

Business Breakthrough *Barometer 2025*

→ The annual pulse check from business
on the pace of the net-zero transition



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Forewords

Business stands at a decisive moment. The pressure to decarbonize and build resilience is no longer peripheral – it is central to competitiveness, risk management, and license to operate. This means that climate action needs to be increasingly embedded in core business strategies.

However, at the halfway point to 2030, with COP30 fast approaching, the gap between commitments and delivery remains far too wide. The Global Stocktake has provided the signposts. Business and governments must shift from pledges to action, from intent to implementation.

The **2025 Business Breakthrough Barometer** is both a mirror and a map: a reflection of where we are today, and a tool to guide strategic decisions. It provides an annual assessment of the low-carbon transition across the real economy, providing business insights on where momentum is building – and the barriers holding back action – across industries and supply chains. The findings indicate how businesses can move beyond incremental change – and how governments can match ambition with the policy frameworks that enable investment and innovation.

The stakes are high. But so are the upsides. The economic and political environment is increasingly shaped by uncertainty and fragmentation. Trade tensions, growing tariff risks, and the resulting reshaping of global supply chains are creating headwinds for business planning and investment. But the Barometer confirms what businesses are increasingly experiencing: **the economic benefits of acting outweigh the cost of delay**. As businesses increasingly recognize decarbonization as a driver of competitiveness, they are choosing to invest where governments are providing transition certainty, creating the right conditions for investment and long-term growth.

At WBCSD, we know that business cannot thrive in a world that fails. We are working with our members to deliver credible transition plans, to transform supply chains, and forge partnerships that deliver a climate and nature-positive future that is inclusive, and just. But business cannot do it alone. **The road ahead demands joint leadership from business and government** – with policy and capital aligning to unlock progress at speed and scale.

The 2025 Business Breakthrough Barometer is a powerful tool. I urge all business and government leaders to read it carefully and act decisively. Together we must use the insights and recommendations to find leverage points, scale what works, and join forces across sectors to accelerate action. Together with our partners, WBCSD is committed to helping companies and governments navigate this complexity and lead with integrity.

This is a decisive decade. Every delay makes the transition more costly. Those who act now will be the ones to secure long-term value, resilience, and competitive advantage – and will define the future economy.



Peter Bakker

President and CEO, World Business Council for Sustainable Development (WBCSD)

Forewords

2025 marks a decade since the Paris Agreement – a moment that laid down a shared direction for global climate action and brought broad alignment around the goals set for 2030, including deep emissions cuts, stronger resilience, and a step change in climate finance. The path since has been uneven, but the direction still holds. Now, with five years remaining to deliver on those goals, the measure of progress lies not in what is being promised, but in what is being built.

With COP30 to be held in the Amazon region in Brazil, the year ahead carries particular weight for the host country. This is a region shaped by complexity – where environmental risk, industrial development, and social demands intersect – and where the opportunities to demonstrate credible, real-economy progress are matched by the urgency of the challenges faced.

As Brazil's Climate High-Level Champion, I see this not as a moment to raise the volume of commitments, but as a moment to bring more clarity and coordination to delivery – by focusing on what is already working, identifying where support is missing, and helping to clear the barriers that continue to slow progress.

The role of business in this effort is essential. While many companies have begun adapting their operations and investing in low-carbon, more resilient systems, progress remains uneven. Structural barriers, from access to finance to regulatory delays, continue to limit what can be delivered, and where.

Having worked across sectors where decarbonization is complex and capital-intensive, I know all too well that good intentions are not enough. Progress depends on whether the right conditions are in place and whether the systems surrounding a company make it possible to move from ambition to implementation.

The Business Breakthrough Barometer was developed with that in mind. It helps track those enabling conditions across key sectors, offering a clearer view of where implementation is taking root, where structural gaps persist, and where targeted interventions – regulatory, financial or technological – can unlock momentum. But understanding the architecture of implementation means little if it isn't followed by action.

If we are to accelerate progress, we need to shift attention from pledges to outcomes, from aspirations to execution, and from reporting to results – results that take shape in infrastructure, supply chains, jobs and investment flows. That also means recognizing the role of adaptation alongside mitigation, particularly in places already under pressure from climate impacts. In many parts of the world, resilience is an immediate priority, and one that business is well placed to support.

This is a perspective that Brazil, through its diverse industrial base and long-standing role in international climate negotiations, is well placed to bring. It is positioned to help convene a more balanced conversation, one that takes into account the different starting points, needs and capacities of countries and companies alike. The Barometer is part of that wider ambition: to support a more coordinated, transparent and delivery-focused phase of climate action in the lead-up to COP30.

I encourage businesses to treat this Barometer not as a one-off publication, but as a prompt to engage more directly with the systems they influence, to understand what is enabling or blocking progress, and to work with others – across sectors and borders – to help shift those dynamics. Systems transformation depends on shared effort, and that effort starts by grounding ambition in what is actually being built.

As we prepare for COP30, the focus must remain on action that is credible, inclusive and capable of delivering real results for people, economies and the ecosystems on which we all depend. I remain committed to working with business leaders throughout this year to help make that possible.



Dan Ioschpe
Climate High-Level Champion for COP30

Executive *Summary*



01.

01. Executive Summary

Amid geopolitical turbulence, businesses are maintaining transition investments, focusing on markets and solutions that support long-term competitiveness, with Asia and Europe growing 'bright spots'.

In the face of rising uncertainty, businesses are not stepping back from climate action – they are targeting action where the conditions are right, with **9 out of 10** business leaders surveyed maintaining or increasing their transition-related investments and emissions targets over the past year.

Companies are increasingly channeling investments into *bright spots*: markets offering stable policy environments, affordable clean energy and growing demand for low-carbon solutions. These locations are beginning to capture a *transition dividend*, with Asia and Europe emerging as increasingly attractive destinations for investment (cited by **74%** of business leaders). In contrast, half of business leaders named the US as a less attractive destination compared to a year ago, with policy uncertainty a key driver for those businesses reducing investments.

Competitiveness – not compliance – is driving action. More than half (**56%**) of surveyed business leaders say the primary motivation for investment in the transition is to secure long-term industrial competitiveness, not just as a response to regulatory obligations or to meet reporting requirements. Companies are focusing on technologies that offer both sustainability and commercial returns, such as renewables, electric vehicles and other low-carbon solutions with strong market momentum and falling costs.

In harder-to-abate sectors such as steel and cement, businesses are taking a more targeted approach – investing where they see clear demand signals and the potential for supportive policy. But across all sectors, the direction of travel is clear: businesses increasingly see a focus on decarbonization as a strategic necessity to stay ahead in evolving markets.

Businesses are sounding the alarm on rising climate impacts, calling for governments to stay the course as businesses cannot shoulder the burden alone.

Almost all business leaders surveyed (**92%**) believe that achieving a net-zero economy – one that delivers a stable climate – will result in lower burdens on their organization than the costs of

transitioning. At the same time, **61%** predict that increased costs from climate-related disruptions will already impact their businesses in the year ahead, including through extreme weather and supply chain volatility.

As a result, businesses are urging governments to hold the line: **96%** of business leaders say governments should stay the course on net-zero commitments and **85%** call for stronger international coordination to unlock cross-border investment and build market scale.

The broader socioeconomic aspects of the transition, such as equity and biodiversity, were less prominent in this year's conversations. These issues may not be top of business agendas today but they are shaping the political context that future investment depends on. We will assess these in the lead-up to the next report.

As the transition enters a decisive phase, the clarity, coordination and long-term direction of policy are essential – particularly for capital-intensive breakthrough technologies that must scale this decade to deliver by the 2030s.

The message is clear. Delayed action will have a negative impact on long-term competitiveness. Policymakers, business leaders and investors must act decisively, designing targeted policies that reinforce supply chain resilience, enable sector-specific investments and align industrial competitiveness with climate goals.

56%

of surveyed business leaders say the primary motivation for investing in the transition is to secure long-term industrial competitiveness

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96%

of business leaders say governments should stay the course on net-zero commitments

Introduction



02.

01. Introduction

The Business Breakthrough Barometer is the annual pulse check from leading businesses on the pace of the net-zero transition. This is the second year of this report. It provides up-to-date insights from businesses around the world on the progress being made, the strength of the investment case, and where specific policy support can enable businesses to accelerate action and scale investment faster.

The report is a collaborative effort from the global business community led by WBCSD, with valuable contributions from the Breakthrough Agenda, the Climate High-Level Champions and Marrakech Partnership Industry Group, and supported by Bain and Company.

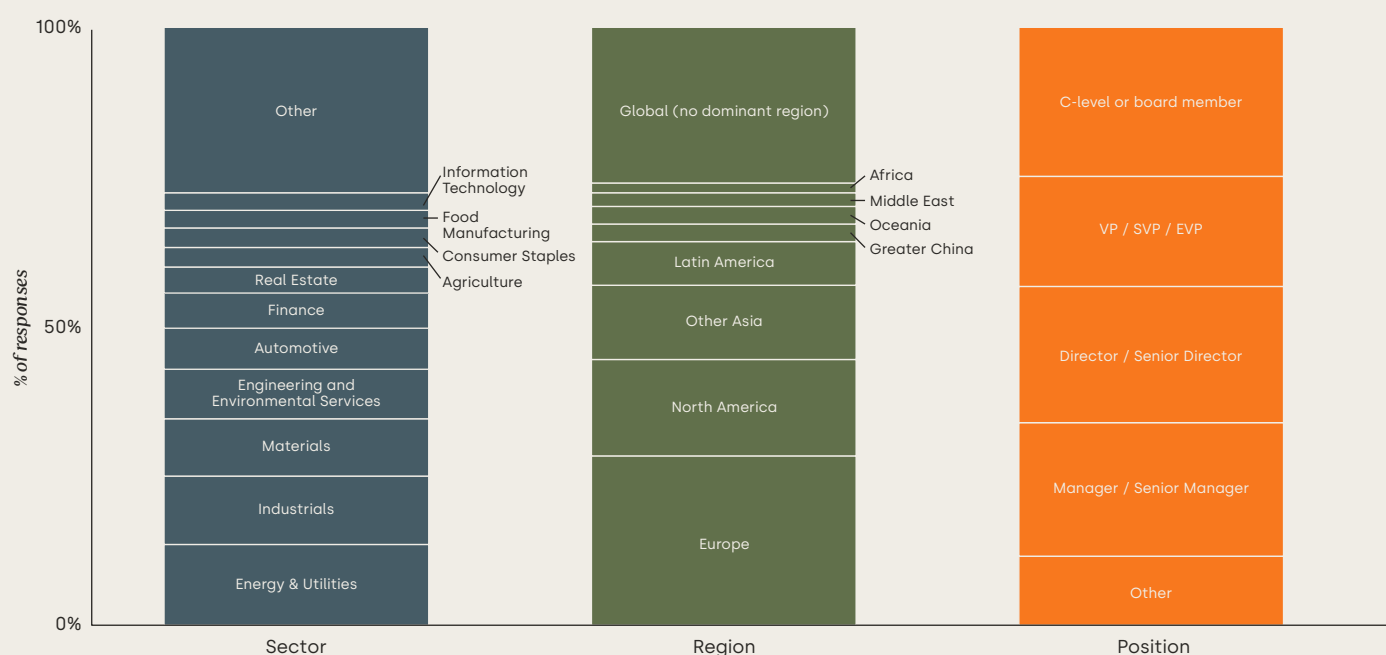
In 2025, understanding the perspective of leading businesses is more critical than ever. Against a backdrop of geopolitical turbulence and a fragmented global narrative on climate, shaped by divergent national interests, shifting policy signals and challenging economic conditions, there is a perception that investment in the transition is slowing and businesses are stepping back from their commitments. Understanding the reality of how these dynamics are impacting business priorities is essential – and forms critical input to the response to the Global Stocktake, as a priority for COP30.

The Barometer insights come from surveys, interviews and collective consultations with more than 300 business executives and business

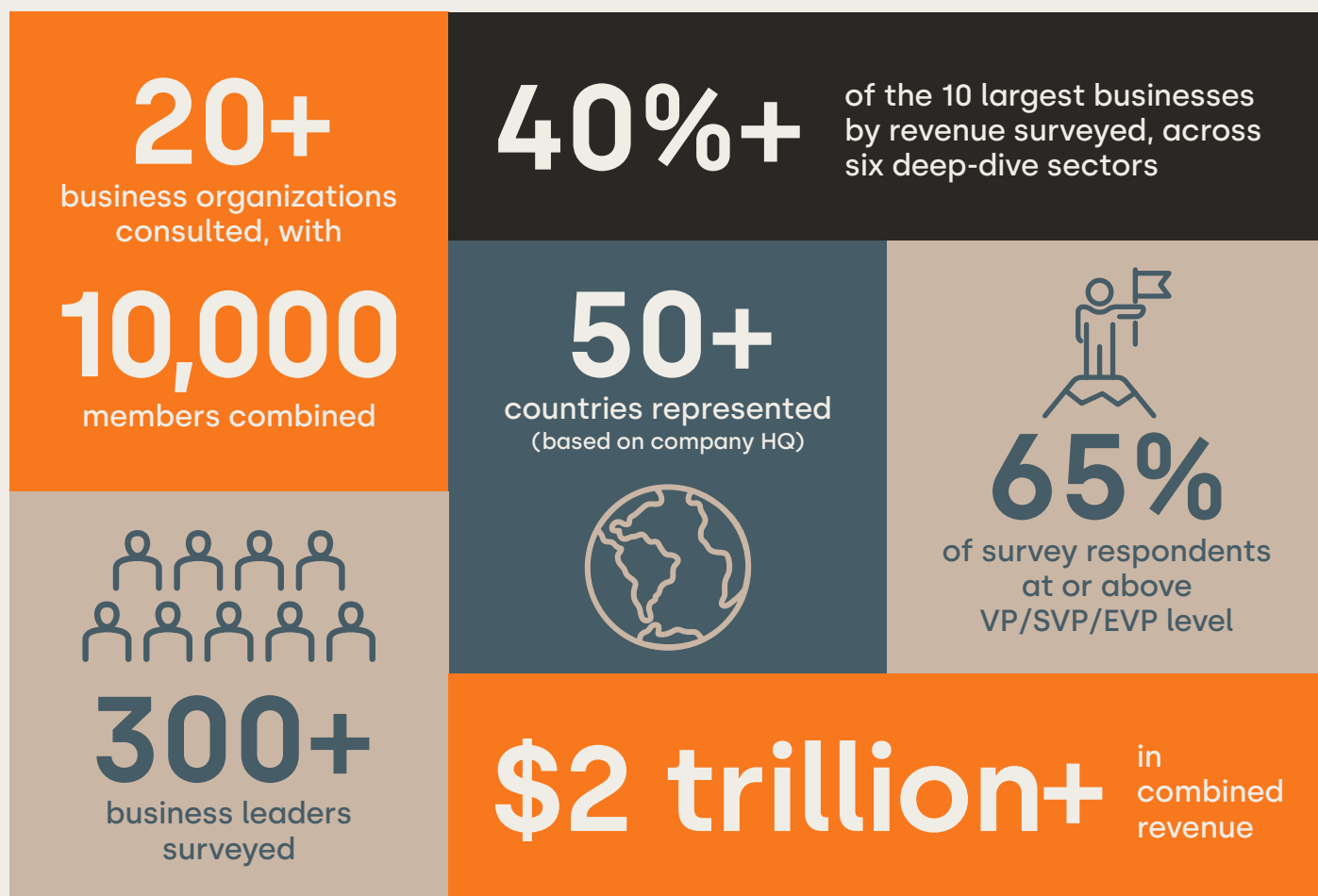
organizations representing over 10,000 members conducted between March and early May 2025. The businesses are leaders in sustainability, particularly in the energy and industry transitions. Participating companies span global multinationals to start-ups; collectively, they have trillions in annual revenue and millions of employees. The participants are principally located in the OECD and BRICS markets but embedded throughout global supply chains. These businesses provide critical insight into how the transition is unfolding in practice and offer a leading indicator of where markets, investment and policy are heading.

The 2025 Barometer report also provides deep dives into six sectors that are the focus of COP-to-COP collaboration through the Breakthrough Agenda – power, road transport, steel, cement, buildings and hydrogen – with an additional focus on fertilizer added this year as an emerging sector of interest. Together, these sectors account for more than 50% of global emissions. For each sector, the Barometer provides a snapshot of progress, barriers, investment insights, policy priorities and countries to watch, reflecting the perspectives of leading companies, not necessarily the sector as a whole. For future years, we recognize the need for more detailed regional analysis and more geographical diversity to capture the unique challenges and opportunities for each region, particularly in emerging markets and developing economies (EMDEs).

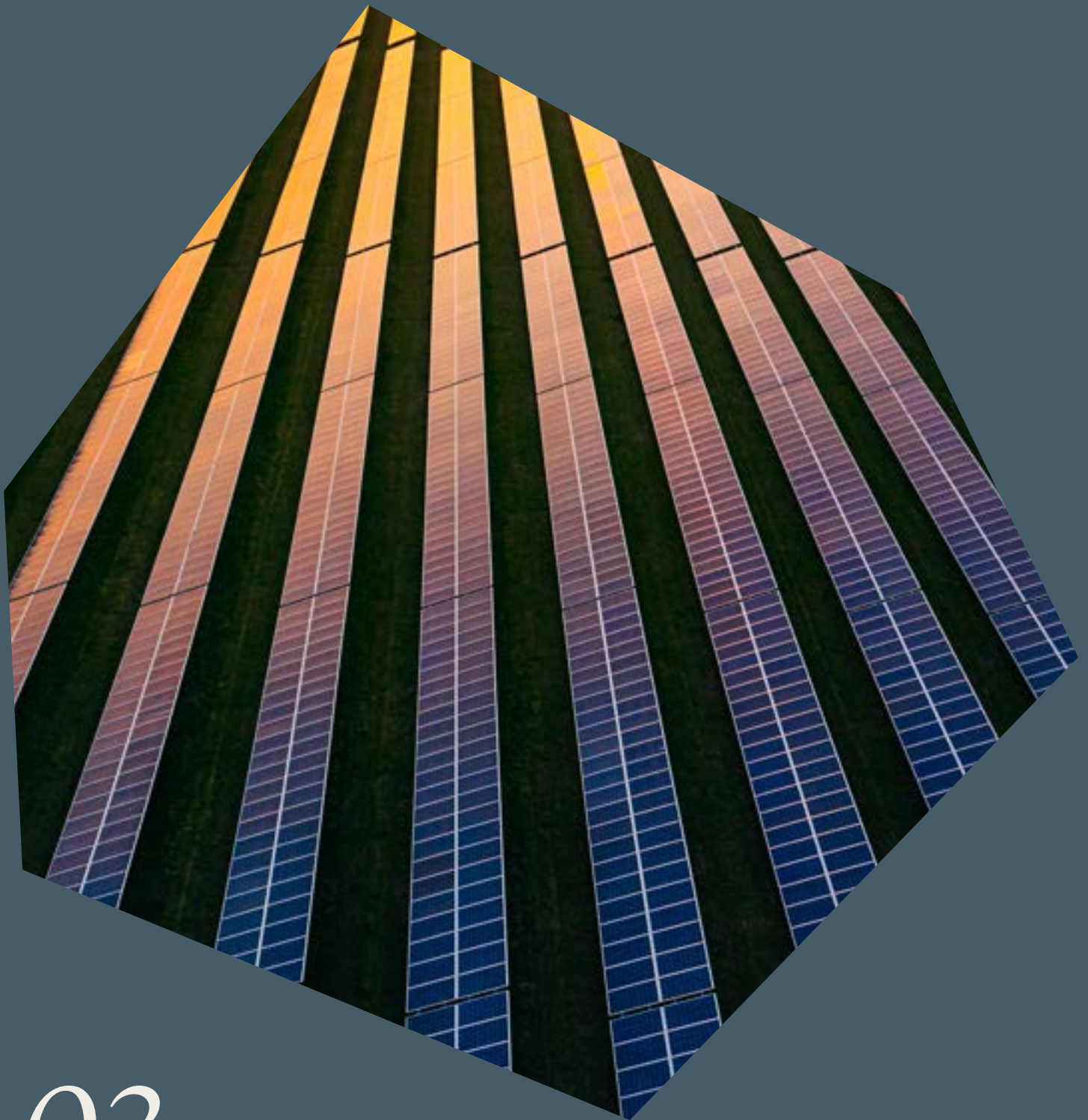
Figure 1: Breakdown of surveyed business leaders by sector, region and position of respondent



Source: Barometer '25 Survey (N=304)



Global Business *Sentiment*



03.

03. Global Business Sentiment

Amid political volatility, businesses are holding firm on transition investments for now, targeting 'bright spots' that deliver competitiveness and cut emissions.

This year's insights reveal growing maturity in the alignment of core business strategy with low-carbon investment, despite political uncertainty.

More than **half** of surveyed business leaders report reduced confidence in governments' support for the net-zero transition over the past year (Figure 2), with concern that **polarization and politicization** will lead to increased transition costs by delaying policy decisions, reducing public support and creating regulatory uncertainty (Figure 3). This erosion of confidence is most acute in North America, where **96%** of leaders in businesses headquartered in the region reported a diminished confidence. In contrast, fewer than **10%** of business leaders in Asia reported a similar decline.

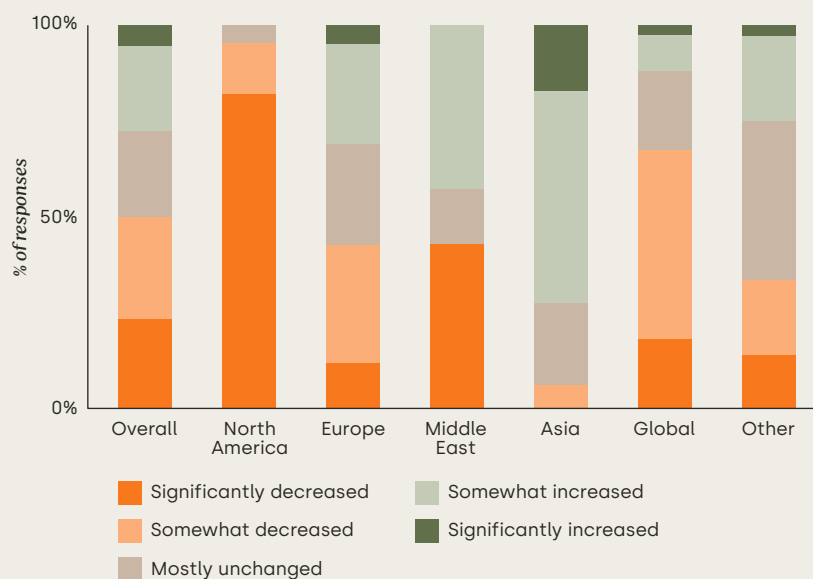
Despite these political headwinds, most business leaders surveyed have **maintained or increased their short-term (95%) and long-term (96%) emission targets** (Figure 4); similarly, **91%** of surveyed business leaders have **maintained or ramped up investments** in clean solutions and infrastructure over the past year (Figure 5). The most significant increases were in Latin America. More than half (**56%**) of surveyed business leaders say the primary motivation for investing in the transition is to secure long-term industrial competitiveness.

Due to the current macroeconomic environment and political instability, the scale and pace of investment varies across regions and sectors. Businesses are strategically **prioritizing investment in bright spots** – markets and technologies that strengthen their competitiveness while reducing carbon emissions, where the business case is strong and increasingly self-sustaining. These include areas such as renewable energy and electric vehicles, where lower costs and improved value propositions make clean solutions commercially viable and **strategically critical to maintaining long-term industrial competitiveness**.

In harder-to-abate sectors, companies are also positioning themselves for **long-term competitiveness by anticipating evolving regulatory frameworks**, such as enhanced public procurement requirements for sustainable products, tightening regulations (e.g., emissions trading system allowances) and the forthcoming Carbon Border Adjustment Mechanism (CBAM) in the EU.

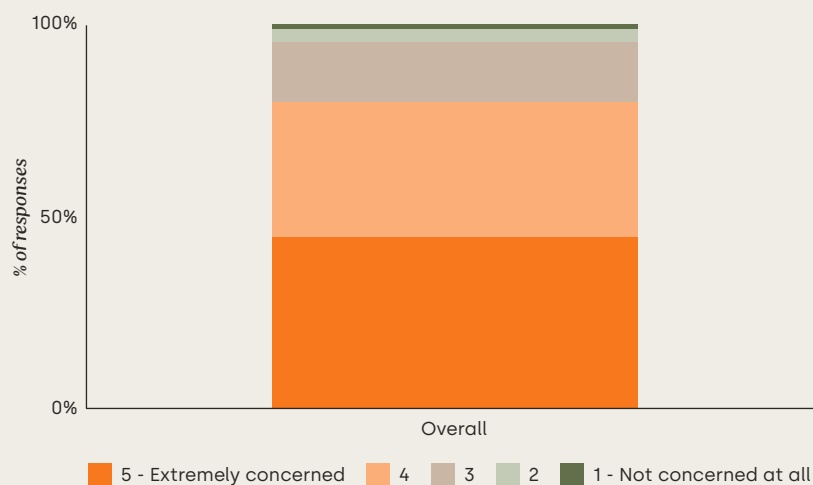
In addition, business leaders report investing in order to gain access to **new customer segments** that actively demand low-carbon alternatives, attracting **climate-conscious capital and unlocking operational efficiencies** – particularly from efficient solutions that support long-term supply chain and resource security.

Figure 2: 50% of surveyed business leaders have less confidence in the government's approach to supporting the net-zero transition over the past 12 months, in their main region of operations



Source: Barometer '25 Survey (N=304)

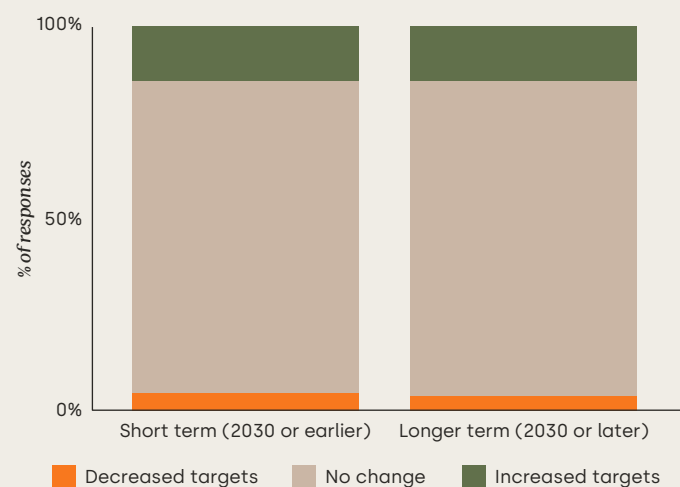
Figure 3: 80% of surveyed business leaders are concerned that politicization and polarization is or will impact the cost of the net-zero transition (for businesses and society)



Source: Barometer '25 Survey (N=304)

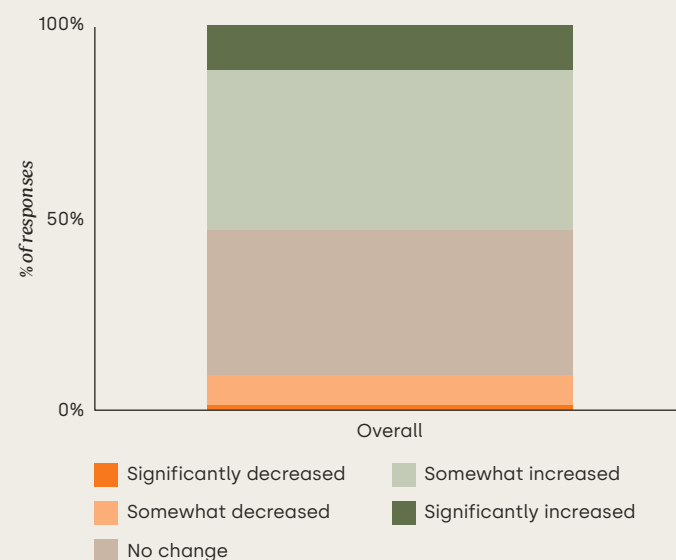
While short-term volatility poses risks, especially for solutions with higher green premiums reliant on policy or customer demand, business leaders remain committed to the long-term transition. For technologies that are closer to a positive tipping point, businesses expect investment to continue, reflecting confidence in the broader trajectory despite near-term uncertainty.

Figure 4: Most surveyed business leaders have maintained or increased their short-term (95%) and long-term (96%) emission targets over the past 12 months



Source: Barometer '25 Survey (N=304)

Figure 5: 91% of surveyed business leaders have maintained or increased their net-zero transition investments compared to 12 months ago



Source: Barometer '25 Survey (N=304)



“Despite short-term uncertainty, electrification, rising energy demand and the growth of renewables all point to a resilient long-term transition trajectory. Renewables are now the fastest, most reliable and, increasingly, the cheapest source of energy in many markets, and that alone gives us confidence in the medium-to-long-term outlook.”

– Senior Strategy Director, Multinational Electric Utility Company



“The recent slowdown in the hydrogen industry is best seen as a necessary phase of consolidation and realism and marks a healthy shift from hype to targeted deployment. This pendulum swing is enabling long-term advancement. Steady continuation now will unlock future momentum and prevent years of unnecessary delay.”

– VP Sustainability & Social Impact, European Energy Company



“We’re seeing strong momentum where there’s a clear business case- especially in areas like technology, digitization, and operational efficiency. Energy efficiency, smarter material use, and improved logistics are proving that the transition is not just possible, but profitable.”

– Executive Vice President of Sustainability & Innovation, Multinational Construction and Development Company

How this is showing up in the energy and industry sectors

Clean energy investments hit record levels in 2024, surpassing **USD \$2 trillion**⁴ worldwide (Figure 6). Yet investments are not increasing across the board. They concentrate on *bright spot* solutions where market forces are sustaining momentum through falling costs, greater economies of scale, improved supply chains and an increased focus on energy security (see each sector deep dive for more details).

Proven, scalable technologies saw the largest investment growth in 2024. Electric vehicles (EVs), renewable energy and power grids drew the majority of total energy transition investments in 2024 (**USD \$1.88 trillion**)⁵, up **14.2%** despite macroeconomic pressures (Figure 6).⁶

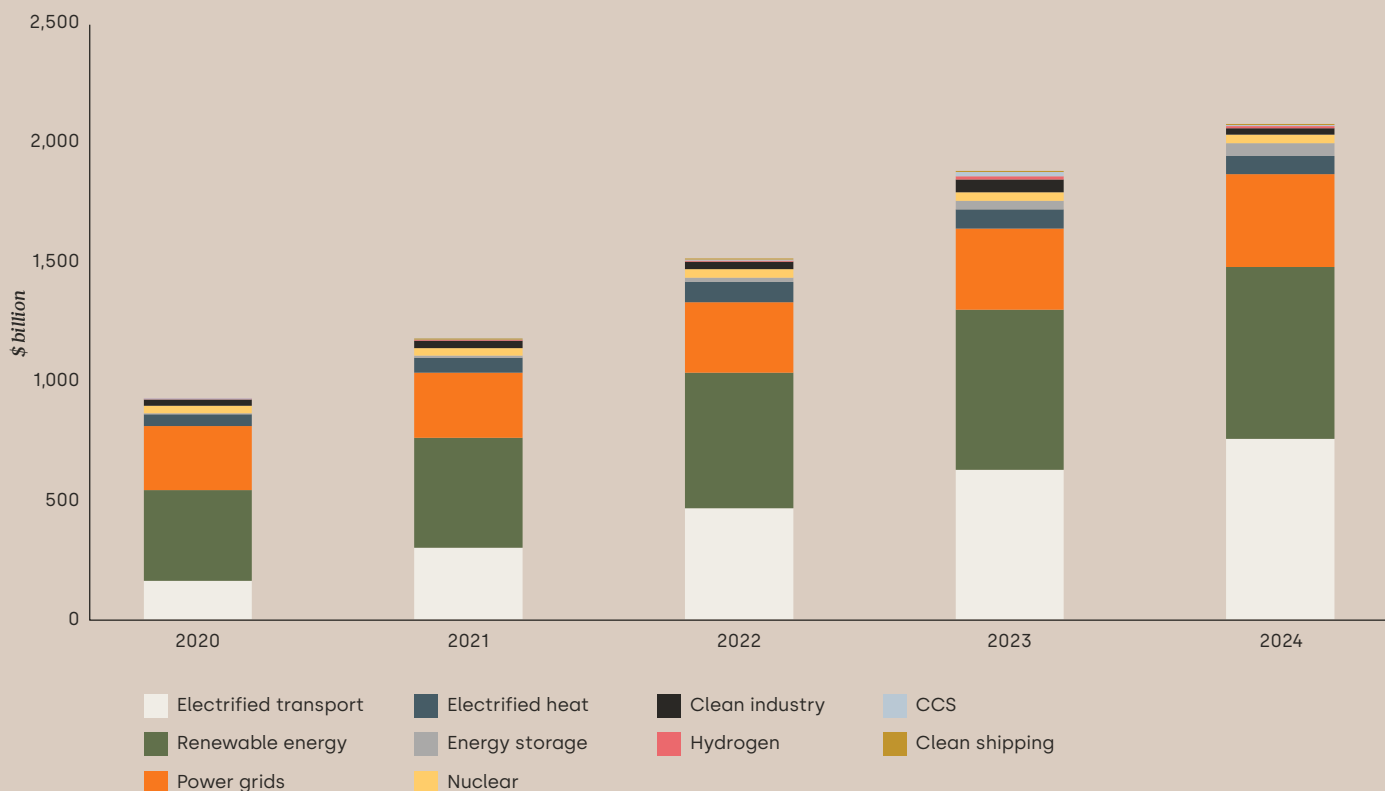
→ **Electrified transport (20% growth in investments in 2023–24 (Figure 6)⁷**: Businesses remain confident about the long-term trend of electrified transport. They point to continued EV penetration growth in most markets in 2024, with China reaching **~45%** EV penetration. Here, electric models are already cheaper than internal combustion engine (ICE) vehicles at point of purchase. Emerging markets in Asia, Latin America and Africa are also seeing gradual uptake, largely propelled by affordable Chinese models and growing (Chinese) investment in local charging infrastructure.

However, many businesses have voiced concerns about ongoing political volatility and trade uncertainty impacting growth in core markets, like Europe and the US, in the near-term.

→ **Renewable energy (RE) (8% growth in investments from 2023 to 2024 (Figure 6)⁸**: Businesses signal continued appetite to invest, given long-term demand growth and the low cost of mature RE technologies. Renewables hit record buildout in 2024, led by a surge in solar and wind (to a lesser extent). Falling costs, Chinese module exports and supportive policies in countries like China, India, Brazil, Germany and the US have driven buildout.

→ **Power grids (15% growth in investments from 2023 to 2024 (Figure 6)⁹**: Businesses and governments continue to invest heavily to expand power grids to support rising load growth and the rising share of renewable energy supply in connection queues. Nuclear is also gaining renewed interest as a clean power source, including among big tech firms, contributing to the push for grid reliability and long-term system resilience. Survey respondents perceive support for infrastructure buildout as rising in all countries, regardless of climate priorities.

Figure 6: Global energy transition investments by sector, 2020-2024



Source: BloombergNEF (2025). Energy Transition Investment Trends 2025.

→ **Energy storage (36%** growth in investments from 2023 to 2024 (Figure 6)¹⁰): Businesses note that battery energy storage system (BESS) installations surged in 2024, enabling RE buildout as corporates and industrials rushed to secure clean, stable power supply. Significant cost declines, driven by manufacturing overcapacity, technical improvements and cheaper raw materials boosted this surge.

On the other hand, **investments in emerging technologies have been hit** over the last year. Business leaders note that **making big bets on breakthrough technologies is challenging without policy certainty and access to affordable clean energy**, especially where it requires the transformation of existing assets (vs greenfield sites). In today's tighter capital markets, sectors whose economics depend on subsidies, mandates or uncertain estimates of future cost reductions are the first to feel the squeeze, with many projects pared back or paused.

→ **Hydrogen (42%** reduction in clean investments from 2023 to 2024 (Figure 6)¹¹): Investments declined as rising costs and uncertain offtake stalled much of the pipeline and led to widespread project delays. Without clear long-term demand signals, the business case for clean hydrogen remains challenging, with continued uncertainty about offtake agreements impacting project viability.

→ **Steel:** Linked to this, major steel companies have opted to delay large-scale transition investments, particularly for hydrogen-based direct reduction iron (DRI) production. This has affected projects with **+10 Mtpa in planned capacity**¹² with business leaders citing high energy prices, limited hydrogen availability and continued regulatory uncertainty. If brownfield sites miss the end-of-life window to invest in transition technologies and opt to reline blast furnaces instead, they risk locking in carbon emissions for another 15–20 years.

→ **Carbon capture, (utilization) & storage (CC(U)S) (56%** reduction in investments from 2023 to 2024 (Figure 6)¹³, following a near doubling from 2022 to 2023): Business leaders note that uncertain economics, sustained high interest rates, policy preferences for electrolytic H₂ (notably in the EU), and limited infrastructure continue to constrain momentum for CCS/CCUS.



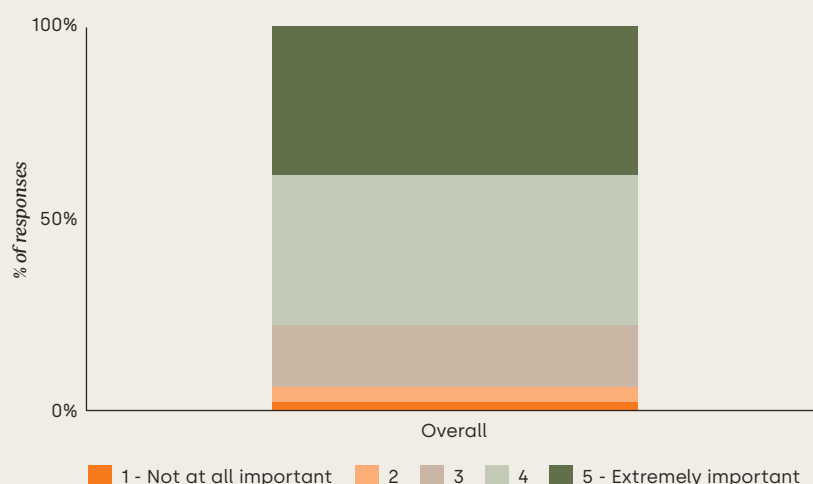
'Bright spot' countries – those offering clear and stable policy frameworks, supportive net-zero transition policies, demand-side certainty and affordable clean energy – are capturing a 'transition dividend.'

Some **94%** of surveyed business leaders cite **supportive clean energy and net-zero transition policies** as critical factors when assessing investment decisions in existing or new markets (Figure 7). Countries in **Asia and Europe** are increasingly attractive destinations according to **74%** of business leaders surveyed (Figure 8), due to their long-term approach that moves beyond targets to coordinated industrial plans, driven by energy security priorities and new economic opportunities. Countries in these regions are rapidly scaling renewables, electrification, green hydrogen and low-carbon industrial materials. Conversely, **more than half** of business leaders identify declining policy support or lack of government clarity as reasons to reduce transition-related investments (Figure 9). **50%** of business leaders surveyed highlighted the US as a less attractive investment destination compared to last year (Figure 8).

Business leaders have also called out **demand-side measures** as particularly important to driving transition-oriented investments. They cited increased certainty about customer demand as the **primary driver of investment growth in 2024**; on the flip side, **demand uncertainty has also been a driver of reduced investment** (Figure 9). Business leaders note that the EU's ReFuelEU stands out for its binding mandates for sustainable aviation fuels, spurring investment decisions. In contrast, in Australia's steel sector, which is geared towards green iron exports by leveraging strong renewables and ore resources, limited domestic demand signals may be slowing investment.

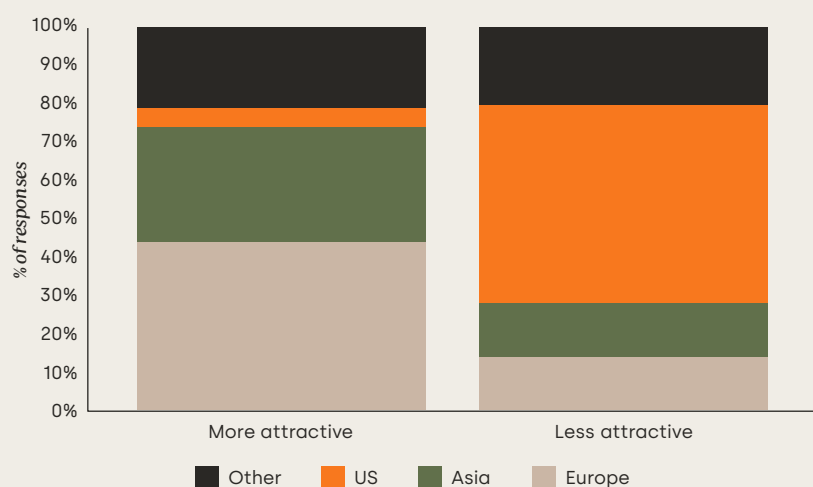
Finally, **access to affordable clean energy is playing an increasingly central role in investment decisions** across all types of industries – due to its contribution to lowering costs, increasing the reliability of power supplies, decarbonizing operations and scaling technologies like green hydrogen (Figure 9). Recent polling commissioned by E3G, Beyond Fossil Fuels and We Mean Business Coalition shows **90%** of business leaders prioritize access to renewables-based electricity when investing, with **half** planning to relocate to markets offering better access within five years.¹⁴ China stands out for its ability to provide large-scale, cost-competitive renewable electricity, attracting industrial investment in sectors such as clean manufacturing and hydrogen (e.g., in net-zero industrial parks). In contrast, business leaders cite concerns in Europe that rising energy costs and stalled public support for electrification risk slowing momentum and triggering political backlash against clean energy.

Figure 7: Supportive clean energy and net-zero transition policies are important for 94% of surveyed business leaders when evaluating investments in their key markets or potential new markets



Note: 94% includes responses in the 3–5 range, indicating importance
Source: Barometer '25 Survey (N=304)

Figure 8: 74% of surveyed business leaders identified countries in Europe and Asia as becoming more attractive for investments in the net-zero transition over the past year, while 50% highlighted the US as less attractive for such investments



Source: Barometer '25 Survey (N=304)



“For us to take a FID [financial investment decision] on a low-carbon steel project, we need a combination of factors in place: access to affordable clean energy, financial support (CAPEX and OPEX), carbon cost and leakage protection, protection from unfair trade and demand push.”

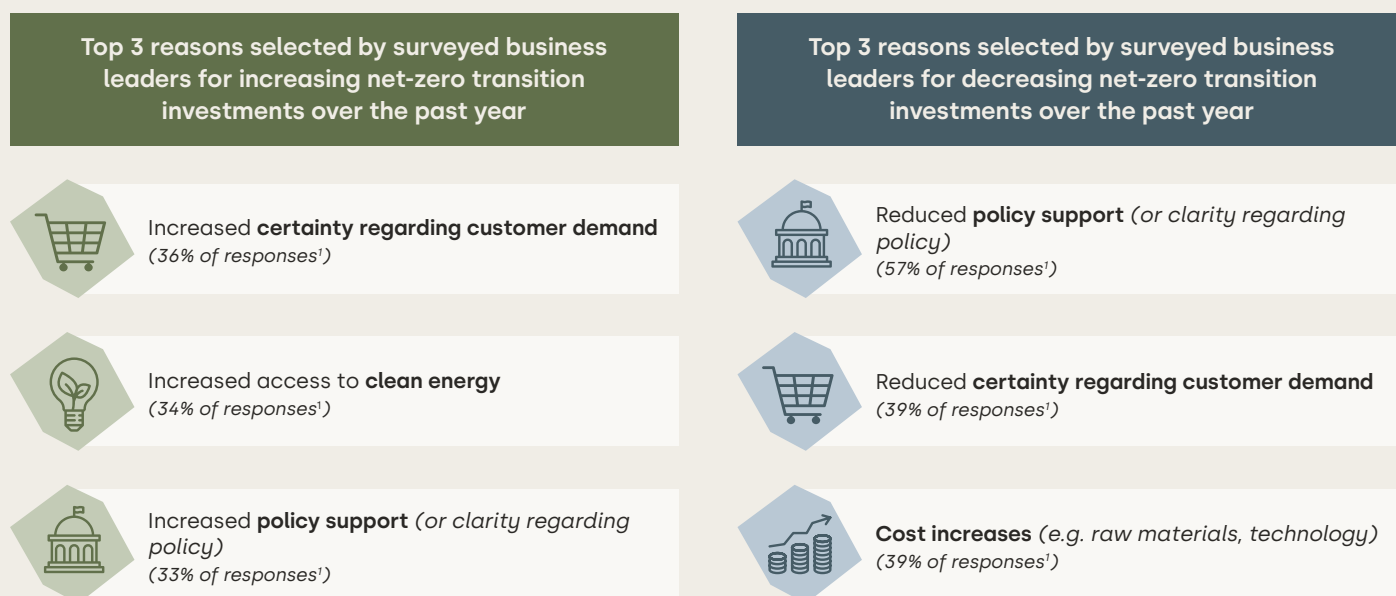
– Climate Change Engagement Manager, Global Steel Company



“At the end of the day, we need regulatory certainty - whether it's 45V in the US or mandates in the EU - you can't build a business model without it.”

– Chief Sustainability Officer, Global Energy Equipment Manufacturer

Figure 9: Top three reasons selected by business leaders for increasing or decreasing net-zero transition investments over the past year



Note: 1) Totals exceed 100% as respondents could select multiple alternatives
Source: Barometer '25 Survey (N=304)

How this is showing up in the energy and industry sectors

Companies are investing in markets that deliver these enabling conditions. Clean technology factory investments¹⁵ are a good indicator of long-term momentum and economic opportunity and so help to identify *bright spots*. Asia and Europe are emerging as particularly attractive (Figure 10). While the US was also a major destination for investments in 2024, predictions show growth in factory investments will slow down in 2025.

→ **Mainland China** received ~80% of global clean technology factory investments in 2024 (Figure 10)¹⁶. Businesses note how China is scaling clean technologies rapidly and pragmatically, focused on securing clean energy, economic growth and global leadership in clean energy supply chains. A coordinated industrial strategy that includes direct subsidies, low-cost financing, land access, and state-driven scale-up of supply chains like solar, batteries and EVs underpin this.

→ **Europe drew \$6.2 billion** in investments in 2024, up ~263% from the previous year (Figure 10). Business leaders note that the continent is most advanced in consistent, long-term supportive policies for the transition, including the onset of the CBAM. This makes the region especially attractive for near-zero carbon innovation investments. The EU Clean Industrial Deal outlines lead markets and harmonized standards for low-carbon production, aiming to increase investment certainty, while also allowing for the more effective establishing of green public procurement. Selected highlights:

- The **UK** is taking a leadership role in the power sector, due to its accelerated grid expansion, GBP £4 billion in fast-tracked funding for grid infrastructure and plans for transparent planning processes.
- **Germany** has set ambitious targets for renewables, launched record onshore wind auctions and set incentives for battery storage and green hydrogen, alongside investments in major grid upgrades and developing market reforms.

→ **India** is predicted to see a significant (~80%) increase in clean technology factory investments in 2025 (vs 2024) (Figure 10). It is taking bold steps to attain a leading position with national low-carbon product standards for steel, the introduction of sustainability requirements into public procurement and launching domestic manufacturing support schemes.

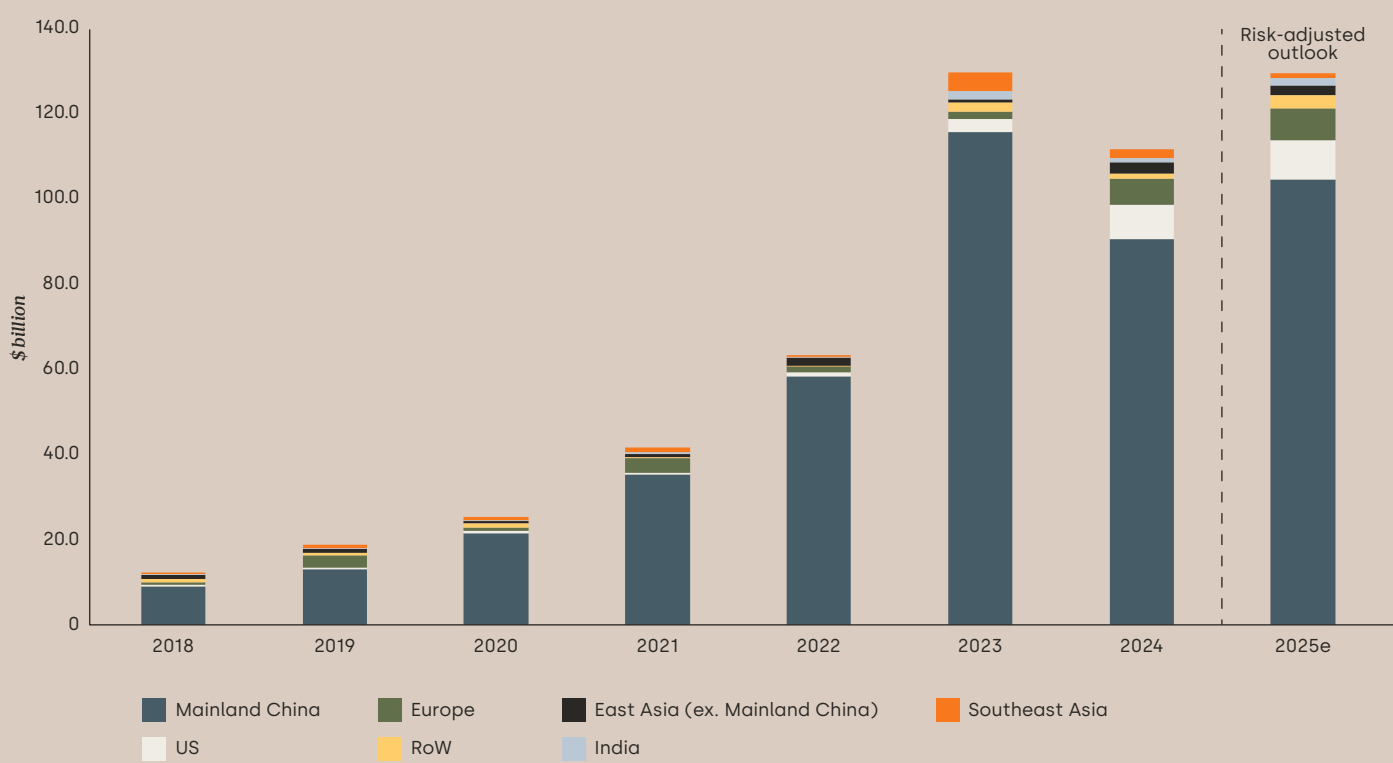
→ Additionally, companies highlighted **Brazil** as a *bright spot* in South America. With renewable energy auctions and a low-carbon hydrogen regulatory framework and incentives, it is leveraging its natural resource advantages and policy momentum to become a hub for low-carbon hydrogen and materials, with industries like steel, cement and chemicals increasingly adopting biomass and electrification.

In contrast, businesses note that **other regions are becoming less attractive** for transition-related investments in 2024–25, as enabling conditions deteriorate or stall.

→ While the **US** remains a key destination for clean energy investments, its growth is expected to decline from 148% per annum from 2023 to 2024 to **15%** from 2024 to 2025. (Figure 10). Businesses note increased uncertainty regarding policy and funding (for example, freezing of Department of Energy loans, rollback of EV policy support, Inflation Reduction Act) and geopolitical flux related to the evolving tariff environment.

→ Businesses also note that some **developing economies, including in Africa**, remain challenging investment propositions, particularly due to the high cost of capital, combined with insufficient green financing/policy support for high up-front capital expenditure (CAPEX) requirements of many clean technologies (e.g., renewable energy installations or electrolyzers). As an example, Africa received less than ~3% of clean energy investments, despite representing ~20% of the global population.²⁰

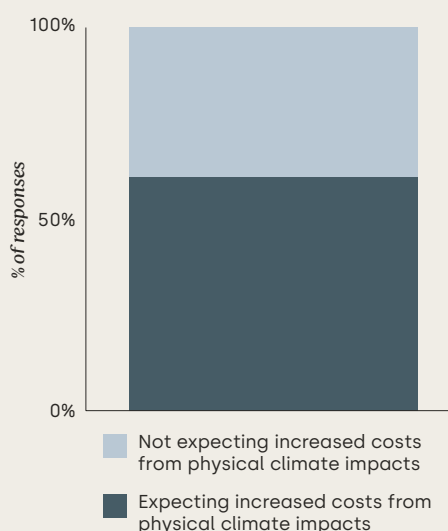
Figure 10: Clean technology factory investments by major geography, 2018-2025e



Source: BloombergNEF (2025). Energy Transition Investment Trends 2025.

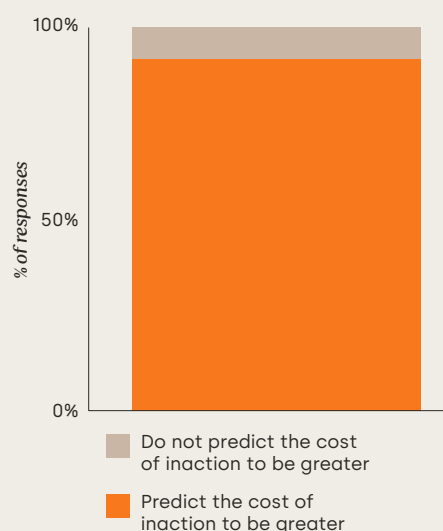
Business leaders urge governments to stay the course as they experience mounting costs from climate impacts; they highlight that the cost of inaction will be higher than the cost of achieving a stable climate.

Figure 11: 61% of surveyed business leaders expect to see increased costs to their organization from physical climate impacts in the next 12 months



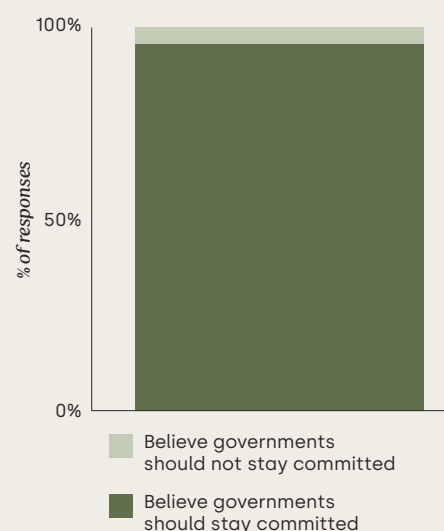
Source: Barometer '25 Survey (N=304)

Figure 12: 92% of surveyed business leaders predict that the cost of inaction will be greater than the cost of action to achieve net-zero emissions for their organization



Source: Barometer '25 Survey (N=304)

Figure 13: 96% of surveyed business leaders believe governments should stay committed to achieving net-zero emissions



Source: Barometer '25 Survey (N=304)

The effects of climate change are already impacting businesses directly: 61% of business leaders anticipate experiencing increased costs to their businesses from climate impacts – such as extreme weather events or supply chain disruptions – in the next 12 months (Figure 11). Consequently, 52% of surveyed business leaders are incorporating adaptation and resilience planning as a key part of their business strategies.

There is a broad agreement that the longer-term **cost of inaction will exceed the cost of transition**. Almost all (92%) of the surveyed business leaders predict that the consequences for their organization of failing to act on climate change – such as physical damage, asset losses and rising insurance costs – will be more severe and far-reaching than the cost of decarbonization (Figure 12).

Businesses are clear that they cannot tackle this challenge alone – 96% of surveyed business leaders believe governments should stay committed to achieving net-zero emissions (Figure 13). They warn that political instability and wavering ambition risk undermining progress and deterring future investment. They also see maintaining **international collaboration as essential**, with 85% of business leaders surveyed rating it as moderately or extremely important. Yet only 28% report meaningful progress in global cooperation over the past year, with most progress seen in areas such as technology support, enabling infrastructure and standards.



“Physical climate risk is now a top business consideration in due diligence of assets, locations and design decisions.”

– Global Head of Sustainability, Global Real Estate Company



“Adaptation and resilience (A&R) is a top priority for us and we have set up a dedicated unit reporting to the head of strategy. We spend a lot of time on advocacy efforts to raise awareness of A&R costs and planning needs. Utilities need more public support to fund adaptation to avoid costs being passed to consumers.”

– Head of Energy and Climate Policies, Global Energy Company

How this is showing up in the energy and industry sectors

- **Utilities and power companies** face heightened resilience requirements (like substations that must be able to endure flooding events lasting up to 24 hours) due to infrastructure exposure to extreme weather events. This is driving higher investment costs, raising insurance premiums and increasing service disruptions.
- Similarly, **real estate companies** need to consider climate risks in their locations and face insurance underwriters with more extensive reporting requirements and climate risks priced into the premiums.
- **Global supply chains** are also increasingly at risk as disruptions from extreme weather or infrastructure damage become more common. Disruptions are leading to revenue loss and production downtime but can also drive rising input costs from shortage and insurance adjustments.

The next year will test the transition's resilience, as shifting trade dynamics and rising industrial competition force countries and companies to balance economic priorities with transition opportunities.

Businesses highlight several uncertainties that they will be watching and will shape the trajectory and investment in the net-zero transition over the next 12 months:

- **Trade clarity and stability** are top of mind, as shifting tariff regimes risk disrupting global supply chains. Without clear and stable trade policies, companies face difficulties in forecasting costs and returns on low-carbon investments, potentially delaying progress on targets.
- **In Europe, businesses are watching how sectors will maintain industrial competitiveness** – especially in internationally traded sectors like automotive and steel. A clear decarbonization strategy that supports the re-industrialization of Europe will be key.
- **China's role in the global energy transition is a major focus**, driven by its expanding industrial capacity and growing international investments. Businesses are adapting their strategies in response to the supply of low-cost clean energy technology exports, looking for policy frameworks that balance domestic industry support with global cooperation and trade. **Emerging markets** may look to seize the transition opportunity presented by affordable clean technology and solutions exported from China.
- **Maintaining investment and innovation momentum is a growing concern.** The impact of a slowdown in public and private investment in

the US may stall early-stage clean technology deployment. Businesses are watching for signals of renewed commitment to innovation support and particularly whether the government will maintain parts of the Inflation Reduction Act.

- **Public support for the transition is a critical factor.** With affordability concerns rising, companies are hoping governments will proactively manage perceived cost-of-living impacts, most of which they expect to be limited, to sustain social and political backing for electrification and renewables.

Business leaders will be watching carefully for more *bright spots* that enable further investment through policy clarity that reinforces supply chain resilience, tackles sector-specific challenges and aligns industrial competitiveness with climate goals.



“We remain committed to investing in the energy transition but this investment trend needs support from governments and regulators to provide clarity and certainty to businesses and investors. There is a risk of political and economic volatility slowing progress.”

– Chief Sustainability Officer, Multinational Electric Company

Energy and Industrial *Sectors Summary*



04.

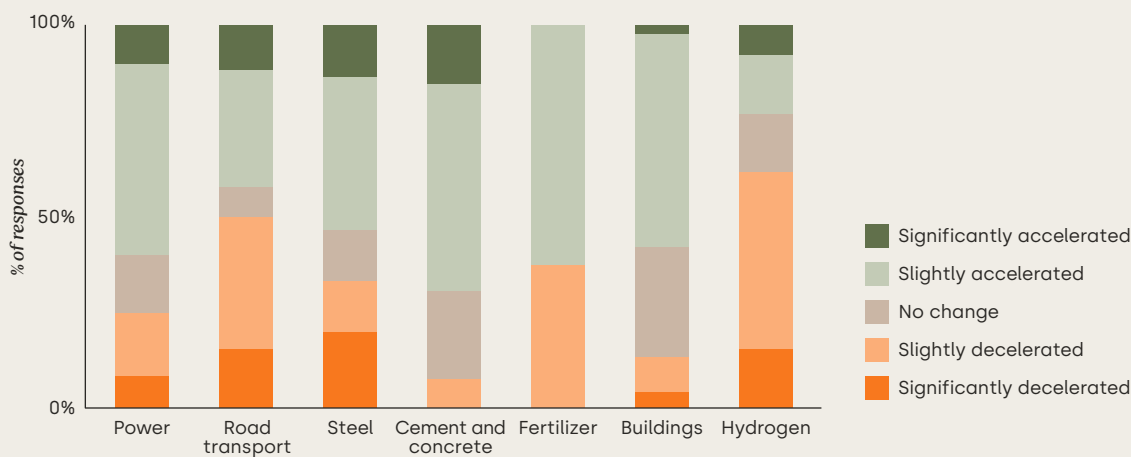
04. Energy and Industrial Sectors Summary

The pace of transition varies across sectors

Business perception of the pace of the transition remains mixed but with some progress seen over the past year. Surveyed business leaders in the cement, power and buildings sectors perceive the strongest acceleration in their sectors, reflecting greater government support, innovation development or a clearer business case (Figure 14). In road transport, still influenced by policy to stimulate customer demand and impacted by trade uncertainty, the picture is mixed.

Business confidence dipped amid a slowdown in Europe, despite progress seen elsewhere, particularly in investment growth in select emerging markets and developing economies. The hydrogen, steel and fertilizer sectors are advancing slowly, with businesses increasingly selective in investment decisions due to policy uncertainty and the significant cost gap between transition technologies and conventional assets and production routes.

Figure 14: Over the past 12 months, surveyed business leaders perceive greatest acceleration in the global pace of the net-zero transition in the power and cement sectors, while they perceive the greatest deceleration in the global pace of transition in the hydrogen sector



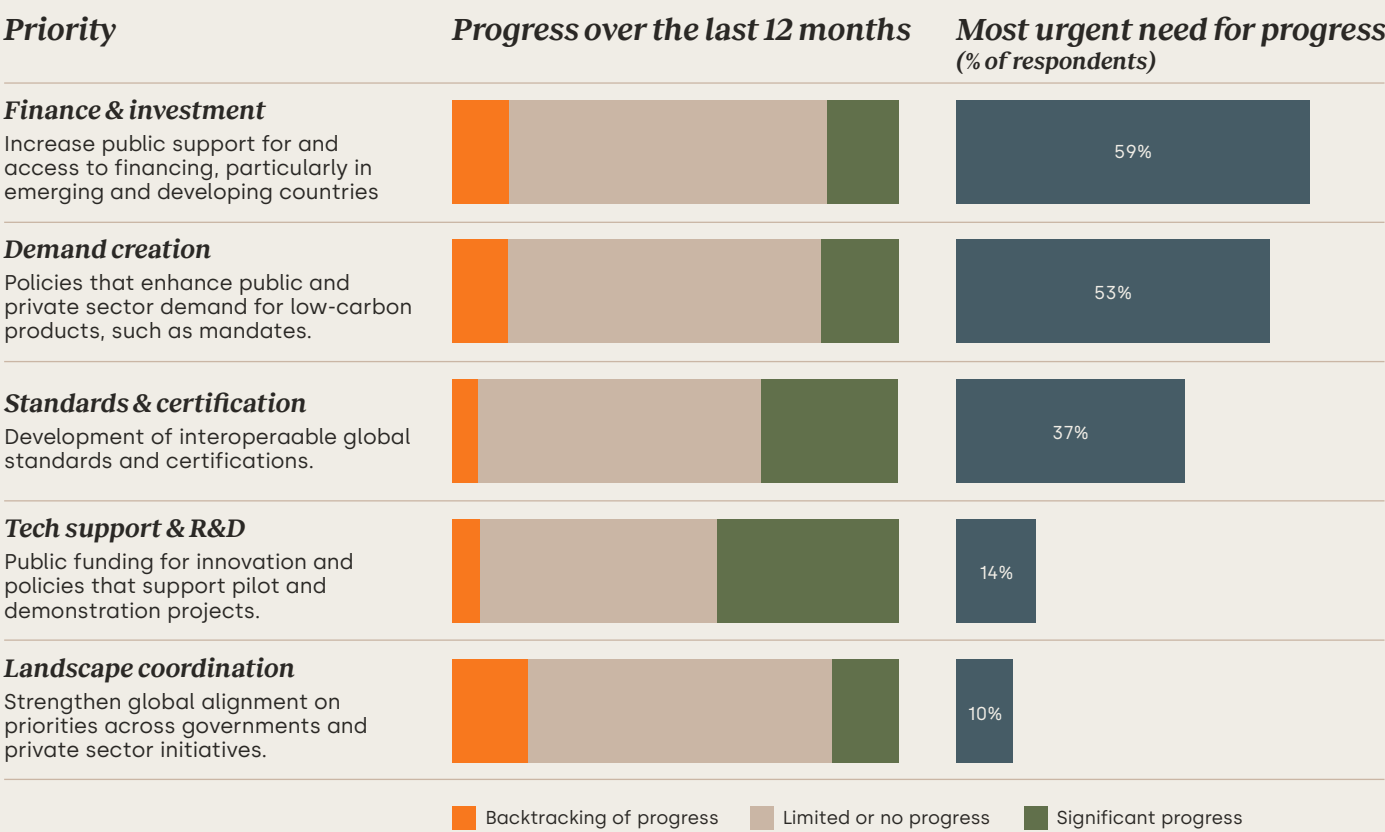
Source: Barometer '25 Survey (N=304)

Further acceleration requires sector-specific interventions

Businesses note that there was some progress on priority areas for policy development and (inter) national collaboration over the last 12 months (Figure 15). **Technology support and research and development (R&D)** saw the most progress over the last year, followed by standards and certifications.

Meanwhile, supportive policies to scale finance and investment and to stimulate demand creation saw limited improvement, despite businesses seeing them as critical to scale markets.

Figure 15: Assessment by surveyed business leaders of global progress on policy priorities over the past 12 months and the policy priorities with the most urgent need for progress over the next 1-3 years (from a list of up to 10 options)



Note: Total responses exceed 100% due to multiple choice
Source: Barometer '25 Survey (N=304)

Policies to enable **finance and investment (59%** of business leaders), **demand creation (53%)** and developing **standards and certifications (37%)** are the top priorities where business leaders see the most urgent need for government action across all sectors (Figure 15). They see finance and investment support by governments as critical to closing commercial gaps, accelerating project timelines and ensuring a stable investment environment – particularly in sectors exposed to policy uncertainty, long payback periods or emerging technologies. **Demand creation** is especially critical for nascent sectors such as electrolytic hydrogen and primary steel, where customer willingness to pay a low-carbon premium remains weak. In more mature sectors like renewables and EVs, companies increasingly highlight the need for **harmonized standards and**

certifications to scale markets, drive mass adoption and unlock international trade. Yet, they also point to the need for **faster infrastructure buildout to support system-wide integration and reliability**.

The message from leading businesses is consistent: they are committed to the transition in the long-term, despite short-term volatility, and are already investing significantly to deliver long-term competitiveness. They are ready to further scale transition investments but need stable regulatory frameworks and clear and supportive policies that translate into bankable markets. If governments implemented targeted, sector-specific policies, **78% of executives say they would increase investment in the transition**. For governments, the implication is clear: the more predictable and supportive the market environment, the faster capital will flow.

Figure 16: Summary of the policy priorities perceived by surveyed business leaders as most urgent to make progress on, by sector

Global top 3 priorities   				Other priorities   		
	Priority #1	Priority #2	Priority #3			
 Power	 Infrastructure: Streamline permitting, align market design, and advance interconnectors to scale investment in grid infrastructure and storage	 Finance and investment: De-risk private sector investments in EMDEs, provide long-term contracts and set binding national RE targets	 Demand-side management: Reward demand flexibility, support cross-sector electrification, and ensure affordability to consumers			
 Road transport	 Infrastructure: Coordinated, standardized, and incentivized rollout of interoperable EV charging infrastructure	 Demand creation: Set mandates, tax vehicles by emissions, and address higher initial costs of EVs, including for low-income consumers	 Finance and investment: Expand concessional finance for EMDEs and offer incentives to boost EV manufacturing			
 Steel	 Demand creation: Scale public procurement, catalyze private sector demand and strengthen carbon pricing mechanisms	 Standards and definitions: Develop internationally aligned definitions and certification for low-carbon steel and lifecycle assessments	 Finance and investment: Provide technology-agnostic funding and support access to low-cost renewable energy			
 Cement & concrete	 Finance and investment: Scale financing for innovations and provide OPEX support for CCUS projects	 Demand creation: Implement green public and private sector procurement mandates	 Standards and certifications: Introduce carbon intensity- and performance-based standards to encourage innovation			
 Buildings	 Demand creation: Introduce building performance thresholds, enhance green public procurement, and update building codes, incl. resilience	 Finance and investment: Support CAPEX, tie concessional finance to carbon impacts and provide differential support by segment	 Standards and certifications: Apply common standards based on embodied carbon and whole-lifecycle carbon assessments			
 Hydrogen	 Demand creation: Implement industry-wide demand policies for low-carbon hydrogen utilization and implement carbon pricing	 Finance and investment: Encourage public-private risk-sharing, develop infrastructure incentives and long-term offtake contracts	 Standards and certifications: Establish harmonized standards and pilot agreements between countries with common H2 certification			
 Fertilizer*	 Demand creation: Introduce incentives for offtakers and introduce carbon pricing or carbon border adjustment mechanisms	 Finance and investment: Introduce funding and risk-sharing mechanisms to unlock project financing	 Technology support and innovation: Establish international public-private consortia to pool R&D funds and share knowledge			

* Nitrogen-based fertilizers

The headline policy priorities are the ones the respondents selected the most frequently in each sector as requiring the most urgent progress. The specific policy priorities are based on interviews and sector consultations with leading businesses and business organizations.

Source: Barometer '25 Survey (N=304)

Innovative approaches by transition leaders

High costs of capital, for certain low-carbon solutions, are driving companies to rethink how they deliver capital projects – by forging strategic partnerships, proactively engaging in the policy landscape and adopting more agile decision-making – to de-risk and scale low-carbon investments.

In 2024, rising capital costs and tighter budgets strained business cases and forced capital discipline. The leading businesses most successful in delivering on their projects did so with the recognition that a **new approach to capital projects is needed**. Delivering more projects, on-time and cost efficiently, is only becoming more important.

→ Companies are developing **joint ventures and value chain partnerships to de-risk large-scale investments**. Many automotive companies are increasingly securing upstream critical mineral access, battery R&D and recycling capacity through partnerships, while steel and hydrogen companies are partnering with utilities to secure access to renewable energy.

→ Companies are **innovating to underwrite large capital programs** through strategic co-investments often supported by public-private financing and export credits. Leading companies are securing equity partners throughout the value chain to de-risk project execution and offtake, such as steel companies securing equity investments from automotive customers.

→ Companies are more **proactively engaging with the policy and stakeholder landscape**. Government affairs is taking an increasingly strategic role. Multiple leading steel companies highlighted the importance of dedicated policy teams that work with both local and federal governments to support transformational investments, including financing support.

→ Companies are building on the traditional stage-gate process, adopting **more flexible decision-making frameworks** to allow timely and informed choices. This is especially key for large, legacy industrial players needing to transform. In the steel sector, companies are achieving success with large-scale initiatives by breaking down traditional siloes in decision-making. Being able to make swift development and construction decisions is key, such as securing grid connections, signing power purchase agreements (PPAs), managing water supplies or pushing governments on regulation and permitting.

In an increasingly complex landscape, all businesses can learn lessons from the leaders stepping up to meet the moment: finding ways to balance legacy investments with the need to scale up low-carbon solutions.

Countries *to Watch*



05.

05. Countries to Watch

Business leaders consistently highlighted the countries below as becoming increasingly attractive destinations for investment over the past year. Each has taken deliberate steps to create the conditions for market growth through clear policy frameworks, targeted incentives or strategic sector development. Collectively, they offer compelling examples of combined climate and industrial policy leadership – providing valuable lessons for other countries. That is not to say there is not more to do; there is still a long way to go to reach long-term climate and industrial goals. See the sector deep dives for further detail.

Figure 17: Countries to watch, by sector

 Power	 UK Transparent planning, targeted financial support and a liberalized market help de-risk energy investments. Accelerated grid expansion and GBP £4 billion in fast-tracked funding for grid infrastructure are reinforcing the UK as a competitive destination for clean energy infrastructure.	 India <i>(new this year)</i> Scaled-up RE and storage auctions, transmission upgrades under the Green Corridor, and liberal foreign direct investment rules are driving strong de-risking and investment momentum for renewable energy.	 Germany <i>(new this year)</i> Ambitious renewable targets, record onshore wind auctions and incentives for storage and green hydrogen, alongside major grid upgrades and market reforms, are accelerating investment in clean power.
 Road transport	 China Rapid buildout of fast-charging and battery-swap infrastructure, combined with tax exemptions and significant funding to stimulate demand, including direct purchase and trade-in subsidies, create strong market conditions for EV investment and scale-up.	 Mexico <i>(new this year)</i> A strong EV manufacturing base, state-level incentives, rapid growth in charging infrastructure, including national fast-charger corridors, and supportive federal EV incentives (e.g., import duty exemptions, tax breaks) make it an attractive market for EV manufacturing investments.	 India <i>(new this year)</i> New 2024 incentives, including purchase subsidies, charging infrastructure support and de-risking tools are catalyzing demand and strengthening the investment case for EVs. Import duty concessions, demand-side policies and freight decarbonization strategies further enhance market attractiveness for global players.
 Steel	 India <i>(new this year)</i> The green steel taxonomy the country has implemented is strengthening public procurement and the aim is to triple steel production by 2050. Favorable subsidies for the use of electrolytic hydrogen in steel manufacturing, access to affordable renewable energy and rising steel demand make it a key market for low-carbon steel.	 Germany <i>(new this year)</i> Favorable government incentives (e.g., H2 Global, federal funding) and exposure to ETS boost low-carbon steel competitiveness. Access to low-cost clean energy and hydrogen remains a challenge but industrial hubs and expertise support investments.	 Brazil <i>(new this year)</i> Abundant low-cost renewable energy and organic biomass enable alternative low-carbon steel routes. Strong government incentives, including investment platforms, support project development and increase attractiveness.
 Cement and concrete	 India <i>(new this year)</i> Favorable credit schemes and industrial programs reward emissions cuts. Booming demand, a net-zero roadmap and evolving policy tools like taxonomy and public procurement requirements make it a compelling market for low-carbon cement investment.	 China <i>(new this year)</i> Expanding national ETS to cement and strong state mandates signal rising support for low-carbon projects. In addition, clear policy direction and scale make it increasingly attractive for cement decarbonization investments.	 UK <i>(new this year)</i> In-coming carbon pricing, net-zero building codes and green public procurement mandates create a favorable policy landscape. Major CCUS funding enhance the investment viability of low-carbon cement.

Figure 17: Countries to watch, by sector (cont.)

 Buildings	 Australia <i>(new this year)</i> Implemented climate reporting regulations, National Australian Built Environment Rating System and mandated green leasing for all government tenancies increase this country's attractiveness. An emerging green finance market is further strengthening its appeal for sustainable buildings investment.	 France Strict building regulations for operational and embodied carbon, targeted retrofit incentives for worst-in-class buildings and industry-led innovation make France a front-runner for sustainable building investment.	 UK <i>(new this year)</i> Strengthening building codes, net-zero mandates and whole-life carbon assessments are boosting standards. Green public procurement and financial incentives, including tax breaks and grants, create strong investment signals in sustainable construction in the UK.
 Hydrogen	 India Auction-based subsidies, support schemes for innovation plants, storage and infrastructure, production-linked incentives for electrolyzer manufacturing and access to low-cost renewables position India as a high-potential market for electrolytic hydrogen investment.	 Australia <i>(new this year)</i> Generous subsidies, e.g., production tax credits (USD \$2/kg), abundant and cheap solar and wind, and proximity to major Asian offtake markets position it as a key market for electrolytic hydrogen investments.	Middle East and North Africa <i>(new this year)</i> Access to abundant, low-cost solar and wind, proximity to EU and Asian offtake markets, and national hydrogen strategies and incentives are boosting the region's attractiveness for electrolytic hydrogen investment.
 Fertilizers* <i>(new this year)</i>	 Oman Supportive policies and abundant natural gas for blue ammonia create a strong production base. Dedicated land, deep-water ports and export-ready infrastructure further position Oman as a strategic hub for fertilizer investment.	 Brazil Abundant renewables, high fertilizer demand (currently importing 85% of demand), strategic export access and policies focusing on fertilizer self-sufficiency make it an increasingly attractive market for green fertilizer investment.	 Australia Excellent solar and wind resources, strong government backing and early commercial success position Australia as a frontrunner. Proximity to key Asian markets and growing export infrastructure further enhance investment appeal.

* Nitrogen-based fertilizers
Source: Barometer '25 Survey (N=304)

Sector *Deep Dives*



06.



Breakthrough Agenda Goal: Clean power is the most affordable and reliable option for all countries to meet their power needs efficiently by 2030.

Business confidence

Business leaders are optimistic about the pace of transition, albeit with nuances across regions and technologies. The confidence of businesses surveyed that the world will reach the 2030 Breakthrough Agenda goal has increased compared to last year. Investment levels remained strong given robust business case progress, especially in countries with **clear long-term renewable energy (RE) targets, financial support and**

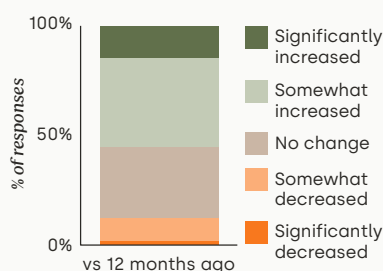
infrastructure buildout policies. However, business leaders warn that policy and supply chain uncertainty could reverse progress and urge governments to stay committed to the transition.

37%

confident the sector will meet the 2030 Breakthrough Agenda goal (vs 20% in 2024)

Investment

Power figure 1: Change in level of surveyed business leaders investments in the net-zero transition in the power sector over the past 12 months



BA Barometer Survey '25 N = 304; Power sector respondents N = 60. Includes respondents from energy and utility sectors only.

Top 3 reasons for increasing investment (as stated by business leaders)

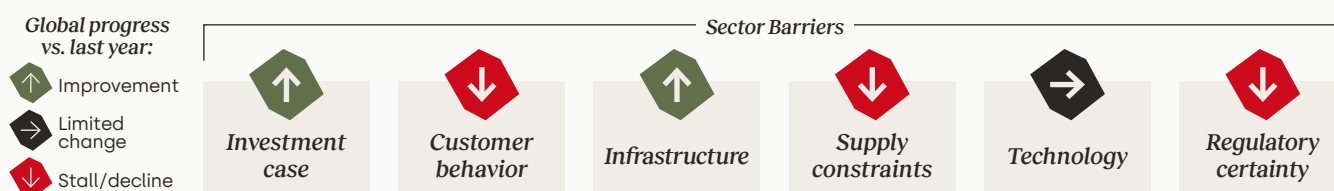
- **Increased financial support**, with auctions for renewables, energy storage and transmission grid buildout leveraged globally (e.g., in UK, Germany, Brazil, India and Australia)
- **Increased grid infrastructure support**, with countries implementing grid expansion planning policies to unlock anticipatory investment (e.g., in the UK) and policies expediting grid permits (e.g., in Germany), accelerating and de-risking investments
- **Increased demand certainty** for renewable energy, with carbon pricing mechanisms like the EU Emissions Trading System (ETS) – a preferred model to ensure revenue certainty – by making low-carbon energy sources increasingly cost competitive



“Governments must offer clear, stable and long-term frameworks to unlock further capital from businesses. Investment cycles in this sector run 20-30 years and without long-term visibility, the investment won't come.”

– Senior Strategy Director, multinational electric utility company

Business case progress



Where businesses saw progress

- **Investment case:** Significant cost reductions ensure that renewable energy sources are now the cheapest form of electricity/power generation in most markets globally.
- **Infrastructure:** There is growing awareness of infrastructure criticality to intermittent energy source deployment, with improved visibility of transmission and distribution needs in key markets. There are advances in rapid battery energy storage system (BESS) deployment and the evolution of storage business models, such as growth in mixed solar & storage corporate power purchase agreements (PPAs), hybrid tolling and merchant models for asset owners.

Where progress stalled or declined

- **Supply constraints:** Global supply chain instability and tariff uncertainty (e.g., for components) are risking clean tech deployment and installation momentum.
- **Regulatory certainty:** There is uncertainty about continued support for key technologies in specific markets (e.g., offshore wind in the US)
- **Customer behavior:** Social and political pushback to renewable energy is rising, largely driven by perceived high energy costs for consumers (e.g., driven by price volatility, macro-economic difficulties, required infrastructure investments and geopolitics) as opposed to higher technology cost.



Renewables surge with strong business confidence but emerging technologies and regional gaps persist

Businesses signal **continued appetite to invest in clean energy projects** given **long-term demand growth**. Renewable energy source (RES) buildout soared to **record levels in 2024**, with net installed capacity growing 20% year-over-year to ~4.5 TW (46% of global capacity), driven by solar and wind in China, India, Germany and Brazil (Power fig. 2). RES contributed >30% (~10 TWh) to global electricity generation, with 15% from wind and solar. **Significant cost reductions and the role of renewables in establishing domestic power generation for energy security** supported this expansion. Businesses note that **RES is now the cheapest form of electricity generation in most markets and the fastest to deploy**, though the speed of deployment depends on existing infrastructure.

To de-risk and secure returns, businesses are **optimizing capital expenditure** (CAPEX) via modularization and financing models like asset farm-downs. There is also a shift toward **vertical integration**, including large utilities expanding backward into generation, with leaders emphasizing the need to cover the entire value chain to be competitive.

While confidence is high for mature technology buildout, **it is lower in developing technologies**, which still face **significant challenges in reaching full commercial scale**, such as small modular nuclear reactors and floating offshore wind. Policy remains a critical enabler for the development of immature technologies. Businesses note regional variations in support, for instance with a high degree of uncertainty in the US amid the review of the Inflation Reduction Act.

Regional disparities in capital allocation remain a challenge, with most clean power investment continuing to flow to favorable investment destinations and **underrepresented in developing markets**. Africa received only ~2% of global investment despite representing ~20% of the global population.

Addressing infrastructure and market design challenges: grid infrastructure, batteries and nuclear

Rapid RE expansion continued to face infrastructure and market design challenges. Key issues are long grid connection queues, with 2.4 TW of RE capacity currently awaiting or undergoing grid connection review (Power fig. 3), high up-front CAPEX, and balancing challenges due to intermittency – which **60%** of business leaders expect to have a negative impact on grid stability. As a result, businesses note an increased focus on and acceptance of **accelerating infrastructure investments**. **Resilience and adaptation** are rising on the agenda, with companies urging governments to support those cost increases associated with building resilient infrastructure. In addition, **45% of survey respondents reported an increase in behind-the-meter power installations¹** in the last 12 months, as leading companies with high electricity demand seek ways to **avoid slow grid connections and ensure clean and low-cost power supplies**. This is **raising concerns** of grid fragmentation, shifting costs to smaller users and reinforcing unequal access to clean energy.

Businesses noted a **surge in battery energy storage systems (BESS) additions in 2024** (+55% year-on-year) to complement the RE buildout and maintain flexibility as variable source generation increases (Power fig. 4). A sharp decline in costs, driven by manufacturing overcapacity in China, falling raw material prices and technical and scale improvements boosted this – following a similar learning curve as solar and wind. BESS deployment varied significantly by geography. The year saw an evolution in new business models and avenues to monetize BESS assets:

- >50% of the 55 GW of additional BESS capacity in 2024 was in China and ~30% in the US (Power fig. 4);
- Other countries implemented policies to spur BESS investment, such as BESS and/or capacity auctions in the UK, Brazil, India and Australia;
- Increased interest from smaller utilities too, often driven by policy – for instance, in Italy, the transmission system operator will offer BESS asset owners 15-year tolling agreements, where they can keep some capacity for merchant revenue;
- 2024–2025 has also seen a rise in demand for mixed corporate PPAs, combining RE with BESS, offering industries that need stable power supply (e.g., data centers or high-temperature industries) a route to decarbonization;
- Businesses also note the need for other solutions for longer-term storage.

Interest in nuclear picked up in 2024, as countries and technology companies seek alternative, clean baseload power sources. Globally, there is now ~70 GW of capacity under construction, 50% of which is in China, where there are substantial financial incentives and streamlined permitting and regulatory procedures. In the US and other Western countries, businesses only expect new nuclear additions to materialize in the long-term (mid-2030s and beyond).

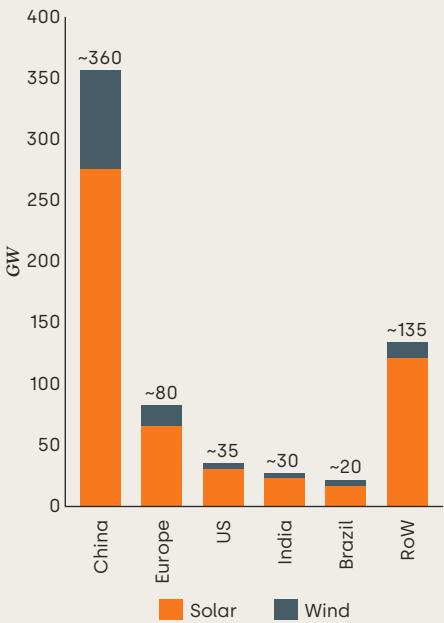
Business leaders caution that future investment is at risk without policy stability and social safeguards

Despite significant progress, businesses are calling on governments to uphold supportive policies and protect clean-tech supply chains, emphasizing that they made recent investments prior to the latest geopolitical shifts. They warn that, **without continued support to overcome the upfront CAPEX hurdle and to level the playing field with subsidized fossil-based power, future investment levels may not be sustained**. Additionally, they worry that concerns about energy affordability may drive social and political pushback against renewable energy.

¹Generated electricity used directly without first passing through the public grid

RE buildout soared in 2024, led by solar and wind in China, EU, US, India & Brazil

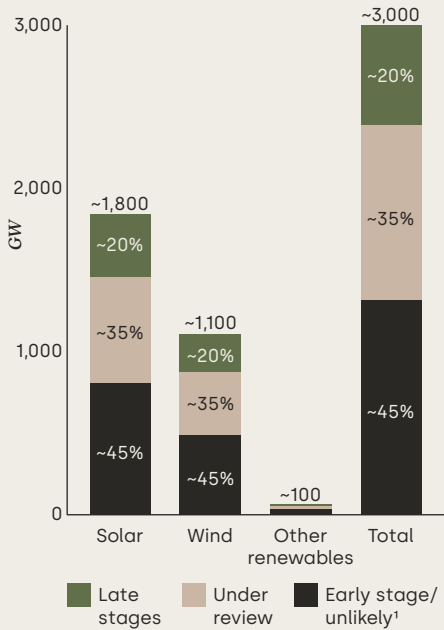
Power figure 2: Global solar and wind capacity additions by region in 2024



Source: Ember (2025). [Monthly & Yearly electricity data](#). International Renewable Energy Agency (IRENA) (2025). [Irena Renewable Capacity Statistics](#).

Globally, ~2.4 TW of RE is awaiting or undergoing review

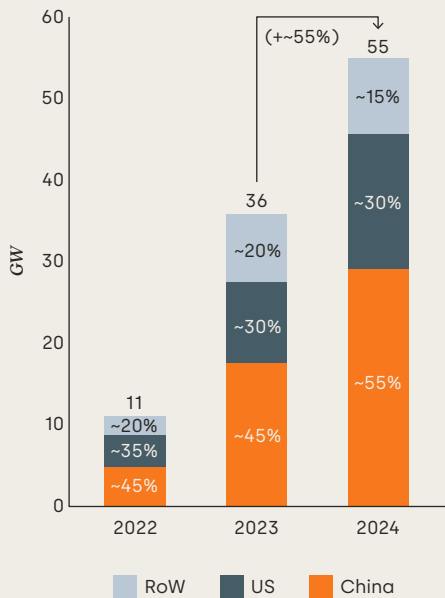
Power figure 3: Global renewable energy capacity in connection queues by stage



Note: 1) Projects in the preliminary stage of development with low likelihood of reaching completion
Source: International Energy Agency (IEA) (2024). [Renewables](#).

BESS additions rose sharply in 2024, driven by China and the US, tackling issues of RE intermittency

Power figure 4: Global grid-scale battery energy storage system (BESS) additions by region



Source: U.S. Energy Information Administration (EIA) (2025). [Battery capacity additions](#). Rho Motion (2025). [Global BESS deployment statistics](#).



Policy priorities

Some **90%** of business leaders signal that long-term policy stability is important in unlocking low-carbon power investments. They also see international collaboration as highly important (**80%**) for the expansion of renewables, given global supply chains and the need to supply energy across borders. International collaboration progress has been mixed. Several interconnector projects progressed globally in 2024 but trade uncertainty exacerbated by tariffs added supply chain disruption risk. While policy needs vary by region and require local framing, several broad themes highlighted by businesses emerge as critical across most markets: progress in finance and investment support, policies enabling infrastructure buildout and demand-side management.



New priority
in 2025



National
policy



International
policy

Finance and investment



Long-term credible targets: Set specific and binding national renewable energy targets (also in NDCs) and ensure consistency between policy statements and legislation (e.g., on grid expansion and permitting).



Revenue certainty: Strengthen investor confidence via long-term pricing mechanisms (e.g., for storage and infrastructure, via auctions, carbon pricing, PPAs).



Smart use of public finance: Target de-risking mechanisms (e.g., guarantees, concessional finance) at undercapitalized markets (e.g., Africa) or technologies (e.g., small modular nuclear reactors), rather than mature solutions where capital already flows.



“Revenue certainty through mechanisms like contracts for difference and stable CO₂ pricing are essential to enable long-term investment decisions in renewables.”

– Director of Strategy & Sustainability, international energy company

Enabling infrastructure



Streamline planning and permitting: Expedite processes to enable anticipatory investment, and accelerate the expansion of grid and point infrastructure



Reformed market design: Align market frameworks with long-term need including scaled infrastructure and high RE share.



Regional integration: Enable cross-border interconnection and open data sharing (e.g., capacity maps, curtailment signals) to improve RE use and minimize balancing costs.



“Infrastructure, especially grid investment, is critical for the transition...without policy, ambitions to triple renewables are disconnected from grid buildout realities.”

– Sustainability Manager, multinational electric utility

Demand-side management



Treat flexibility as a core system resource: Create market signals that reward households and businesses for load reduction and flexible demand.



Grid-friendly electrification: Link targets for EVs, heat pumps and air conditioning with the right infrastructure and smart pricing to prevent spikes in electricity demand that drive up costs.



Affordable clean energy: Ensure investments in renewables don't increase the cost of energy to maintain public support and ensure fairness. Tools include repurposing fossil fuel subsidies or offering low-cost clean energy through hybrid PPAs or demand flexibility.



“Accelerating permitting is not enough; governments must also back electrification programs to ensure demand grows in sync with renewables buildout, and provide for continued investment in grid infrastructure and interconnectedness, energy storage and complementary solutions such as ancillary services.”

– Senior Strategy Director, multinational electric utility

Countries to watch

Business leaders have highlighted three markets as increasingly attractive for clean power development, given financial support mechanisms and policies supporting infrastructure buildout.



United Kingdom

- **Strategic spatial energy plan** creating transparency around infrastructure development, de-risking investments
- **Financial support** such as RE and capacity auctions and smart export guarantee; fully liberalized market incentivizing competition
- Initiatives driving **accelerated grid expansion**, such as the Office of Gas and Electricity Market's 2025 announcement fast-tracking investment (£4 B) for grid infrastructure



Germany

- **Aggressive 2030 targets**, including 80% RE goal, 2x onshore wind and 3x solar
- **Robust auctions** (e.g., ~3 GW onshore wind auction in 2024), incentives for energy storage
- **Progressive policy environment:** Grid and RES planning and permit expedition policies (including rapid transposition of EU's Renewable Energy Directive II) and RE cost re-distribution (e.g., RE surcharge elimination and incorporation into state budget)



India

- **Auctions to support clean energy** investment, such as large scale-up in RE and storage auctions in 2024
- **Green Corridor initiative** (in Phase II), scaling up transmission infrastructure incentivizing and de-risking RE and storage investments
- **Liberal foreign direct investment rules** facilitating high levels of investment from international players



Breakthrough Agenda Goal: Zero-emissions vehicles are the new normal and accessible, affordable and sustainable in all regions by 2030

Business confidence

Business sentiment regarding the pace of transition was mixed in 2024, with confidence in meeting the Breakthrough Agenda goal remaining low. A decrease in business leaders' confidence in government support compared to last year (**73%** less confident this year), as well as a deceleration in electric vehicle (EV) penetration growth, particularly in the US and Europe, partially drive this. Despite this, investment levels remain strong, especially in countries with **financial incentives for EV manufacturing or purchase** and **policies catalysing demand**.

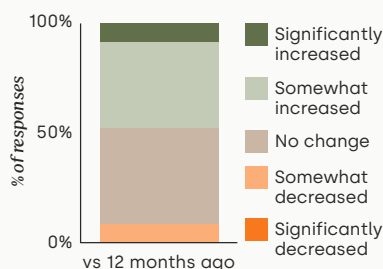
Business leaders are clear that the shift to electrification is here to stay; however, they warn that decelerating demand-side policies, volatile trade conditions and uncertainty risk slowing down progress.

9%

confident the sector will meet the 2030 Breakthrough Agenda goal (vs 11% in 2024)

Investment

Road transport figure 1: Change in level of surveyed business leaders investments in the net-zero transition in the road sector over the past 12 months



Source: BA Barometer Survey '25 N = 304; Road sector respondents N = 26.

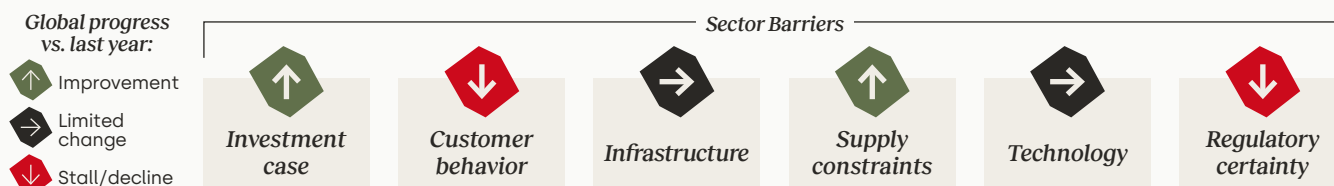
Top 3 reasons for increasing investment (as stated by business leaders)

- **Increased demand certainty:** Fleet electrification targets, internal combustion engine (ICE) bans and low-emissions zones (e.g., in Europe and China) giving companies confidence to scale EV production, especially for light-duty vehicles (LDVs) and urban commercial segments.
- **Increased policy support:** Sustained or new subsidies for EV manufacturing (e.g., in Mexico) and charging infrastructure buildout (e.g., in India) incentivize investments from international automotive manufacturers.
- **Cost reductions:** Falling battery prices and improved total cost of ownership, especially in China and for light-duty electric trucks, are narrowing the cost gap with diesel, driving increased investment across both passenger and commercial EVs.

“Clear policy signals are needed to sustain the transition, especially purchase subsidies and tax breaks to incentivize demand for both LDVs and HDVs, and production subsidies, particularly for HDVs, to make EVs competitive with ICE vehicles.”

– Chief Sustainability Officer, leading heavy-duty vehicle manufacturer

Business case progress



Where businesses saw progress

- **Investment case:** There are signs of progress with policymakers announcing or launching multiple financial support mechanisms in 2024, including in Thailand and “swing states” like India (e.g., manufacturing subsidies and direct purchase subsidies).
- **Supply constraints:** Supply constraints eased in 2024, driven by expansion in battery manufacturing and material sourcing, as well as semiconductor supply stabilization.

Where progress stalled or declined

- **Customer behavior:** Hesitancy continues in adopting EVs due to range anxiety and concerns with insufficient buildout of public charging infrastructure, especially for commercial vehicles
- **Regulatory certainty:** Uncertainty about the EU 2035 internal combustion engine (ICE) ban conditions and timelines continue, with potential changes to EV regulation and tariff implications in the US.

¹EV swing states: large light-duty vehicle markets with limited EV penetration but which estimates expect to register high EV growth rates in the short- to medium-term



Road transport | Business intelligence (Passenger vehicles)

China leads as global EV growth diverges, exposing strategic risks for western original equipment manufacturers (OEMs)

Growth in EV penetration continued in 2024 but showed significant regional variation (Road fig. 2). **China saw a strong increase in penetration, to ~45%, while penetration stagnated in Europe and the US**, remaining at ~20% and ~10%, respectively.²

China remains an EV frontrunner, with low-cost models already exceeding price parity with ICE. The year saw strong domestic sales and greater internationalization of Chinese EV manufacturers (now with >1.5 million cars a year of overseas manufacturing capacity) (Road fig. 3). More widespread availability of cost-effective Chinese vehicles (including 2-wheelers) and supportive infrastructure drove sales in emerging EV markets in Asia, Latin America and Africa. The global share of Chinese OEMs in the EV market has increased to >70%, including >85% share in Brazil and Thailand.³ To bypass high EU tariffs on Chinese battery electric vehicles (BEVs), Chinese OEMs have scaled up plug-in hybrid electric vehicle sales in the region and are introducing additional models in the EU in 2025.⁴

In contrast, **EV uptake in Europe and the US stagnated, with significant consequences for Western automotive manufacturers.** Businesses highlight that this slowdown is forcing manufacturers to adjust capacity plans and manage the ongoing dual investment burden in both ICE and BEV platforms – which is especially challenging given recent lower investment in ICE. Underused BEV production capacity is contributing to profit pressure, making it harder to compete with increasingly dominant Chinese players. Industry leaders acknowledge that China's competitive edge is reshaping the global automotive landscape, posing growing challenges for Japanese and European automakers, particularly in cost-sensitive emerging markets.

Battery supply chain still dominated by Asia as innovation gap widens

Battery prices continued to fall, and Asia-based players, mainly in China and South Korea, continue to dominate the market. They are significantly further along the experience curve than Western manufacturers, who are struggling to compete and relying heavily on imports (e.g., the US imported ~70% of lithium-ion batteries from China in 2024).⁵ In response, European carmakers are forming joint ventures with Chinese tech firms to access advanced EV software, batteries and autonomous systems. The year also saw an increase in EU players investing in novel technologies, such as solid-state and cobalt-free batteries, seeking to close a growing innovation gap while balancing trade tensions and domestic industrial policy. However, scaling these technologies is challenging and no winning model has emerged.

Given the criticality of battery access, automakers are pursuing different strategies for capability development. This is evident in **battery tech** development, where approaches range from focusing on in-house R&D prioritizing one or two technologies, to heavily relying on suppliers of commercialized technologies. Additionally, automakers are engaging in partnerships or co-investing in the processing or mining of critical materials, as well as in recycling efforts.

Public charging is a bottleneck, with China leading and Europe and the US lagging

Charging infrastructure access remains a key driver in accelerating EV adoption, especially public charging in cities. **China leads in deployment** (Road fig. 4), backed by extensive government investments and rapid expansion in urban and highway networks, whereas **Europe and the US face challenges in grid capacity, slow permitting and fragmented policy support.** However, **select Western countries** (e.g., Norway, Denmark, Netherlands) **show how companies can offer convenient public charging at affordable prices.** Announcements in 2025 about ultra-fast charging could mark a breakthrough in convenience, helping make widespread access to fast, reliable charging a reality.

²S&P Global (2025). [Light Vehicle Sales Forecast](#).

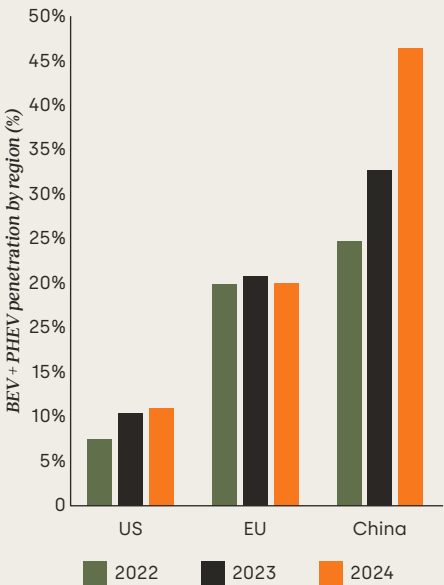
³International Energy Agency (IEA) (2025). [Global EV Outlook \(2025\)](#).

⁴Rho Motion (2025). [Global BESS deployments surpass expectations in 2024](#).

⁵BloombergNEF (2025). [Energy Transition Investment Trends 2025](#).

China's EV penetration surged in 2024, driven by growth in affordable models

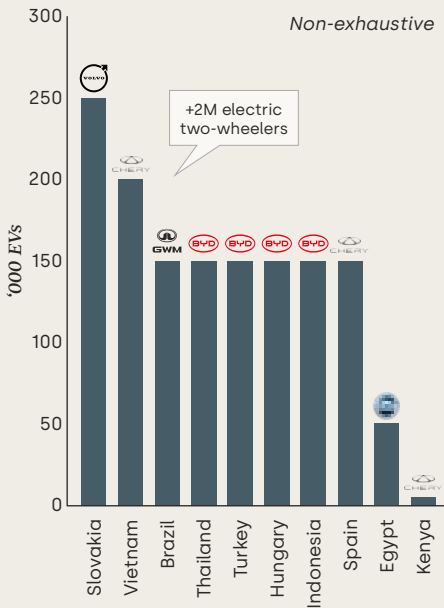
Road figure 2: Battery electric (BEV) and plug-in hybrid EV (PHEV) penetration by region



Source: S&P Global (2025). [Light Vehicle Sales Forecast](#).

Chinese OEMs are rapidly expanding overseas, targeting emerging markets

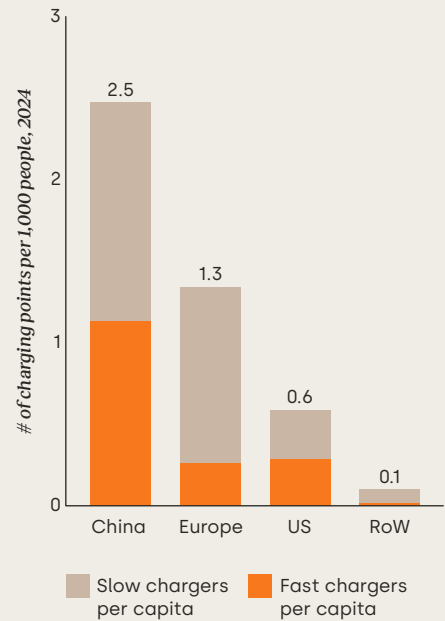
Road figure 3: Chinese investments in international EV manufacturing capacity announced in 2024-2025



Source: American Enterprise Institute (AEI). [China Global Investment Tracker](#).

High levels of charging infrastructure support Chinese EV expansion

Road figure 4: Public charging infrastructure per capita by region and type



Source: International Energy Agency (IEA) (2025). [Global EV Outlook \(2025\)](#).



Heavy-duty vehicle transition trails light-duty vehicles due to cost, payload and infrastructure gaps

Businesses note that the transition of commercial vehicles to zero-emissions heavy-duty vehicles (HDVs) is progressing much slower than in the LDV segment (4% p.a. growth for HDV vs 55% for LDV since 2015⁶). This is primarily **due to high upfront costs, payload constraints and slow infrastructure development**.

Although expectations for total cost of ownership for short-haul cargo vehicles, for instance last-mile delivery, are for them to be cost-competitive with ICE in the near-term (by 2030), long-haul battery electric trucks are likely to remain far more expensive than ICEs. This is largely due to the opportunity cost of reduced range and payload capacity (Road fig. 5).

Industry keeps options open as long-term technology remains uncertain

While the **overall industry is converging around battery electric trucks in the long-term**, HDV manufacturers and trucking companies are pursuing multiple decarbonization tracks. This is partially to **hedge against uncertainties** in cost, infrastructure and technological breakthroughs; it is also to account for the need to **offer vehicles for cross-border activity**.

- **Battery electric trucks seem to be the superior pathway given current economics**, with all major manufacturers expanding their electric vehicle portfolios. Since 2020, the number of electric HDV models available has nearly doubled, with China leading in production (Road fig. 6). However, achieving total cost of ownership parity with ICE vehicles remains essential to accelerating large-scale adoption.
- **As a short-term bridging solution**, HDV manufacturers are also looking at sustainable drop-in fuels like renewable diesel and biodiesel for long-haul applications; large manufacturers are also investing in biofuel-compatible ICE engines.
- **Fuel cell electric vehicles** are expected to be a minor and potentially niche pathway, as high total cost of ownership and lack of availability of electrolytic hydrogen make large-scale adoption unlikely.

Policy remains the key driver but global ambitions are uneven

Businesses see government regulations and subsidy programs as the **biggest accelerators of investment**. Yet regional differences in policy ambitions have led to varied adoption rates.

Some examples:

- **The EU and the US leading the push for HDV electrification given binding emission standards** (e.g., 90% reduction in new HDV emissions by 2040 in EU) and minimum shares of biofuels in transport. This has forced manufacturers to accelerate zero-emissions truck production. The US relies more on financial incentives and state-level policies, with subsidies aimed at both battery electric trucks and fuel cell electric vehicle development.

- **Chinese dominance in HDV electrification driven by a raft of incentives offered by the state**, including purchase subsidies and trade-in subsidies for commercial vehicles introduced in 2024. Additionally, they also include **early investment in charging and battery swapping technologies** and a dense network of **domestic automotive manufacturers supporting resilient supply chains**.
- **Asia-Pacific (excl. China) seeing slower electrification adoption**; Japan, South Korea and India lagging due to weaker regulatory pressure and continued reliance on conventional fuels and hybrid solutions. Domestic regulation to promote electrolytic hydrogen production may promote more widespread adoption of fuel cell electric vehicles in Japan and South Korea in the short-term.

Long-haul charging and hydrogen infrastructure are not keeping pace

The **slow rollout of public charging and hydrogen refueling stations is one of the biggest barriers** to widespread HDV electrification (Road fig. 7). Short-haul freight has seen some charging network expansion but long-haul corridors still lack sufficient infrastructure to make electrification practical at scale.

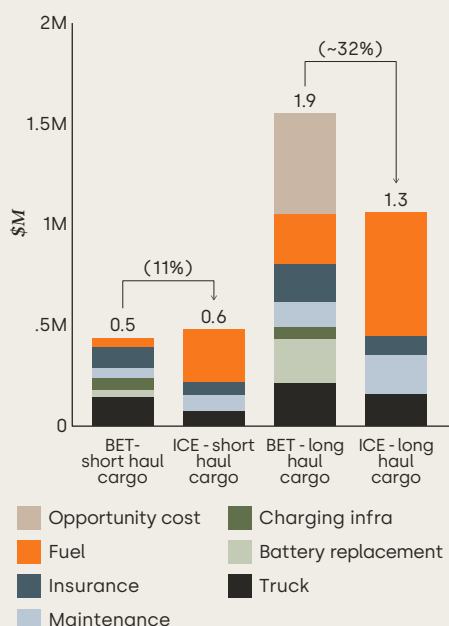
- For short-haul applications, **cargo fleet operators are increasingly bypassing public infrastructure** challenges by building private charging hubs.
- In long-haul, electrification still relies on **government-backed public charging networks** and infrastructure is much more limited. Several large HDV manufacturers are driving megawatt charging developments in the US and across Europe but full-scale deployment will take years.
- Contrastingly, **China's strategy for electrifying its large HDV fleet focuses more on battery swapping** than the buildout of HDV charging infrastructure on highways, as planned in the US and the EU.

⁶S&P Global (2025). [Light Vehicle Sales Forecast](#). International Energy Agency (IEA) (2025). [Global EV Outlook \(2025\)](#).

Short haul BET¹ will be cost competitive vs ICE by 2030 but not for long-haul

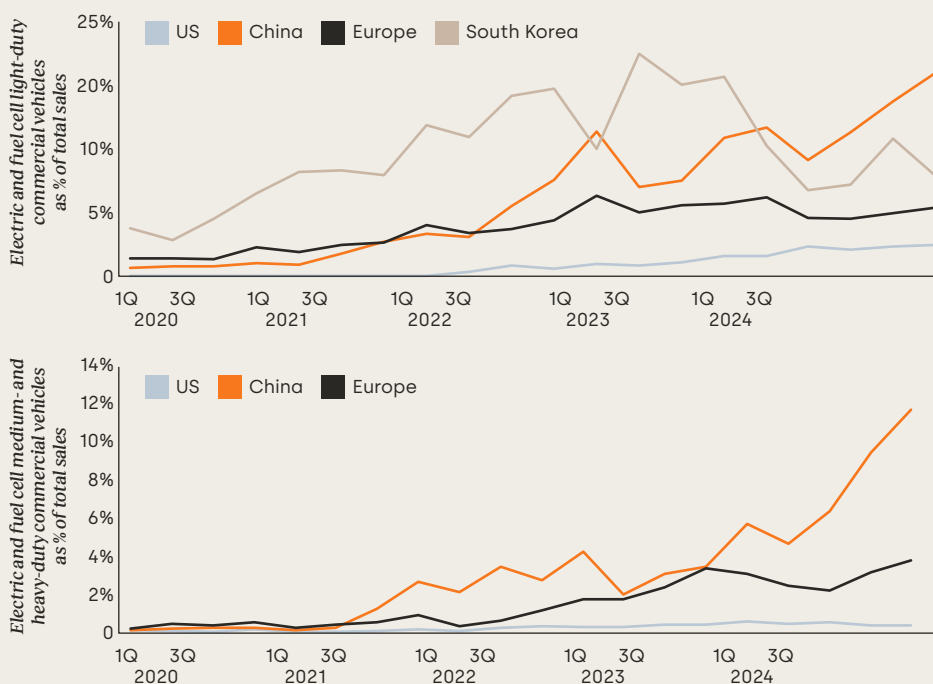
China leads the way in electric and fuel cell light, medium, and heavy-duty commercial vehicle penetration

Road figure 5: Total cost of ownership for trucks, by segment



Note: 1) Battery electric trucks Source: Basma, H. & Rodriguez, F. (2023). [A total cost of ownership comparison of truck decarbonization pathways in Europe](#). International Council on Clean Transportation (ICCT). National Renewable Energy Laboratory (NREL) (2021). [Spatial and Temporal Analysis of the Total Cost of Ownership for Class 8 Tractors and Class 4 Parcel Delivery Trucks](#).

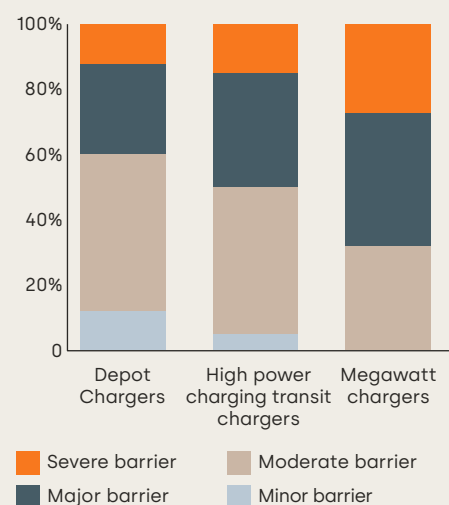
Road figure 6: Electric and fuel cell commercial vehicle sales by region



Source: BloombergNEF (2025). Global e-mobility: What to expect in 2025.

Charging infrastructure is viewed as a significant barrier to electrification for heavy-duty trucks, especially megawatt chargers which would allow significantly faster charging

Road figure 7: Views on whether a lack of charging infrastructure is a barrier to electric HDV expansion, by charger type



Source: Barometer '25 Survey N=304; Road sector N=26



Policy priorities

Some **75%** of business leaders note that policy is highly important in unlocking transition-related road transport investment. In addition, **80%** of business leaders highlight international collaboration as extremely important, due to global EV supply chains and in facilitating the cross-border function of vehicles. Business leaders highlight progress on infrastructure (e.g., EV charging) buildout but signal a backtracking of progress regarding trade conditions and demand creation. To unlock additional investments in the sector, business leaders name policies relating to demand creation, infrastructure and finance and investment as the most crucial to advance over the next 1-3 years.



New priority
in 2025



National
policy



International
policy

Demand creation



Mandates: Set mandates for the purchase of low-emission vehicles, including commercial, and for the phaseout of internal combustion vehicles.



Carbon pricing: Tax CO2 emissions e.g., through road toll differentiation or incorporation into emissions trading systems (ETs).



Upfront purchase support: Address higher initial costs of EVs to enable broader adoption, particularly for fleets and low-income consumers.



“Governments serious about accelerating EV adoption must focus on affordability - through purchase incentives, better financing terms and policy support that enable charging infrastructure in residential and commercial spaces.”

– Chief Sustainability Officer, large Indian conglomerate

Infrastructure



Cross-border charging corridors: Coordinate internationally on freight electrification to ensure charging infrastructure is available along cross-border routes.



Standardize EV charging points: Enable global interoperability (for cars and trucks) and harmonize payment systems.



Accelerate charging point buildout: Provide incentives for truck charging (e.g., urban depot charging), and cars (e.g., residential charging).



“EV charging is particularly hard because of energy demand and business case limitations; infrastructure without sustainable economics won't attract investment if there is no policy support.”

– Project Manager, global automotive manufacturer

Finance and investment



Expand concessional finance: Provide low-interest loans, guarantees, and blended finance instruments to reduce risk and attract private capital for manufacturing and charging infrastructure in emerging markets and developing economies.



EV manufacturing: Offer financial subsidies and other incentives, such as government-backed loan guarantees, to catalyze investment.



Lower electricity price spread: Bring electricity prices on a par with fuel prices, in regions where diesel is subsidized.



“For the heavy-duty sector, production costs remain high and total cost of ownership is still 10-15% above diesel; without stronger financial mechanisms, scaling will remain slow.”

– Chief Sustainability Officer, leading heavy-duty vehicle manufacturer

Countries to watch

Business leaders have highlighted three markets as increasingly attractive for low-carbon road transport, given high levels of demand, charging infrastructure and financial support.



China

- Continued **rapid expansion of LDV and HDV charging infrastructure**
- Significant funding to stimulate demand, incl. **direct purchase subsidies, trade-in subsidies and purchase tax exemptions**



Mexico

- **Strong EV manufacturing base** and state-level incentives (incl. up to 95% payroll tax breaks)
- **Rapid growth in charging infrastructure**, incl. national fast-charger corridors, supported by federal EV incentives (e.g., tax breaks)



India

- **Financial incentives**, incl. **direct purchase subsidies, charging infrastructure support and financial back-stops** to de-risk investment
- **Establishment of “mobility valleys”** to catalyze investments and innovation in EV manufacturing
- **Regional demand incentives** for EVs (e.g., Delhi's household limit to two ICE vehicles)



Breakthrough Agenda Goal: Near-zero emissions steel is the preferred choice in global markets, with efficient use and production established and growing in every region by 2030

Business confidence

Businesses perception of the pace of transition is mixed and increasingly nuanced across regions and technology pathways. Fewer leaders are confident the sector will reach the 2030 Breakthrough Agenda goal (7%) compared to last year (20%), citing high energy costs, limited hydrogen availability and uncertainty about policy support. Nonetheless, leading businesses are still investing in countries with **strong policy support** and **access to low-cost clean**

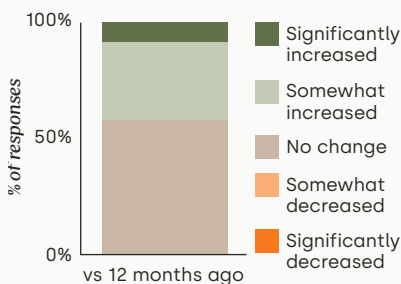
energy, particularly in transition pathways with the clearest business case. A two-speed transition between iron- and steelmaking is emerging, with steelmaking investments prioritized given lower costs and more mature technology.

7%

confident the sector will meet the 2030 Breakthrough Agenda goal (vs 20% in 2024)

Investment

Steel figure 1: Change in level of surveyed business leaders investments in the net-zero transition in the steel sector over the past 12 months



Source: BA Barometer Survey '25 N = 304; Steel sector respondents N = 15.

“Three things need to happen to speed up the pace of the transition: mandated demand, affordable financing and access to energy. The economics do not work without demand at scale.”
– Chief Sustainability Officer, multinational steel manufacturer

Top 3 reasons for increasing investment (as stated by business leaders)

- **Increased access to affordable clean energy:** Low-cost renewable electricity is a pre-requisite for low-carbon iron- and steelmaking production sites, which has allowed projects in Sweden and the Middle East and North Africa (MENA) to gain traction.
- **Cost reduction:** Lower cost of technology and input materials is critical to ensuring sufficient investment returns. Investments are progressing in low-carbon steelmaking given the relatively lower investment needed to transition assets (e.g., via scrap use and electric arc furnaces), while ironmaking is lagging due to high capital expenditures (CAPEX) and energy requirements.
- **Increased demand certainty:** Making projects bankable requires demand certainty due to the higher cost compared to carbon-intense steel, specific opportunities in the EU market appear favorable due to carbon pricing and industry mandates (e.g., for electrolytic hydrogen or renewable energy share), compared to other regions.

Business case progress



Where businesses saw progress

- **Customer behavior:** Signs of progress with growing voluntary demand from European customers like automotives and steel offtakers betting on the EU's carbon border adjustment mechanism (CBAM) and Emissions Trading System (ETS), making low-carbon steel cost competitive
- **Technology (R&D and demonstration):** Several renewable steel demonstration plants established and advanced in 2024 (e.g., commissioning of H2-Direct Reduced Iron (DRI) pilot plant in the United Arab Emirates)

Where progress stalled or declined

- **Regulatory certainty:** Ongoing uncertainty about ETS allowances, pricing impacts and compliance obligations, in addition to US tariffs and possibility of trade war
- **Supply constraints:** High electrolytic hydrogen prices and project delays hurting the outlook for the H2-DRI pathway; access to low-cost and stable clean energy remains a hurdle in some regions
- **Investment case:** Overcapacity, mainly from China, compressing margins, making both general steel and low-carbon steel transition investments less attractive



Low-carbon steel capacity lags far behind 2030 targets

Current capacity from low-carbon steel projects remains significantly below that required to meet the 2030 1.5°C aligned targets, falling short by approximately one-third of the 50 Mtpa target¹ (Steel fig. 2). Nearly three-quarters of announced projects have yet to reach final investment decision (FID). Given typical timelines, these are unlikely to be operational by 2030. Business leaders worry many projects will not materialize, with only a third of survey respondents confident that recent announcements will reach FID by the end of the decade.

Global overcapacity and trade uncertainty undermine the investment climate

Businesses note that broader structural challenges in the industry increasingly shape sentiment. **Global steel overcapacity**, driven by a construction slowdown in China and a surge in low-cost steel exports, has compressed margins and dampened the investment climate. As a result, many businesses have **delayed large-scale transition investments**, particularly those involving retrofitting legacy assets for low-carbon production. Additionally, uncertainty regarding international steel trade dynamics, intensified by US tariffs, is likely to exacerbate delays in low-carbon steel projects relying on predictable cost structures and long-term offtake certainty.

Europe's progress slowed amid energy and policy challenges

Europe, which currently leads in announced low-carbon steel projects, with 36 in total (Steel fig. 3), has seen the sharpest deceleration. Major companies have **cancelled or delayed planned low-carbon capacity** due to **high energy prices, limited hydrogen availability and continued uncertainty about ETS allowance timelines**. Business leaders report they are increasingly skeptical that the region will meet its decarbonization targets, as concerns mount over balancing climate ambition with industrial competitiveness. Instead, they point to a bifurcation in the transition, where steelmaking using electric arc furnaces and scrap steel will transition faster than ironmaking (i.e., DRI).

Leading projects offer hope, enabled by renewables access, policy and execution

Despite these headwinds, **a number of leading projects (>15 Mtpa capacity, mainly in Europe)² have progressed over the past year**. While they represent a small share of total production globally (~1,900 Mt in 2024),³ they serve as critical proof points for the wider industry. These projects typically benefit from a mix of enabling factors: access to low-cost renewable power to produce electrolytic hydrogen, targeted government incentives and strong project execution and commercial capabilities. Businesses note the following:

- Greenfield projects are progressing more reliably than retrofits, which remain technically and financially complex.
- Government support is critical, both to catalyze demand (e.g., through EU mandates and CBAM) and to offer financial subsidies. This helps de-risk project capital-and operating expenditures, as market willingness to pay unsubsidized prices for near-zero steel remains low.
- Early offtake agreements – especially with customers in consumer-facing industries – have been crucial in reaching FID.

Voluntary demand exists but is too small to drive scale

Voluntary off-take supports the leading projects but unlocking large-scale renewable crude steel investments will require further demand. Automotive and white goods manufacturers largely drive current offtake through premium product strategies that can commercialize low-carbon products. Expectations of higher steel prices due to CBAM and ETS are also a key driver, where players see benefits in being early adopters. However, total offtake **volumes still represent a small share of overall steel consumption**. Major first-mover offtake typically covers only 10–15% of total offtaker steel consumption, underscoring the need for further demand-side policy to drive scale.

Two-speed transition emerges between short-term gains and long-term decarbonization

A two-speed transition is emerging in the steel sector, marked by a divergence between near-term, incremental progress and longer-term, capital-intensive shifts. **Investment in steelmaking decarbonization**, (e.g., via scrap use and electric arc furnace) is **progressing** but remains a short-term solution given limited scrap steel supplies. On the other hand, high capital costs, policy uncertainty and immature technologies **are delaying ironmaking decarbonization**. Outside of Europe, most companies currently prioritize the former, along with improvements in efficiency, renewable energy integration and the use of higher-grade iron ore. In contrast, ironmaking decarbonization, particularly through technologies like hydrogen-based DRI and carbon capture and storage (CCS), remains in the piloting phase and businesses broadly view it as a post-2030 solution.

¹Note: The 2030 targets refer to the near-zero emissions primary steelmaking capacity that would be needed to be on a 1.5°C compatible pathway based on IEA, IRENA and Agora Industry scenarios. Source: Agora Industry. [Global steel transformation tracker](#).

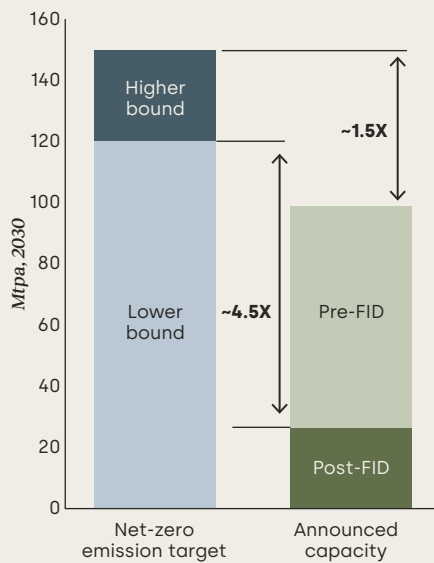
²Leadership Group for Industry Transformation (Leadit). [Leadit Green Steel Tracker](#).

³World Steel: [2024 global crude steel production totals](#).

The total announced capacity pipeline is currently 44% short of the 2030 net-zero emission target

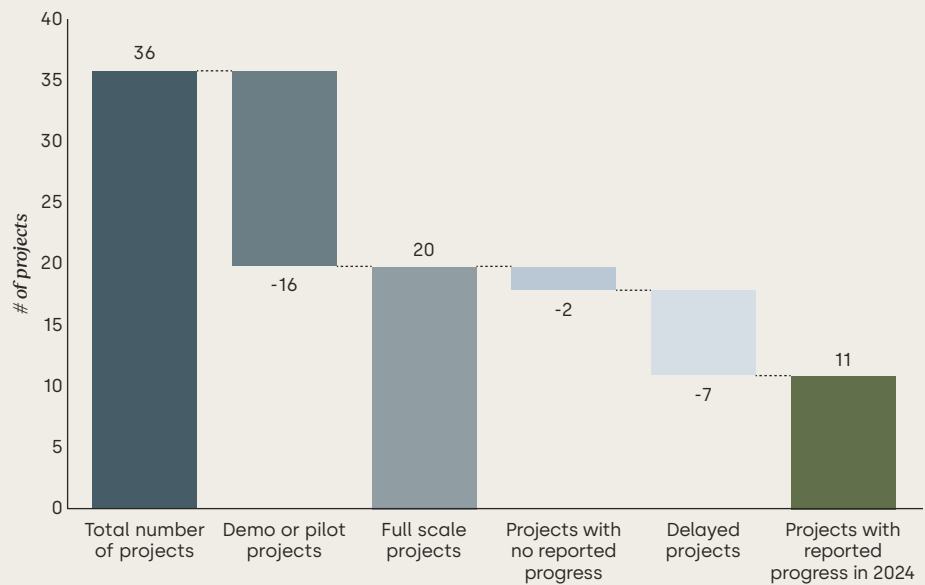
11 out of 20 full-scale low-carbon and near-zero steel projects1 in Europe made progress in 2024, but 7 were delayed

Steel figure 2: 2030 near-zero steel target vs announced capacity as of 2024



Note: The 2030 targets refer to the near-zero emissions primary steelmaking capacity that would be needed to be on a 1.5C compatible pathway based on IEA, IRENA and Agora Industry scenarios. Source: Agora Industry. [Global steel transformation tracker](#).

Steel figure 3: Low-carbon project progress in Europe, 2024



1) Includes BF-BOF to EAF, BF-BOF with CC(U)S, Electrolytic hydrogen DRI and NG to hydrogen DRI
Source: Literature research. Leadership Group for Industry Transformation (Leadit). Leadit [Green Steel Tracker](#).



Policy priorities

Some **90%** of surveyed business leaders highlight the importance of policy in driving increased investment in low-carbon steel production. They also highlight international collaboration as highly important (**90%**), due to cross-border supply chains and global trade. While progress on low-carbon standards and research and development has advanced, trade tensions and tariff uncertainty have worsened. Business leaders highlight demand creation, the establishment of global standards and certifications, and finance and investment as the policy priorities most crucial to driving progress on over the next 1–3 years.



New priority
in 2025



National
policy



International
policy

Demand creation



Scaled public procurement:

Apply emissions thresholds or sustainability criteria for steel in public tenders.



Incentivizing private sector demand:

Use mechanisms like mandates, tax credits or double-sided auctions to catalyze demand, such as H2Global in hydrogen, and link producers with offtakers, including in emerging markets and developing economies.



Carbon pricing: Implement carbon pricing or carbon border adjustment mechanisms to increase cost competitiveness of low-carbon steel.



“We have capacity to produce more low-carbon steel than today but we are not seeing sufficient demand; policy support is crucial.”

– Corporate Climate Change Engagement Manager, multinational steel manufacturer

Standards and certifications



Globally interoperable

certifications: Develop simplified and internationally aligned certifications for near-zero steel, to ease compliance for customers and enable tradeable and investable markets for producers.



“We need a clear definition of what ‘low-carbon steel’ is, including shared enforcement across regions, which will streamline the trade of low-carbon products.”

– Head of Sustainability Services, global certification and assurance company

Finance and investment



Technology-agnostic funding:

Increase access to project financing (e.g. loan guarantees, first-loss capital, and tax incentives), and base this on decarbonization potential, rather than specific technology pathways.



Cost of electricity: Implement measures to secure sufficient low-cost renewable energy for the steel industry amid competition with higher willingness-to-pay sectors.



Simplified criteria: Simplify eligibility criteria to increase accessibility of subsidies and financing solutions.



“Policymakers should prioritize tax incentives as one of the levers to improve the financial viability of low-carbon projects and expand access to green finance.”

– Climate Change Director, global steel manufacturer

Countries to watch

Business leaders have highlighted three markets as increasingly attractive for clean power development, given financial support mechanisms and policies supporting infrastructure buildout.



India

- **Steel industry inclusion in national carbon market** and establishment of emissions intensity reduction target
- Recent advances in **renewable steel regulatory frameworks and policies**, incl. green steel taxonomy
- Access to **low-cost renewable energy** (e.g., solar)
- **Additional policy incentives for H₂** (e.g., National Green Hydrogen Mission)



Germany

- **Government and federal funding for heavy industry, including steel**
- Aligned industry **“green” steel definition introduced** in 2024 and supported by the German government
- Existing steel **industry hubs and expertise**
- **Electrolytic hydrogen incentives** (e.g., H2Global) and ETS exposed market



Brazil

- Access to **low-cost renewable energy** (e.g., hydropower)
- Attractive for alternative decarbonization pathways (e.g., use of **biochar**) given **availability of biomass**
- Favorable **government incentives** (e.g., Brazil Investment platform)



Breakthrough Agenda Goal: Near-zero emission cement the preferred choice in global markets, with efficient use and near-zero emission cement production established and growing in every region of the world by 2030.

Business confidence

Business leaders perceive a slight increase in the pace of the transition this year, as leading countries expanded supportive low-carbon cement policies. However, leaders' confidence in achieving the 2030 Breakthrough Agenda decreased compared to last year. Progress has primarily centered on incremental changes that have a positive business case, such as using supplementary cementitious materials to lower clinker ratios, while also lowering costs. However, business

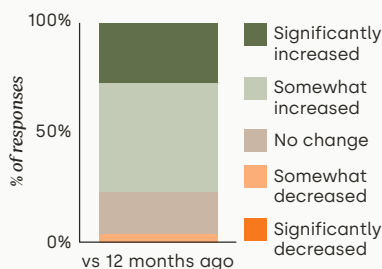
leaders highlight that unlocking breakthrough solutions (e.g., carbon capture and storage or zero-carbon cement technologies) at scale will require targeted financial support to bridge the cost gap and accelerate deployment.

40%

confident the sector will meet the 2030 Breakthrough Agenda goal (vs 45% in 2024)

Investment

Cement figure 1: Change in level of surveyed business leaders investments in the net-zero transition in the cement & concrete sector over the past 12 months



Source: BA Barometer Survey '25 N = 304; cement & concrete sector respondents N = 26.

Top 3 reasons for increasing investment (as stated by business leaders)

- **Cost reductions** (e.g., via use of supplementary cementitious materials) drive increased investment by enabling decarbonization without raising product costs, making low-carbon cement more commercially viable
- **Increased demand certainty** through the implementation of measures guaranteeing offtakers for low-carbon cement producers, such as public procurement requiring low-carbon cement (e.g., in Oslo, Zurich, New York)
- **Increased or continued policy support is key**, with businesses highlighting the incorporation of the cement sector in national emissions trading schemes (ETS) (e.g., in China) and financing support as significant measures



"There's momentum to invest, but the business case needs to be viable. Public support and green procurement policies give us the confidence that demand will follow."

– Head of Sustainability Strategy & Engagement, multinational cement producer

Business case progress



Where businesses saw progress

- **Regulatory certainty:** Progress on regulations globally, including: China's incorporation of cement into its national ETS and mandates on clinker emissions reduction, Germany's approval of Carbon Contracts for Difference and climate and infrastructure funds, and the Global Cement & Concrete Association launching global ratings for low-carbon cement and concrete.

Where progress stalled or declined

- **Customer behavior:** Lack of willingness to pay and preconceived concerns about quality of lower-clinker cements still hampers large-scale adoption of lower-carbon cement.



Cement sector advances on traditional decarbonization but breakthrough technology lags

Businesses report continued progress on decarbonization efforts over the past year and highlight the cement sector's alignment on clearly defined decarbonization roadmaps, which have supported enhanced business action and investment. Companies acknowledge there is no single solution; instead, they are pursuing a combination of decarbonization levers. Traditional strategies, such as clinker substitution and alternative fuel use, remain the primary drivers of emissions reductions and continue to advance on the back of a clear business case. This especially applies in emerging markets and developing economies, where there is limited willingness to pay for more expensive low-carbon products. However, progress on breakthrough technologies, which are needed to achieve zero-carbon cement, remains limited. These solutions are particularly exposed to setbacks, with sustained high interest rates and geopolitical uncertainty, as investors are less willing to take on new risks.

Clinker substitution momentum keeps building

Leading companies continued to advance clinker substitution efforts in 2024 (Cement fig. 2). Meanwhile, regional disparities persist due to varying supplies of supplementary cementitious materials (SCMs), regulatory frameworks and market incentives. In the EU, the ETS and Carbon Border Adjustment Mechanism (CBAM) are catalyzing progress but availability is limiting the growing use of fly ash and slag. Businesses in the US, for instance, are implementing the "mining" and processing of fly ash stockpiles (beneficiation) to increase SCM usage. Going forward, new SCMs, like calcinated clay, may alleviate some of the supply constraints but widespread adoption will be gradual. In contrast, Asia-Pacific benefits from both abundant SCM supplies and supportive policy, showing early signs of being a potential exporter to Europe.

Alternative fuels: growth but an East-West divide

Alternative fuels for energy use in cement production continued moderate growth across regions (Cement fig. 3). But local regulation and economics, which determine access to waste feedstock such as biomass and industrial waste, shaped their adoption. In Europe, thermal substitution rates (TSR) rose ~1 p.p. in 2020-2023 to ~56%, with rising competition for waste feedstocks and the need for kiln upgrades at high TSR levels limiting growth. In the US, TSR increased to ~16% in 2023, up from ~15% in 2022, driven by higher landfill tipping fees and growing pressure from corporate sustainability efforts. In Asia, average TSRs remain low, with China growing from ~2% to ~3% in 2022-24 due to lower costs of coal and limited waste infrastructure. The region saw increased government support for alternative fuels and waste use in select markets (e.g., Indonesia).

Carbon capture and storage pipeline grows, yet still falls short of 2030 needs

Although the carbon capture and storage (CCS) pipeline for cement production expanded by 12 projects (~30%) in 2024-2025 (Cement fig. 4), the 2030 pipeline remains far below that required to meet the Breakthrough 2030 goal. High capital and operational expenditures, dependence on public funding and a lack of infrastructure are constraining progress. Businesses highlight that while commitment to CCS remains strong, timeline extensions reflect a growing realization of the complexity of projects moving into implementation. Most major companies outside Europe are still in the piloting phase. Businesses note the importance of policy support to progress, with current projects relying heavily on subsidies to cover high capital expenditures (CAPEX), which is critical to making the business case profitable.

New tech wave attracts venture cash; commercial proof still pending

A new wave of alternative decarbonization technologies gained traction in 2024, attracting USD \$250-300 million in venture capital funding compared to ~\$130 million in 2023;¹ however, major cement companies remain concerned about the commercial and technical viability of new solutions (e.g., electrochemical cement, biogenic cement) that have yet to scale.

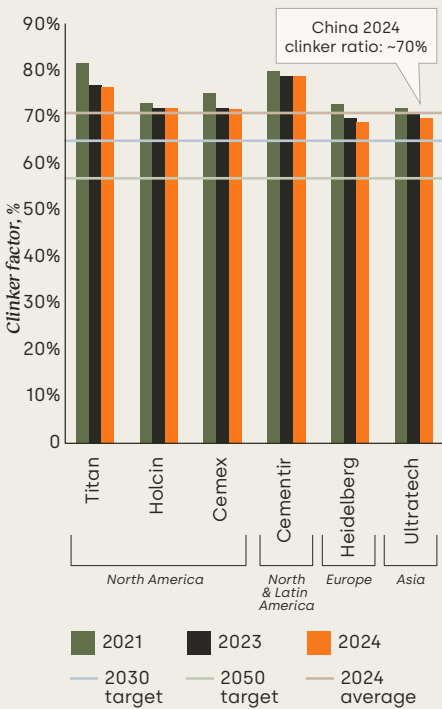
Demand pull: growing but still a niche

Demand for low-carbon cement is growing across most regions, supported by public and private sector commitments, yet limited to niche sectors. Large infrastructure and data center buildouts are setting new benchmarks, with procurement policies increasingly prioritizing low-carbon cement. In the US (e.g., New York's 2027 low-carbon concrete mandate) and EU (e.g., 2024 Construction Products Regulation enforcing low-carbon green procurement from 2026), state and regional procurement policies are driving demand. Low-carbon cement is also set to become more competitive in China, with the inclusion of the sector in the national ETS.

¹PitchBook (Accessed April 2025). Search results include all venture capital (VC) transactions announced or completed between January 2023 and December 2024. The focus is on companies involved in cement production or manufacturing and related activities, specifically those pursuing decarbonization strategies, including carbon capture, net-zero, carbon neutrality, or zero-emission technologies. The search includes all deal stages and series, with related keywords also considered.

Marginal improvements in clinker ratio in 2024, but more is required to reach 2030 targets

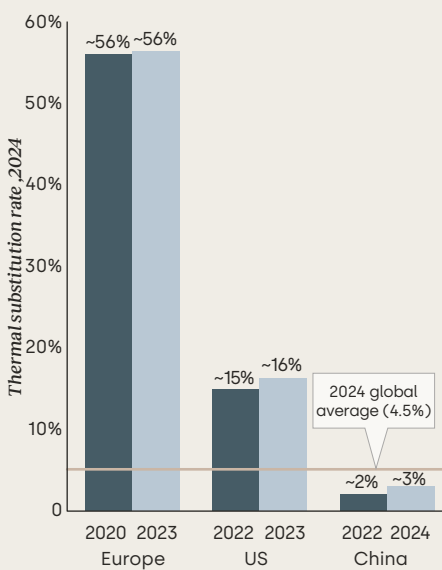
Cement figure 2: Development of companies' clinker ratios compared to the global average and the 2030/2050 targets



Sources: International Energy Agency (IEA) (2025). [Demand and Supply Measures for the Steel and Cement Transition](#), International Energy Agency (IEA) (2023). [Cement](#). Company annual reports (2024).

Improvements in alt. fuel use in 2024 across regions: EU is leading the way, but effort needed to grow global average

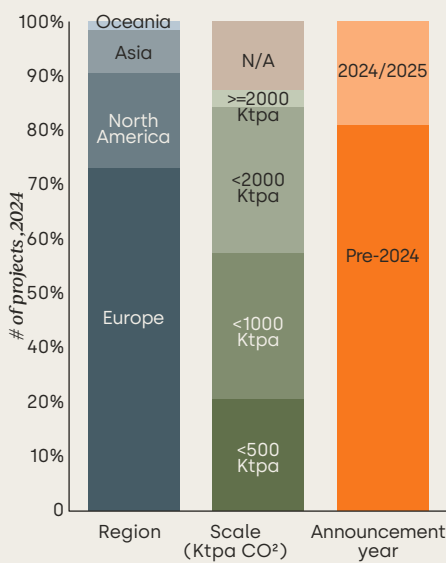
Cement figure 3: Alternative fuel use in cement production by region compared to the global average



Sources: Cement Manufacturers' Association (CMA) (2024). [Cement, Energy & Environment Jan–Jun 2024](#). Sui, T. / FICEM (2024). [Decarbonization and Circularity of China Cement Industry](#). Presented at Congreso Técnico 2024. RMI & China Cement Association (2022). [Toward Net Zero: Decarbonization Roadmap for China's Cement Industry](#). Portland Cement Association (PCA) (2024). [2024 PCA Cement Fly-In: Alternative Fuels](#). Cement Products (2025). [Alternative Fuels: Where Next?](#) Published February 10, 2025.

CCS pipeline greatest in EU due to ETS/ CBAM, followed by US with CCS tax credits

Cement figure 4: Global cement carbon capture and storage project pipeline as of May 2025



Source: International Energy Agency (IEA) (2025). [CCUS Projects Database](#). Accessed May 2025.



Policy priorities

Some **95%** of surveyed business leaders signal the importance of policy in unlocking increased investments in the cement and concrete sector; **95%** also state that international collaboration is highly important. Business leaders see significant progress in collaboration, education and innovation over the past year. They also note progress in standards and certification, but also highlight that this is one of the three policy priorities where it remains most crucial to drive progress over the next 1-3 years. The other two are finance & investment and demand creation.



New priority
in 2025



National
policy



International
policy

Demand creation



Public sector procurement mandates: Provide stable demand for production by requiring the use of low-carbon cement and concrete in public projects (e.g., roads, bridges, buildings), and include advance commitments for novel technologies.



Private sector demand: Introduce mandates and incentives to scale industry demand for low-carbon cement and concrete.



“CCS/CCUS for near zero and low-carbon cement will require both upfront financial support and ongoing operational cost coverage to enable companies to invest in these projects.”

– Deputy Chief Sustainability Officer, Indian cement company



Chain of custody models: Enable the tracking of sustainability attributes through the value-chain to support monetization (e.g., using book-and-claim models).



Carbon intensity-based standards: Develop and implement common global standards with thresholds based on carbon intensity.



Performance-based standards: Expedite performance-based assessments of low-emissions mixes to speed up the timeline between R&D and deployment.



“Green public procurement is needed to drive acceptance of low-carbon cement products. Public sector leadership would catalyze private sector demand.”

– Chief Sustainability and Innovation Officer, global green cement manufacturer

Finance and investment



Innovation financing: Ramp-up public funding and risk-sharing mechanisms to incentivize and scale investment in innovation (e.g., research grants, subsidies or tax credits).



OPEX support: Support high running costs for CCS/CCUS projects by offering long-term operating expense (OPEX) support, in addition to capital expenditure (CAPEX) financing.



“Zero-emissions concrete standards, similar to zero-emissions vehicle standards, would create clear incentives to invest in low-emission solutions.”

– Business Development and Strategy Leader, low-carbon cement manufacturer

Countries to watch

Business leaders have highlighted three markets as increasingly attractive for low-carbon cement and concrete, given funding mechanisms and stable policy and regulatory frameworks.



India (low-carbon cement)

- **New carbon credit trading scheme** and the Perform, Achieve, Trade program rewarding cement producers for **cutting emissions and energy use**
- **Booming market and infrastructure push**, with expected massive construction buildout
- **National roadmap to net-zero** by 2070 for the cement industry, with a **national low-carbon cement taxonomy**, incl. **public procurement** requirements, in progress



China (low-carbon cement)

- Recent announcement that the government will **extend national ETS to the cement** industry, incentivizing low-carbon cement projects
- **Mandates targeting 80% ultra-low emissions clinker production by 2028**, in addition to overarching **emissions reduction targets**



United Kingdom (near-zero cement)

- **Robust carbon pricing and tightening caps** for industry
- Tightening building regulations, **including net-zero building codes and carbon mandates**
- **Low-carbon public procurement** requiring use of certified sustainability framework (e.g., BREEAM sustainability assessment method for the built environment and infrastructure) and conducting whole-life carbon assessments
- **Major funding for CCUS and industrial clusters**, with government approved >GBP £20 billion to develop carbon capture hubs, with first projects signed



Breakthrough Agenda Goal: Near-zero emissions and resilient buildings are the new normal in all regions by 2030.

Business confidence

Business leaders perceive a slight increased pace of transition, reflected in greater confidence that the buildings sector will reach its 2030 Breakthrough Agenda goal. Leading businesses have grown their transition-oriented investments over the last year, citing improved customer demand and certainty, growing investor pressure and better access to clean energy as key drivers. Business leaders note that global policy swings are affecting the sector less than local and national regulations are. In select markets, businesses

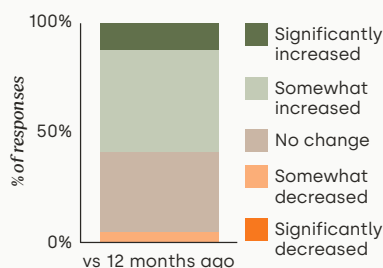
highlight continued progress on creating a conducive investment environment, with strong regulatory standards, building codes and supportive financial policies. However, investments in lower-emissions and resilient buildings are primarily in the commercial segment in mature markets.

20%

are confident the sector will meet the 2030 Breakthrough Agenda goal (vs 10% in 2024)

Investment

Buildings figure 1: Change in level of surveyed business leaders investments in the net-zero transition in the buildings sector over the past 12 months



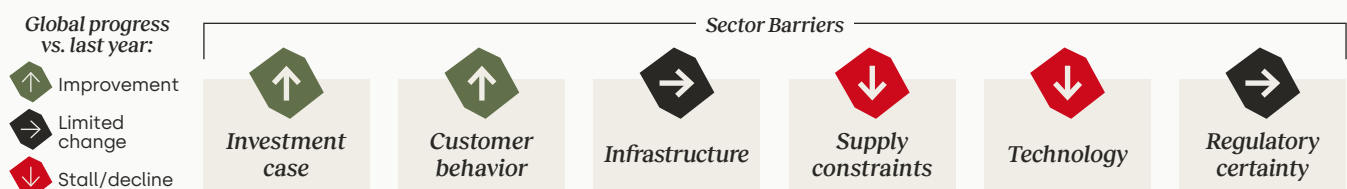
Source: BA Barometer Survey '25 N = 304; Buildings sector respondents N = 45.

Top 3 reasons for increasing investment (as stated by business leaders)

- **Increased demand certainty**, mainly from cities with green public procurement mandates or from commercial tenants of buildings
- **Increased pressure from investors** as the risk of stranded "brown" assets drives appetite for buildings with stronger environmental performance, accelerating retrofit and redevelopment investment
- **Increased access to clean energy** for power supplies in buildings, lowering long-term operating costs and green certifications

“Given that corporate demand for sustainable buildings continues to outpace supply, sustainability measures that improve operational efficiency, support energy security and cut carbon emissions can add long-term value. In the face of mounting climate risks, many of these measures, such as access to clean energy, can also build resilience – especially for critical assets.”
– Global Head of Sustainability, global real estate company

Business case progress



Where businesses saw progress

- **Customer behavior**: Continued demand from the private sector for certified green buildings that are often in limited supply (e.g., by large cloud providers in the US, prime commercial real estate in Asia) but typically limited to a small share of the building stock.
- **Investment case**: Improved investment cases in select regions and building segments, given higher end-user (e.g., tenants, owner) willingness to pay.

Where progress stalled or declined

- **Technology**: Limited incentive to invest in innovation, especially given slow progress in establishing clear, internationally recognized energy-use intensity and whole-life carbon assessment standards, which could allow monetization of new low-carbon solutions.
- **Supply constraints**: Although businesses have made some progress with workforce training programs (e.g., in the US and Canada), shortages in engineering and delivery skills for green new builds and retrofits continue.



Global demand grows for low-carbon and climate-resilient buildings

Businesses report continued demand for lower-emissions buildings, especially in mature markets in Europe, Asia-Pacific (e.g., Japan, Singapore, Australia) and major cities in China (e.g., Hong Kong, Guangzhou, Shanghai). As such, all businesses surveyed perceive some willingness to pay an upfront premium for energy-efficient buildings (Buildings fig. 2). Leading real estate developers note there is more demand than supply for green buildings but demand mostly stems from prime commercial buildings in key cities. A new trend is the increased demand for "green" data centers (e.g., in countries like Singapore).

Climate resilience is also growing in focus, with countries like France advancing national strategies for adaptation. In Southeast Asia, businesses note that heat and urban flooding risks will drive demand for resilient buildings, with significant potential future construction projects. In the US, the insurance industry is leading the push. Growing exposure to climate risks is driving developers to evaluate climate exposure, implement mitigation measures and secure sufficient insurance coverage. Businesses and policymakers also increasingly recognize the threat of stranded assets linked to aging and energy-inefficient buildings. Transitioning to "green" assets improves the companies' physical and financial resilience and can increasingly serve as a standalone investment case.

Europe sets the pace for the transition to low-carbon buildings

Europe has taken a leading role in driving the transition in the sector, largely through regulation. Businesses highlight the importance of European leadership, as other regions increasingly look to it for inspiration. They warn that backtracking in Europe could significantly impact transition momentum.

Examples of key policies

- The EU Energy Performance of Buildings Directive requires new buildings to be near-zero energy by 2030 and the retrofitting of 26% of the most energy inefficient buildings by 2033;
- Embodied carbon is gaining attention, with EU mandates to conduct whole-life carbon assessments for new builds over 1,000 square meters by 2028 and leading nations already implementing embodied carbon limits (e.g., France, Netherlands, Denmark);
- The Clean Industrial Deal has taken initial steps to introduce harmonized standards for low-carbon cement and steel, which opens the door for the effective establishment of green public procurement requirements.

China's top-down push accelerates demand

In China, top-down policies actively support the buildings sector transition and drive demand, including initiatives such as the General Code for Building Energy Efficiency and Renewable Energy Utilization, the Implementation Plan for Promoting Equipment Renewal in the Industrial Field, and mandatory green building certifications. These initiatives incorporate renewable energy and energy-efficiency requirements and therefore promote the adoption of technologies such as solar photovoltaics (PV), efficient electric systems like heat pumps, and other lower emissions solutions (e.g., insulation, LED lighting, smart controls).

Market-driven momentum outside Europe & China

Outside Europe and China, companies note that the **business case** primarily drives demand for sustainable solutions, including demand from large cloud providers, favorable financing or de-risking devaluation. A **shift in investor focus towards a cost reduction, efficiency and energy security frame** is accompanying this demand.

- In Asia, businesses pursuing sustainable buildings (e.g., via retrofitting existing assets) for commercial purposes are attracting lower financing costs, premium rent or better tenant retention from an international tenant base.
- In the **US, commercial drivers of affordability and cost are key** amid a lack of unified national regulations. Some states and cities are developing and implementing policies mainly focused on operational carbon (e.g., California's Title 24, New York City's Local Law 97, Boston's and Seattle's Performance Standards).

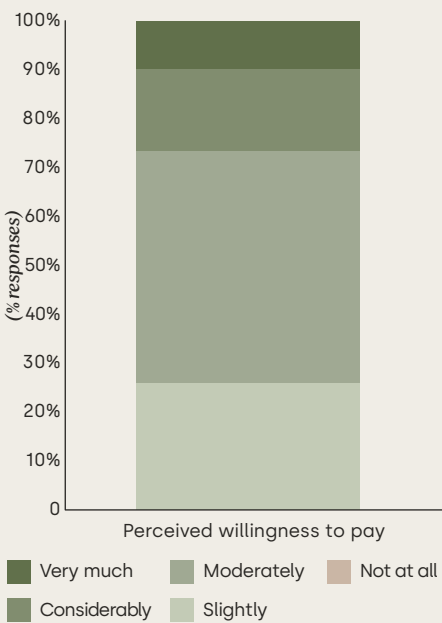
Overall progress remains limited and fragmented

Despite progress, businesses note that these trends remain concentrated in prime commercial real estate in developed markets, representing less than 10% of building stock in those regions and an even smaller share globally. Progress continues to focus on incremental improvements in operational carbon – which accounts for most sector emissions – particularly through energy-efficiency measures. However, select segments saw a slowdown in activity in 2024, with rooftop solar installations falling by over 25% in both the US and EU (Buildings fig. 3) and heat pump installations down ~20% year-on-year in the EU (Buildings fig. 4). Policy uncertainty about support schemes, relatively competitive fossil energy prices and mounting cost-of-living pressures drove this decline.

Moreover, businesses note that deeper emissions cuts are still needed across the buildings life cycle, including embodied carbon in construction materials such as concrete and steel. Elevated interest rates, persistent inflation and geopolitical shocks are making investors hesitant, pushing capital-intensive decarbonization projects, such as low-carbon cement adoption and large-scale retrofits, down the agenda until economic viability improves.

All businesses perceive some willingness by tenants to pay an upfront premium for energy-efficient buildings

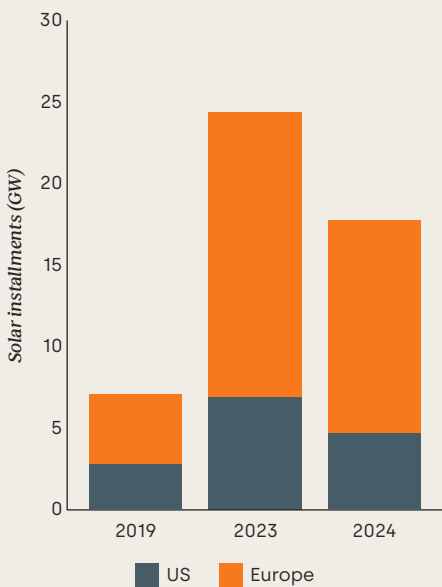
Buildings figure 2: Barometer survey results on commercial and residential tenants' willingness to pay for efficient buildings



Source: BA Barometer Survey '25 N = 304; Buildings sector respondents N = 45.

Residential solar installations declined in 2024 in both the EU and US

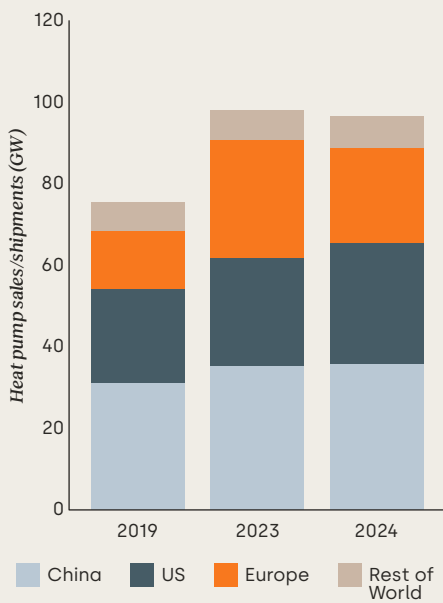
Buildings figure 3: Residential solar installations in the EU and US, 2019-2024



Sources: Solar Power Europe (2024). [EU Market Outlook for Solar Power 2024-2028](#). Solar Energy Industries Association (2015). [Energy Efficiency](#).

Heat pump sales/shipments declined in Europe in 2024, grew in the US and were flat in China

Business figure 4: Heat pump sales/shipments by region, 2019-2024



Source: International Energy Agency (IEA) (2025). [Heat pump sales for selected regions, 2019-2024](#).



Buildings | Policy priorities and countries to watch

Policy priorities

Business leaders highlight three key policy priorities that require urgent progress from policymakers over the next 1-3 years: demand creation, finance and investment, and standards and certifications. Key policy priorities align globally but with regional nuances: developed countries seek incentives for upgrading existing buildings to improve sustainability and resilience, while developing regions (e.g., Africa, Asia and South America) focus on support for new green construction. Separately, business leaders note solid progress over the past year on definitions and certifications, as well as on collaboration and education.



New priority
in 2025



National
policy



International
policy

Demand creation



Implement standards: Introduce building performance thresholds (e.g., for operational energy use), retrofit mandates and reporting requirements for carbon intensity and resilience to allow users to make informed purchasing and leasing decisions.



Public procurement: Adopt sustainability requirements in public tenders for construction projects, renovations and retrofits.



Update building codes: Include sustainability and resilience criteria to reduce the risk of stranded assets.



“If public procurement was subject to mandated sustainability requirements, it would create an exponential shift across the whole construction industry and its supply chains.”

– Executive vice president of sustainability & innovation, multinational construction and development company

Finance and investment



Capital cost support: Provide financing support for high upfront capital investments, especially in emerging market and developing economies, and tie concessional finance to carbon performance.



Tailor by segment: Provide differentiated financial support and incentives by segment (e.g., for schools vs. hospitals) and type (e.g., retrofits vs. new builds).



“Tax incentives represent a fast way to support and to encourage property owners in carrying out renovation and energy efficiency improvements. When combined with Energy Performance Contracts, blended finance models would unlock far more private capital.”

– Global Head of Public & Government Affairs, Large Buildings Technology Company

Standards and certifications



Common standards: Develop globally aligned standards based on embodied carbon-intensity, and other thresholds (e.g., energy use per square meter), and simplify international certification processes for buildings and materials.



Life cycle assessments: Develop consistent whole-life carbon assessments for construction.



Chain of Custody models: Enable the tracking of sustainability attributes through the value-chain to support monetization (e.g., increasing end consumer willingness-to-pay, Scope 3 emission reporting).



“To scale solutions like energy-positive buildings, we need to focus on shared standards for energy use intensity and disclosure, based on existing best practice.”

– Global head of sustainability, global real estate company

Countries to watch

Business leaders have repeatedly highlighted three markets as increasingly attractive for low-carbon buildings, given favorable regulatory environments.



France

- **Stringent building regulations** for both operational and embodied carbon
- **Retrofit incentives for worst-class buildings** (e.g., renting of G-rated buildings banned, lower value added tax for renovation works)
- Industry innovation (e.g., **use of bio-based materials to meet targets**)



Australia

- **Green buildings ratings** (National Australian Built Environment Rating System), as well as progressively **tightening efficiency codes** for new and existing stock
- **Green leasing guidelines** in place and **mandated for all government tenancies**
- **Emerging green financing market** for buildings (e.g., green bonds)



United Kingdom

- Tightening building regulations, with **net-zero building codes and limits on embodied carbon**
- Planning conditions focused on **circularity** (e.g., in large cities like London) and high rates of reuse of demolition waste
- Incentives for insulation, heat pumps and solar installation upgrades and **direct grants for low-carbon heating**



Breakthrough Agenda Goal: Affordable renewable and low-carbon hydrogen globally available by 2030

Business confidence

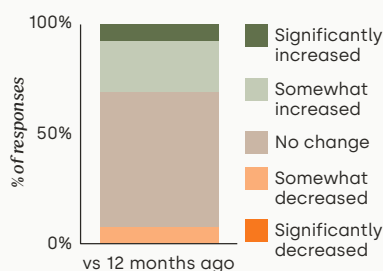
Business leaders see an overall deceleration in the pace of transition this year. Few business leaders (8%) are confident that the hydrogen sector will reach the 2030 Breakthrough Agenda goal, as geopolitical instability, macroeconomic conditions, lack of policy clarity and limited demand are undermining investor confidence and delaying project development. However, there are some *bright spots*, for example in China, where projects are progressing on the back of strong government support. In other regions, while

large-scale momentum is limited, leading businesses report continued investment in smaller-scale projects – particularly where financial incentives, access to cheap and abundant clean energy and proximity to niche offtake markets with a willingness to pay a premium make the business case viable.

8% are confident the sector will meet the 2030 Breakthrough Agenda goal (vs 6% in 2024)

Investment

Hydrogen figure 1: Change in level of surveyed business leaders investments in the net-zero transition in the Hydrogen sector over the past 12 months



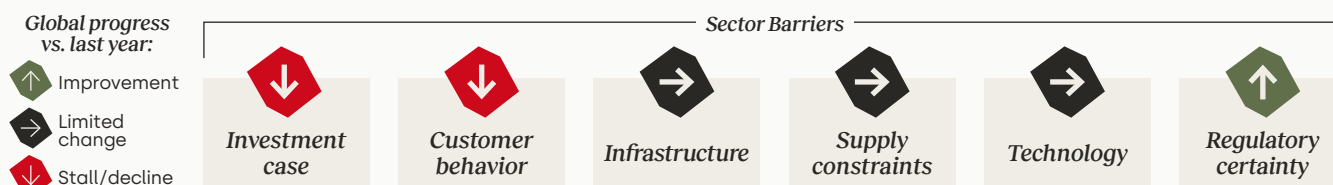
Source: BA Barometer Survey '25 N = 304; Hydrogen sector respondents N = 14.

“H2Global’s contract for difference model is one of the most effective mechanisms; it supports both supply and demand, reduces risk for investors, and facilitates international trade. These are the types of interventions that de-risk costs and get projects moving.”
– Chief Customer Officer, green methanol company

Top 3 reasons for increasing investment (as stated by business leaders)

- **Stable policy support** catalyzing demand and subsidizing costs has been critical to unlocking investment (e.g., EU mandates and electrolytic hydrogen tax credits in Australia and Brazil)
- **Increased certainty on international collaboration and trade**, especially for infrastructure build-out, crucial to marrying low-cost supply with customers who have a high willingness to pay
- **Cost reductions**, particularly in renewable energy as well as electrolyzer capital expenditures (CAPEX) (predominantly in China), have been key in de-risking and ensuring investment returns

Business case progress



Where businesses saw progress

- **Regulatory certainty:** Increased certainty overall, with some geographic variation, such as the unveiling of hydrogen production tax incentives in Australia and Brazil, and the EU’s approval of German Carbon Contract for Difference scheme budget.

Where progress stalled or declined

- **Investment case:** Persistent high production costs, such as regionally high electrolyzer system prices, high costs of renewable energy and high interest rates – combined with sustained low investor risk tolerance.
- **Customer behavior:** Low and uncertain voluntary willingness to pay for low-carbon hydrogen, with little change in demand-side regulation; even the EU has faced challenges catalyzing demand due to delays in member states transposing Renewable Energy Directive (REDIII) into national law.



Low-carbon hydrogen sees slowdown but targeted progress and infrastructure buildout continue

The **low-carbon hydrogen market cooled considerably in 2024** as overall investments fell significantly and there were widespread delays in project final investment decisions (FIDs) and cancellations. However, some leading businesses have been able to advance, leveraging available subsidies and targeting select use cases, including offtakers in mandated industries and geographies. These businesses highlight that some degree of consolidation is natural in such a nascent industry. They remain committed to the sector's targeted, long-term growth, focusing on the highest value use cases. Moreover, the buildout of hydrogen infrastructure continued, as **investment in hydrogen pipelines doubled** to USD \$400 million in 2024.¹

Europe's hydrogen project pipeline under pressure: delays mount but pockets of progress remain

In **Europe**, which accounts for half of the low-carbon hydrogen project pipeline outside China (Hydrogen fig. 2), **market momentum slowed significantly**. Additional measures will be required to meet the 2030 REPowerEU targets. Some **80% of projects slated for commercial operation date (COD) between 2022 and 2024 are delayed** (Hydrogen fig. 3) and **~20% of projects have been shelved or cancelled**.^{2,3} Developers cite **high costs** (e.g., electrolyzer system costs), **insufficient funding** (public and private) and **weak demand** as the primary challenges.

Despite this, **Europe has also shown signs of progress**, with **35% of the pipeline developing** over the past two years and **~10% reaching operational stages**.⁴ Projects progressing typically combine **public funding** mechanisms at EU and national levels, **early offtake agreements** and **financing strategies to offset costs** and make projects bankable. Successful developers often fall into two categories:

1. **Renewable energy developers or industrial gas players** operating at industrial hubs, who can leverage existing relationships and infrastructure to secure early offtake and minimize operational complexity;
2. Players in **industries with electrolytic hydrogen mandates** installing electrolyzers for **captive use**.

In addition to production projects, businesses are developing **hydrogen infrastructure** to facilitate **imports from low-cost regions like the Middle East and North Africa (MENA) into Europe**.

US hydrogen market focused on carbon capture and storage (CCS)-based hydrogen projects but faces similar delays to those in the EU

In the **US**, which represents ~15% of low-carbon hydrogen projects outside of China (Hydrogen fig. 2), the **market has developed similarly to Europe**. Although **>85% of projects** with expected COD over the last two years **were delayed**, **50% of projects in the pipeline made some progress** (between Dec. 2022 and Dec. 2024), and ~10% began operations.⁵ Some **90% of commissioned low-carbon hydrogen projects in the US are pursuing CCS-based hydrogen**,⁶ due to low-cost natural gas and policy incentives (e.g., 45Q carbon capture, utilization and storage (CCUS) tax credit). Leading US projects are tapping into these structural advantages, unlocking projects by (1) **securing low-cost natural gas** via pipelines or partnerships, (2) **applying for tax credits** and (3) **finding offtake in markets with willingness to pay** a premium. Most low-carbon hydrogen projects in the US are targeting export to Europe, Japan or South Korea due to low **domestic willingness to pay**. This is primarily because of a lack of regulatory push to switch from low-cost fossil hydrogen and little monetization potential for products using low-carbon hydrogen.

Pockets of growth in the rest of the world, rapid growth in China

Throughout the **rest of the world** (excluding China), the **projects showing progress** throughout 2024 and 2025 are mainly located in **regions with access to low-cost renewable energy**, such as the Middle East, Iberian Peninsula and North Africa, and with supportive **low-carbon hydrogen policies or targets**, including tax incentives in **Australia and Brazil**. **Proximity to high willingness to pay (WTP) export markets** was another key success factor, with most projects that are advancing producing clean ammonia and securing early offtake agreements with industries in the EU and Asia (e.g., South Korea).

In **China**, supportive policy and access to renewables have driven **rapid clean hydrogen expansion**, with **250–350 Ktpa of new capacity** expected by the end of 2025 (Hydrogen fig. 4) – more than double the national targets. The Chinese electrolytic hydrogen industry has massive growth potential as current capacity represents less than 1% of the country's total hydrogen production. With the Chinese government committing to increased electrolytic hydrogen policy support as part of the next 5-Year Plan (2026–2030), it is likely that the industry will continue to grow rapidly. Despite this, EU concerns over the quality and safety of Chinese electrolyzers are prompting restrictive import policies, such as the European Hydrogen Bank's limit on Chinese electrolyzer content. This is leading Chinese electrolyzer manufacturers to seek manufacturing capacity in the EU to secure market access.

¹BloombergNEF (2025). [Energy Transition Investment Trends 2025](#).

²GlobalData (2024). [Low-carbon hydrogen projects database](#).

³R. Parkes (2024). [Over fifth of new European clean hydrogen capacity is now stalled or cancelled; analyst](#). *Hydrogen Insight*

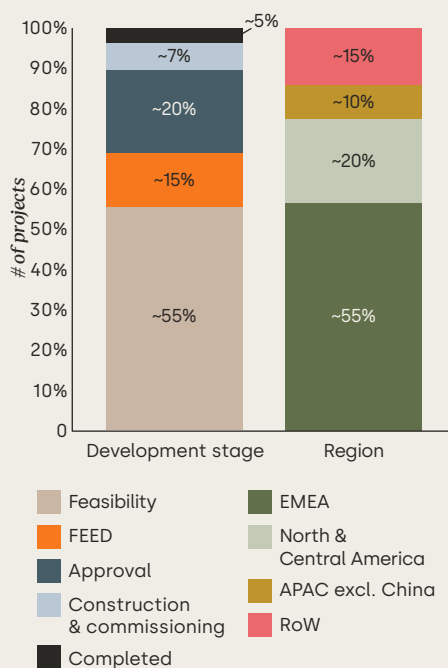
⁴GlobalData (2024). [Low-carbon hydrogen projects database](#).

⁵GlobalData (2024). [Low-carbon hydrogen projects database](#).

⁶GlobalData (2024). [Low-carbon hydrogen projects database](#).

Hydrogen figure 2: Global low-carbon hydrogen projects, ex. China

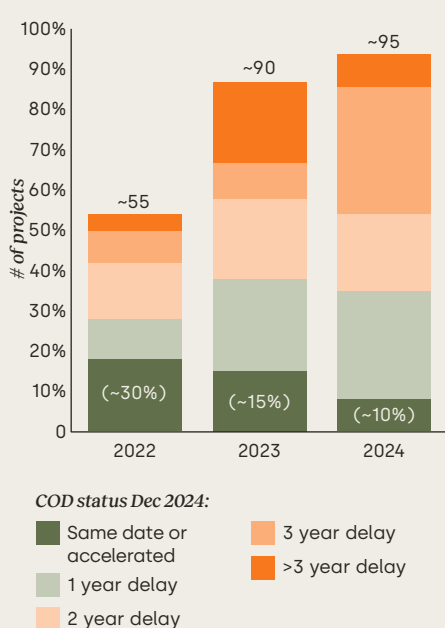
~55% of projects outside China are in the feasibility stage, with 75% located in EU & US



Source: Global Data (2024). [Low-Carbon Hydrogen Projects Database](#).

Hydrogen figure 3: European low-carbon hydrogen project status by expected start year

>80% of European projects with expected 2022-2024 commercial operation date (COD) are delayed by at least 1 year

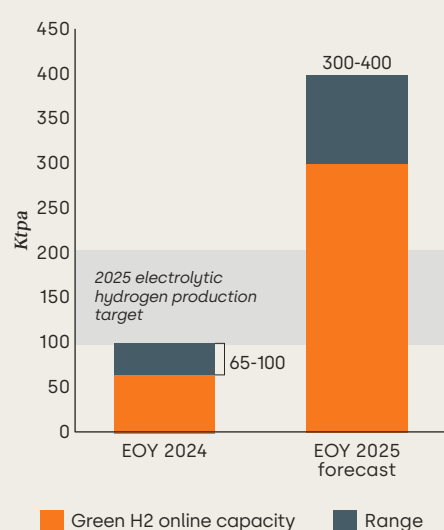


Note: Expected project COD from Dec 2022 pipeline edition compared with expected project COD in Dec 2024 pipeline edition.

Source: Global Data (2024). [Low-Carbon Hydrogen Projects Database](#).

Hydrogen figure 4: Chinese operational green hydrogen production capacity

China is expected to exceed its 2025 green H₂ production targets by 2-3x



Source: Martin, P. (2024). China on course to greatly exceed its 2025 green hydrogen production target. Hydrogen Insight.

⁷Martin, P. (2024). [China on course to greatly exceed its 2025 green hydrogen production target](#). Hydrogen Insight.

⁸L. Collins (2025). [China may lead the world in green hydrogen production, but capacity only represents 0.34% of country's total H₂ output](#). Hydrogen Insight.



Policy priorities

Some **90%** of business leaders highlight that long-term policy stability is highly important to de-risking and unlocking low-carbon hydrogen investments. Additionally, **70%** of leaders see international collaboration as highly important in the sector. Business leaders note significant progress on research and innovation and landscape coordination over the last year. However, they see limited or even backtracking of progress on demand creation, finance support and standards and certifications, which they consider crucial in driving progress over the next 1–3 years.



New priority
in 2025



National
policy



International
policy

Demand creation



Implement standards: Implement and enforce industry-wide requirements to utilize low-carbon hydrogen or its derivatives in specific products (e.g., steel and fertilizer) to de-risk project financing



Carbon pricing: Implement carbon pricing or carbon border adjustment mechanisms to increase the cost competitiveness of low-carbon hydrogen



“Mandates like Renewable Energy Directive III (REDIII) are the most efficient way to create demand certainty and therefore allow projects to develop with confidence that there is a market to sell to.”

– Head of Global Policy, global mining company

Finance and investment



Public-private collaborations: Enable governments and companies to pool resources and share risks in early-stage projects

Create price certainty: Implement financing mechanisms to unlock long-term offtake contracts (e.g., double-sided auctions, contracts for difference, tax credits); subsidise maturing technologies (e.g., electrolyzers and CCUS)



Infrastructure project incentives: Enable the buildout of critical infrastructure (e.g., hydrogen pipelines and terminals) to facilitate the trade of hydrogen and derivatives (e.g., renewable ammonia), and link supply with demand



“Public funding is absolutely critical... tax credits are generally most effective as they give projects more certainty that they will receive funding if they build a project meeting specific criterion.”

– Chief Customer Officer, green methanol company

Standards and certifications



Internationally aligned standards, definitions and certifications: Establish globally harmonized standards, with technology-agnostic certifications based on life-cycle carbon intensity



Pilot trade: Establish trade agreements between countries or within regions using common low-carbon hydrogen certificates to begin building a global market



“Establishing clear, globally aligned clean hydrogen standards is critical, especially to enable the trade of clean hydrogen and its derivatives.”

– CEO and Founder, green hydrogen company

Countries to watch

Business leaders have repeatedly highlighted three markets as increasingly attractive for low-carbon hydrogen, given financial support, cheap and abundant renewable energy, and proximity to offtake markets.



India

- **Financial subsidies** (through auctions) for electrolytic hydrogen
- Support schemes for **innovation & demonstration plants, as well storage, transport and other infrastructure**
- **Access to affordable renewable energy** for electrolytic hydrogen production



Australia

- 2024 **National Hydrogen Strategy** targeting 1 million metric tons of “green” H₂ by 2030
- Generous **financial subsidies for electrolytic hydrogen** production (e.g., production tax credit of USD \$2/kg, the Hydrogen Headstart initiative)
- Access to **abundant and cheap solar and wind** power for electrolytic hydrogen production
- **Proximity to major Asian offtake markets** (e.g., Japan)



MENA

- Tightening building regulations, with **net-zero building codes and limits on embodied carbon**
- Planning conditions focused on **circularity** (e.g., in large cities like London) and high rates of reuse of demolition waste
- Incentives for insulation, heat pumps and solar installation upgrades and **direct grants for low-carbon heating**



Fertilizer | Deep dive (new this year)

There are three main types of inorganic fertilizer: nitrogen (~60% of global production), phosphate (~20%) and potash (~20%).¹ This summary focuses on production and application of nitrogenous fertilizers as an area of interest amongst governments for strengthened international coordination, and presents insights on phosphate fertilizers at the end.

Business confidence

Business leaders highlight progress on international collaboration over the past year, for example the collaboration to advance the Science Based Target initiative (SBTi) land-based emissions methodology. The aim is to set international low-carbon standards for agriculture, including the reporting of scope 1–3 emissions, such as those from nitrogen fertilizer use. In contrast, business leaders report decreasing confidence in government support (**88%**) amid geopolitical and regulatory uncertainty (e.g., for green ammonia production) and a lack of government funding. Of the leading players surveyed, **90%** highlight the importance

of establishing global alignment on the definition and use of **"nitrogen use efficiency"** (NUE) as a key industry metric contributing to broader nutrient use efficiency.

80%

report decreased confidence in Government support compared to 12 months ago

100%

believe there has been some progress in international collaboration over the last year

Investment

The low-emissions nitrogenous fertilizer investment landscape was muted in 2024, with most (**70%**) business leaders reporting a deceleration in their low-carbon ammonia project timelines, and only **33%** believing recently announced projects will reach final investment decision (FID) by 2030. Despite this, some leading players have advanced projects in regions where policy conditions and low-cost feedstocks are available, such as low-carbon ammonia projects in the US. In these cases, leading producers are leveraging low-cost natural gas, carbon capture and utilization/storage (CCUS) tax credits, and the optionality to serve multiple sectors besides fertilizers. Electrolytic ammonia production has seen slower progress, with many projects paused due to high costs, lack of funding and the scale of electricity needed. Moreover, the willingness to pay premiums for lower-emissions products remains a challenge, especially without sufficient cross value-chain coordination mechanisms to pull through demand (from food companies and end users). Business leaders note they are focusing on incremental improvements, including advancing on-farm interventions like nitrogen stabilizers, biologicals and enhanced efficiency fertilizers, as well as soil health-driven approaches, based on soil mapping, extension programs and fertilization best practices, to boost productivity while protecting the environment. When conditions improve, they are ready to make larger-scale transition bets.

Where businesses continued investing, they report 3 key drivers:²

- **Cost reductions** in renewable electricity are being leveraged by leading players in attractive geographies to reduce the cost gap with grey ammonia and de-risk investment
- **Policy support** is driving investment in select countries offering financial support (e.g., US low-carbon ammonia projects leveraging 45Q carbon capture and storage tax credits), as well as regulations to catalyze supply and demand, such as nitrogen-based fertilizer incorporation in the EU emission trading scheme (ETS), and the carbon border adjustment mechanism (CBAM)
- Increased perception of **physical climate risks** is impacting how companies prioritize investment decisions. Some players note they are investing in low-carbon ammonia production capacity to ensure local fertilizer production capacity in the event of supply chain disruptions (e.g., in Brazil), whilst others are investing in product lines to support farmers manage physical risk (e.g., slow-release fertilizers).



"We continue to invest and offer a robust toolbox of agricultural solutions so that we're ready to scale the right solutions quickly and effectively as market conditions improve or demand signals strengthen."

– Vice President of Global Sustainability, global fertilizer company

¹FAOSTAT 2022: [Global fertilizer production quantity by nutrient](#)

²From Barometer survey and interviews



Business case progress

Where businesses saw progress

→ **Standards and certifications:** Fertilizers covered in EU's CBAM under its transition phase, which is enforcing reporting of embedded emissions; progress on SBTi land-based carbon-accounting methodology; final publication of Inflation Reduction Act (IRA) tax credit eligibility (45Q and 45V) has been driving low-carbon and electrolytic ammonia projects; however, businesses note the need for significantly more progress.

Where progress stalled or declined

→ **Customer behavior:** Low willingness to pay (WTP) premiums – especially in emerging market and developing economies (EMDEs), where affordability and adoption barriers remain high; low end-consumer WTP due to limited alignment throughout the value chain given the lack of infrastructure/chain of custody mechanisms to trace low-carbon products (except niche cases).

→ **Investment case:** High production and capital costs in many regions (especially EMDEs), including for electrolytic ammonia capital expenditure.

Policy priorities

85% of business leaders surveyed highlight the importance of policy in unlocking investment for low-emissions nitrogenous fertilizer. Moreover, **all** business leaders identify international collaboration as highly important for progress in the sector, given the need for international trade and the sector's contribution to emissions throughout many industries globally. Businesses highlight the urgent need for progress on policies targeting demand creation, finance and investment, and technology support and business model innovation to develop the industry further.



National policy



International policy

Demand creation



Develop certifications and chain of custody models: Enable farmers or food companies to track sustainability attributes through the value chain to support monetization (e.g., through carbon credits, increasing end consumer willingness to pay, Scope 3 emissions reporting).



Carbon pricing: Introduce carbon pricing or CBAM for fertilizer to drive offtake for low-emissions fertilizers by leveling the playing field in terms of price of alternatives.



Tax incentives: Recognize low-carbon fertilizer's ability to reduce carbon intensity of biofuels.



"We can't place the burden on farmers. Demand needs to come from the top of the value chain: from consumer goods companies and eventually consumers."

– Head of External Engagement in Sustainability and Innovation, global fertilizer producer

Finance and investment



Public funding: Provide finance for high upfront capital investments for low-emissions fertilizer projects (e.g., electrolytic ammonia production), including for emerging and developing countries.



De-risking: Reduce the risk for large-scale private sector capital through mechanisms such as loan guarantees, first-loss capital, contract-for-difference and tax incentives to scale investment into low-emission fertilizer projects.



"To ensure fertilizer companies can continue to play an active role in supporting the agricultural transition, it is important that farmer-centric approaches and the promotion of low-carbon fertilizers and sustainable practices—such as the 4R framework—are appropriately recognized and incentivized through mechanisms like carbon credit generation, which should be reflected in our decarbonization pathways."

– Head of External Engagement in Sustainability and Innovation, global fertilizer producer

Technology support and business model innovation



Public-private collaboration: Establish international consortia to pool research & development (R&D) funds and establish pilot and demonstration projects.



Knowledge sharing: Create forums for sharing of best practices amongst value chain participants, including for on field application, as well as electrolyzers, CCUS and other measures to reduce emissions from fertilizer production.



CO₂ utilization: Policies that recognize the eligibility of using captured CO₂ from CCUS in green fuels and feedstocks, to support such decarbonization investments.



"Establishing clear, globally aligned clean hydrogen standards is critical, especially to enable the trade of clean hydrogen and its derivatives."

– Vice President of Sustainability, global fertilizer company

Countries to watch

Business leaders have highlighted that favorable regulatory environment and access to low-cost renewable energy are key conditions that make markets increasingly attractive for low-emissions fertilizer production.



Oman

- **Favorable policy support** for electrolytic hydrogen/ammonia, including plans for two-sided auctions that create links to downstream industries, including fertilizers
- **Outstanding solar and wind sources** and dedicated land for renewables (10 GW planned by 2030)
- Ample natural gas supply for **low-carbon ammonia**
- **Strong export infrastructure** (e.g., deepwater ports)



Brazil

- **Abundant renewable energy** (hydro, wind and solar) for electrolytic ammonia projects
- **High fertilizer demand** and currently importing 85% of fertilizer used
- **Strong policy momentum**, with national strategies focused on green industrialization and fertilizer self-sufficiency
- **Strategic export access**, with ports (e.g., Pecém) under development for electrolytic ammonia export



Australia

- **Excellent solar and wind resources**, with gigawatt-scale electrolytic ammonia projects under development
- **Government support via Hydrogen Headstart** and designated hydrogen hubs
- **Strategic proximity to key import markets** (Japan, Korea), with growing export-focused ammonia infrastructure

Specific opportunities and challenges for phosphate fertilizers

- As with nitrogen-based fertilizers, **precision fertilizer management** through the 4R Nutrient Stewardship³ offers **opportunities to optimize the use of phosphate fertilizers and other inputs**, reducing their nature and climate impacts and providing balanced crop nutrition. This influences food system emissions through reduced land use expansion and improved soil health, boosting yields and shelf lives. Furthermore, phosphorus enhances nitrogen uptake and efficiency by **improving nitrogen absorption, boosting soil carbon storage, optimizing water-use efficiency, improving yields and preventing soil degradation**.
- However, decarbonizing phosphate fertilizer faces major hurdles, and the sector has no clear decarbonization pathway (e.g., as outlined by SBTi). Key challenges include accurate emissions accounting and hard-to-abate industrial processes:
 - Phosphate rock drying requires high temperature heat (beyond current solar heating capabilities).
 - Phosphoric acid production emits low concentration organo-mineral CO₂ which is hard to capture, technically and economically.
- To enable broader fertilizer decarbonization, policymakers and standard-setters must recognize the specific challenges related to the decarbonization of this important sector.



“We believe that the phosphate industry should be recognized as a hard-to-abate sector (...) We are committed to supporting farmers with the 4R framework⁴(...) giving decarbonized fertilizers at the right time to avoid nutrient loss and improve yield. Yet, we need to be supported for this; the fertilizer sector is critical to worldwide food security and enabling the decarbonization of the agriculture sector through yield improvement, reduce land use expansion, improve soil health, carbon sequestration and more widely a global nature-positive transition.”

– Head of External Engagement in Sustainability and Innovation, global fertilizer producer

³4R Nutrient Stewardship refers to applying the **right** source of nutrients, at the **right** rate, at the **right** time and in the **right** place to optimize fertilizer use for productivity, environmental protection and sustainability

⁴4R Nutrient Stewardship refers to applying the **right** source of nutrients, at the **right** rate, at the **right** time and in the **right** place to optimize fertilizer use for productivity, environmental protection and sustainability

Methodology, Glossary *and References*



07.

07. Methodology, Glossary and References

Methodology

This second edition of the report examines the pace of the transition, based on the experiences of businesses at the forefront of the transition. The Barometer offers up-to-date insights and leading indicators of progress over the past year. We will continue to publish it annually. The Barometer leverages the same research framework and methodology as the 2024 report.

Research framework

The approach integrates three sources of information for a comprehensive view of the transition: **business insights**, **quantitative data collection** and **literature review**.

Business insights

We used qualitative research methods to understand the subjective and experiential dimensions of the transition by businesses across the value chain of key sectors.

- **Survey of senior executives:** We conducted a comprehensive survey with 304 executives from businesses at the forefront of the transition. This gauged overall business sentiment across sectors, as well as sector-specific insights for the 7 sectors in focus.
- **In-depth interviews:** We conducted 39 one-on-one semi-structured interviews with senior leaders from businesses at the forefront of the transition. These interviews provided deep insights into business sentiment, investment trends, barriers and policy priorities to accelerate the transition.
- **Sector group dialogues:** We tested consolidated insights from the survey and interviews with a group of engaged businesses and at least one business organization per sector. These Breakthrough Agenda Business Groups represent a diverse set of companies in terms of geographic locations and value chain positions.

Quantitative data collection

Quantitative data provided the basis for analyzing measurable trends and validating business sentiment. This included industry reports, market studies and macroeconomic data offering insights into development, deployment and investment trends. We leveraged BloombergNEF (BNEF) data extensively, with inputs shaped through consultations with the BNEF team.

Literature review

The literature review (of select industry reports and academic studies) provided additional context to the findings. We consulted sector-specific and overarching publications to understand the latest trends, technological advancements and policy developments.

Data validation and triangulation

We ensured the reliability of the findings by synthesizing survey results, interview insights and secondary data. Throughout "I don't know" responses are excluded from the graphs in the report. Cross-sector workshops with business organizations and sector groups, including with the Marrakech Partnership, further validated the trends and conclusions. Finally, businesses and industry organizations reviewed the full Barometer report to validate that the material represents a coherent business view of the sector and cross-sector state of the transition.

Glossary

- **Leading business** – Businesses with one or more characteristics: 1) investing at scale in clean technology, 2) leading innovation in clean technology, 3) acting as demand side market catalysts, 4) leading policy and advocacy for sector.
- **Clarity on transition pathway** – Common understanding across the sector on the steps, strategies and technology pathways required to reach net-zero, with clearly defined goals, timelines and technologies.
- **Investment case** – Business case for operating, or transitioning to, low-carbon technology (e.g., returns from low-carbon technology compared to traditional options, capital and operational expenditure, cost of capital, availability of financing, revenue model, customer demand).
- **Supply constraint** – Availability of goods or resources in the market for the transition pathway (e.g., key raw input materials, skilled labor, equipment, energy).
- **Technology** – State of technology required for low-carbon operations (e.g., technological maturity, efficiency, scalability).
- **Customer behavior** – Actions, preferences, willingness to pay and decision-making processes of individuals or groups when purchasing goods or services (e.g., awareness of low-carbon alternatives, mentality on upfront costs vs long-term savings, perceived risk, preference for status quo, preference for sustainable, low-carbon products).
- **Infrastructure** – Fundamental physical and organizational structures (e.g., power grids, storage capacity, charging infrastructure, standards, codes, permitting processes, regulatory environment).
- **Business sentiment** – Overarching view from leading businesses on the pace of the transition in the sector and the commitment to overcome barriers in the near-term.
- **Regulatory certainty** – Clear, stable rules and policies that provide long-term overview and predictability for businesses, investors and other stakeholders regarding priority-setting and decision-making processes
- **Direct reduced iron (DRI)** – An iron production route using hydrogen or natural gas instead of coal.
- **Blast furnace–basic oxygen furnace (BF-BOF)** – The traditional high-emissions steelmaking process.
- **Final investment decision (FID)** – A formal commitment to capital expenditure on a project.
- **Power purchase agreement (PPA)** – A contract to buy electricity from a power generator.
- **Battery energy storage system (BESS)** – Energy storage using batteries.
- **Greenfield/brownfield** – Greenfield – new development from scratch; brownfield – redevelopment of existing assets.
- **CAPEX/OPEX** – Capital expenditure/operating expenditure.
- **Emissions trading system (ETS)** – Often used in EU climate policy, especially the EU's Emissions Trading Scheme.
- **Carbon Border Adjustment Mechanism (CBAM)** – Often used in EU climate policy to prevent carbon leakage from imports.
- **Hydrogen taxonomy** – A framework to categorize hydrogen by carbon intensity (green, blue, gray, etc.).

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Endnotes

- 1 BRICS is a forum for cooperation among Brazil, Russia, India, China, South Africa, Egypt, Ethiopia, Indonesia, Iran and the United Arab Emirates.
- 2 Excluding hydrogen, which is an emerging industry that remains very fragmented
- 3 Bright spot technologies are low-carbon solutions with proven cost-effectiveness, market traction and the potential to anchor future industrial growth.
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- 15 Clean tech includes factory investment across the manufacture of solar (polysilicon, wafers, cells and modules), batteries (separators, electrolytes, cathodes, anodes and cells), wind turbines (nacelles only), and hydrogen electrolyzer manufacturing (stack assembly only).
- 16 International Energy Agency (IEA) (2024). [World Energy Outlook](#).
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- 19 BloombergNEF (2025). [Energy Transition Investment Trends](#).
- 20 International Energy Agency (IEA) (2024). [Clean Energy Investment for Development in Africa](#).
- 21 The threshold for the low-carbon standard remains quite high, at 2.2t CO₂/t steel, which means that unabated blast furnace–basic oxygen furnace with best available techniques would qualify.

Acknowledgements

Disclaimer

This publication is the result of input and consultation with a wide range of companies and business organizations that contributed to and reviewed the content. However, this does not mean each company and organization that participated in the consultative process agrees with every word in the Business Breakthrough Barometer or that this constitutes an endorsement.

The report has been prepared for general informational purposes only and is not intended to be relied upon as accounting, tax, legal or other professional advice.

Acknowledgements

The Barometer has been made possible through a joint effort involving many individuals and organizations. We would like to thank the Breakthrough Agenda, the Marrakech Partnership and the Climate High-Level Champions, in particular, for the partnerships that have enabled the meetings and consultative discussions for the Business Breakthrough Barometer.

We would like to thank Bain & Company for their pro-bono technical support to WBCSD in the development of the Business Breakthrough Barometer.

We would also like to thank the businesses and industry organizations that contributed, whether through participation in stakeholder consultations, interviews or reviewing the contents of the Barometer.

About the Breakthrough Agenda

The Breakthrough Agenda, launched at the United Nations Climate Change Conference (COP26), aims to help the world close the “collaboration gap” and accelerate international action on climate change to meet the Paris Agreement’s global net-zero targets.

It convenes countries and initiatives to strengthen international collaboration to make clean technologies and sustainable solutions the most affordable, accessible and attractive option in key sectors and in all regions by 2030. It enhances global cooperation in six major emitting sectors (power, road transport, steel, hydrogen, buildings and cement and concrete), with fertilizers as an emerging sector of interest. These sectors cover over 50% of global emissions. At COP28, governments welcomed a new partnership with the World Business Council for Sustainable Development to strengthen private sector engagement to deliver the Breakthrough Agenda goals. The Business Breakthrough Barometer supports this partnership, and the COP-to-COP process, by providing annual insights to countries on the pace and challenges for sector transitions and identifying the business priorities for international collaboration.

About the Marrakech Partnership

Under the leadership of the Climate High-Level Champions, the Marrakech Partnership for Global Climate Action supports the implementation of the Paris Agreement by fostering collaboration between governments and non-state actors, including businesses, cities, regions and civil society, to accelerate climate action. The Partnership operates across several thematic areas – energy, industry, human settlements, transport, water, oceans and coastal zones, land use and finance – encouraging cross-sector collaboration to scale up climate solutions. WBCSD serves as the Industry Focal Point within the Partnership, which involves many organizations that have provided extensive input and contributions to the development of the Business Breakthrough Barometer.

About Bain and Company

Bain and Company is a global consultancy that helps the world’s most ambitious change makers define the future. Across 65 cities in 40 countries, Bain works alongside its clients as one team with a shared ambition to achieve extraordinary results, outperform the competition, and redefine industries. The firm complements its tailored, integrated expertise with a vibrant ecosystem of digital innovators to deliver better, faster, and more enduring outcomes. Bain’s support to WBCSD is part of the firm’s 10-year commitment to invest more than \$2 billion in pro bono services to bring Bain’s talent, expertise, and insight to organizations tackling today’s urgent challenges in the environment, education, racial equity, social justice, and economic development. Since the company’s founding in 1973, Bain has measured its success by the success of its clients: more than 64% of the Global 500, private equity funds representing 75% of global equity capital, leading nonprofits and innovative startups.

About WBCSD

The World Business Council for Sustainable Development (WBCSD) is a global community of over 225 of the world’s leading businesses driving systems transformation for a better world in which 9+ billion people can live well, within planetary boundaries, by mid-century. Together, we transform the systems we work in to limit the impact of the climate crisis, restore nature and tackle inequality. We accelerate value chain transformation across key sectors and reshape the financial system to reward sustainable leadership and action through a lower cost of capital. Through the exchange of best practices, improving performance, accessing education, forming partnerships, and shaping the policy agenda, we drive progress in businesses and sharpen the accountability of their performance.

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