but also enabling technology like chemical recycling, to reach cost parity and meet required quality standards

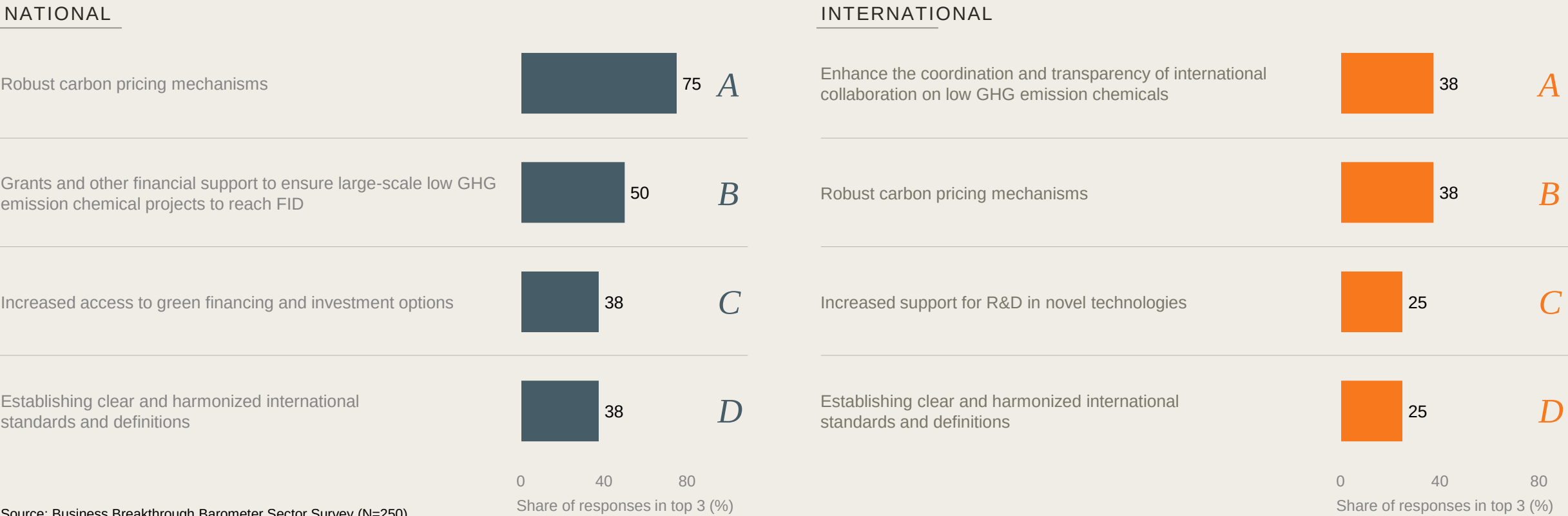


## INFRASTRUCTURE

- Business point to the lack infrastructure for transport and storage to enable alternative feedstock use (e.g., biomass, low carbon hydrogen and captured carbon), increasing the logistical cost of securing feedstock

# Sector sees key policy focus for chemical decarbonization in carbon pricing, standard collaboration and financial support

WHAT ARE THE TOP THINGS REGULATORS SHOULD FOCUS ON IN THE NEXT 12 MONTHS TO ACCELERATE INVESTMENT IN THE DEVELOPMENT AND DEPLOYMENT OF KEY TECHNOLOGIES AND SOLUTIONS TO ENABLE THE NET ZERO TRANSITION WITHIN THE CHEMICAL SECTOR?



Source: Business Breakthrough Barometer Sector Survey (N=250)



# Policy within pricing support, mandates, financing, global collaboration & standards, is cited as top asks from government by chemical producers

Policy focus

National



International



**Pricing support**



**Mandated use**



**R&D support**



**Global collaboration & standards**



**Carbon pricing** comes as a clear priority for business leaders, for example through carbon border measures, but this would only be possible with significant international coordination to ensure a level playing field



**Mandates** for green production targets for producers of primary chemicals would be game changing to incentivise investment into low GHG emission chemicals. However, these mandates must be applied in regional contexts, which could lead to the risk of disjointed approaches



**Increased R&D funding** for advanced technologies in the forms of CapEx support would help accelerate early-stage production investments into low GHG emission chemicals



**Simplified and mutually recognized standards and definitions for low-GHG chemicals** is critical to enable international trade of low GHG emissions chemicals



# Thank *You*



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Council  
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