Business Breakthrough *Barometer 2024*

→ The annual pulse check from leading business on the net zero transition

World Business Council for Sustainable Development

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BREAKTHROUGH AGENDA

Marrakech Partnership

RACE TO ZERO

Contents

Message from the CEO

Halving emissions by 2030 is not just an essential goal, but a catalyst for new investment and business opportunities.

As governments convene in Baku, Azerbaijan this year, there are two critical challenges: mobilizing finance and developing national climate action plans that will drive a decade of investment in decarbonization and resilience. These challenges are interconnected and rely on swift and decisive action by businesses to succeed.

The Business Breakthrough Barometer provides the first annual pulse-check from leading businesses on the opportunities and challenges of the net zero transition and it highlights where governments can best focus effort to create stronger market incentives for investment.

The message from leading businesses is clear:

- → They are already making bold investments. The solutions exist and they perceive significant business opportunities from the net zero transition across energy and industry sectors.
- → But, the investment case is still not well understood by many in the wider investment community, leading to capital markets giving mixed signals.
- → And businesses are facing sector-specific challenges including supply chain cost increases, feedstock constraints and lack of long-term offtake agreements.
- → This is resulting in insufficient capital flowing to low-carbon solutions which is slowing down the scale and speed of the transition, and means that many solutions remain expensive.

Setting ambitious targets - by governments or leading businesses - alone will not create the market conditions necessary for scaling investment. Industries require long-term, sector-specific policies that move beyond voluntary efforts and chart a clear path forward.

Businesses also need to go further by integrating carbon performance into their decision-making and disclosure, publishing transition plans and moving from a demand "signal" to demand "action" for low and zero-carbon products.

Additionally, we need a fundamental rewiring of the financial markets to tilt their capital allocation and valuation incentives toward the scaling of net-zero solutions.

Collaboration and action by countries, businesses and investors can increase investment, ensure economic resilience and future-proof jobs and industries.

We know that the net zero transition is not only possible, it is underway. Businesses at the forefront of the transition are ready to double down and invest further. Now governments must act decisively with bold policies to enable this new wave of opportunity.

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

Introduction

01.

01. Introduction

This 2024 Business Breakthrough Barometer provides the first annual pulse check from businesses on the pace of the net zero transition and what is required to accelerate large-scale investment. The report covers six of the seven sectors covered by the Breakthrough Agenda: **road transport, buildings, steel, cement, power and hydrogen**, along with additional sectors like **shipping, aviation, chemicals, sustainable fuels and batteries** due to their carbon footprints and technological importance in the transition, **collectively constituting more than 70% of total global emissions.**

Business has a critical role to play. The transition relies on business leaders taking risks, driving innovation and allocating capital into net zero business models. Yet business must respond to commercial reality and in 2024 are faced with multiple urgent challenges including strained supply chains, inflation and geopolitical insecurity.

The businesses involved in the Barometer are leaders of the energy and industrial transitions. These companies range from start-ups and multinational corporations to producers and customers across various countries. Collectively, they have trillions of dollars in annual revenue, millions of employees and hundreds of thousands of suppliers. These businesses are leaning in to drive the net zero transition and see themselves as more, or at least as, ambitious as governments.

For governments to succeed, these businesses are indispensable partners in delivering investment, creating jobs and building thriving economies.

The Barometer provides a global business view on the pace of transition and the countries creating an environment for business to invest, with detailed insights for each sector. This is the first of an annual pulse check from this group of transition leaders to gauge progress and identify what needs to be in place to maintain and accelerate momentum.

250
EXECUTIVES SURVEYED

65
TRANSITION-LEADING BUSINESSES INTERVIEWED

+2 trillion
IN ENTERPRISE VALUE

97%
view themselves as more or as ambitious as government

Executive *Summary*

02.

Three-quarters of leading businesses have increased their investments in the net zero transition over the past three years, motivated by growing commercial opportunity.

Despite an uncertain macroeconomic environment, 74% of executives reported increased investments in the net zero transition over the past three years driven by significant business opportunities, with a third committing more than 50% of their capital expenditure.

74% **have increased investments in the net zero transition over the past three years**

Clean energy investment is again defying expectations in 2024 as investments in renewable generation soared, whilst in harder-to-electrify sectors, voluntary demand has sustained a growth in investments to date. An explosion in battery manufacturing capacity and rapid cost reduction is expanding electrification opportunities.

Policy measures such as the U.S. Inflation Reduction Act, forthcoming EU SAF mandates and hydrogen auctions are driving investment and increasing the focus of businesses on decarbonization strategies. Access to cheap, renewable energy is a major draw, with many emerging countries rapidly expanding their EV or renewable power generation where there are strong local policies coupled with access to capital.

91% **view the transition as an opportunity**

However, the next set of large-scale investments are at risk due to the lack of a strong investment case and slow infrastructure scale-up.

66% state that the investment case and infrastructure are the main barriers to acceleration, with frustration that market structures are not effectively rewarding investments in low-carbon technologies slowing the pace and scale of the transition.

66% **report that the investment case and infrastructure are the most urgent barriers**

Businesses cite a 50% inflation in plant capital expenditure costs, rising renewable energy prices, uncertain revenue models, slow permitting processes, limited low-carbon fuel supply, long grid interconnection queues and slow roll-out of charging networks as holding back investments.

Transition leaders stress the critical importance of scaling renewable power generation for all sectors and the need to move beyond a reliance on voluntary demand which is not increasing at the pace needed for sectors such as steel, cement, aviation, shipping and chemicals.

Businesses are ready to significantly increase investment levels if governments step-up with long-term sector-specific policies and stronger international coordination.

Businesses identify the need for long-term sector-specific industrial policies with a focus on simplified permitting, mandated demand, revenue guarantees for early-stage technologies, direct government intervention to build-out infrastructure and continued innovation funding.

Over three-quarters of business leaders say deeper and more effective coordination among major economies is essential, particularly on harmonized definitions and standards, demand commitments, fit-for-purpose international trade rules and cross-border infrastructure.

67% of business leaders say implementing these policies would have a significant impact on investment levels, with 15% of executives indicating their businesses would invest an additional 50% or more.

67%

say progress in critical policy areas would have a significant impact on investment levels

Key *findings*

→ 2024 Market insights from leading businesses

03.

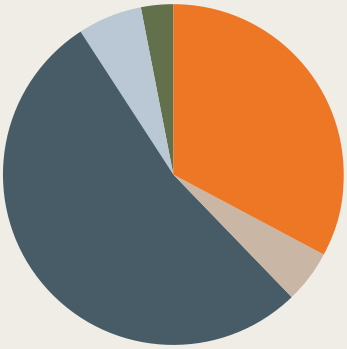
03. Key *findings*

The pace of the net zero transition is accelerating, with leading businesses seeing commercial opportunity and already making significant investments.

Despite an uncertain investment environment, businesses are committing significant capital to the net zero transition, with 91% viewing it as fully or partly as an opportunity. 74% of transition-leading companies report increasing investment in the transition over the last three years, with 35% investing more than 50% of their capital.

Figure 1: Business sentiment on net zero transition opportunity

As many as 33% of businesses see the transition primarily as an opportunity, just 9% see it only as challenge.

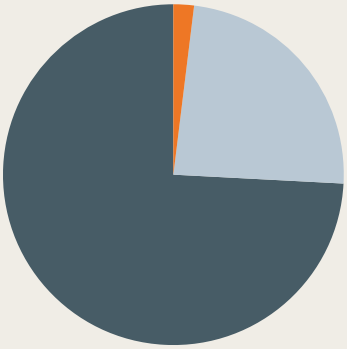


View on transition (survey, %)

- **33%** Mainly an opportunity
- **5%** Somewhat an opportunity
- **53%** Both an opportunity and a challenge
- **6%** Somewhat a challenge
- **3%** Mainly a challenge

Figure 2: Business sentiment on change in net zero aligned investments over last 3 years

74% of businesses have increased their net zero aligned investments over the last three years.



Change in net zero investment over past 3 years (survey, %)

- **2%** Decreased
- **24%** Stayed the same
- **74%** Increased

Figure 3: Business sentiment on CapEx envelope allocated to net-zero business models or assets

Businesses are already investing significant capital, with 35% investing over half of their total CapEx in the transition.

% of CapEx envelope aligned to net zero (survey, %)

- **17%** 0-5%
- **17%** 6-10%
- **15%** 11-20%
- **17%** 21-50%
- **35%** >50%

Clean energy investment has outperformed expectations, with investments in clean energy technologies and infrastructure predicted to surpass two trillion USD in 2024, according to the IEA.

→ Businesses see the overall pace of the transition accelerating, with global installed renewable capacity growing by 13% last year. Over $130 billion was invested in China in solar alone, where panel costs were 50% lower than in Europe and 65% cheaper than the US.

→ Most large economies are now "power swing states" – countries increasing their share of renewable generation faster than the growth of their power sectors. Businesses identify markets as attractive due to abundant natural resources, growing energy demand and stable regulatory environments such as Brazil, India and UAE.

In harder-to-electrify sectors, voluntary demand continues to sustain a significant growth in capital investments in 2024.

→ Steel majors are committing billions to clean technologies. Planned hydrogen-based Direct Reduced Iron (DRI) capacity jumped 150% in the last year. Existing production is also fully sold out due to growing voluntary demand. Businesses expect this strong momentum will be sustained towards 2030, albeit still falling short of 1.5C compatible production levels.

→ Shipping majors are beginning to future-proof their fleets, as the order book for methanol-capable vessels grew by 80% from 2023 to 2024 (accounting for 5% of the total order book in 2024), accelerating a three-year trend and catalysing interest in green methanol as a fuel.

→ Cement companies are investing in alternative fuels and clinker reductions, as well as projects to capture up to 27 million tons of CO2 annually by 2030, betting on future carbon pricing or low-carbon cement procurement to ensure returns.

- → Sustainable Aviation Fuel capacity is expected to grow 165% this year due to strong voluntary demand, despite a cost 2-3 times the price of conventional fuel.
- → Chemicals companies are beginning to invest in electrified steam crackers, which are critical for decarbonizing energy-intensive processes.

There are clear signs that more ambitious policy measures are accelerating corporate action.

- → Companies both within and outside the EU report a greater focus on decarbonization following agreement on CBAM and ETS reform.
- → Forthcoming EU SAF mandates and an uptick in clean fuels policies in other markets are providing a substantial boost to sustainable fuel demand, prompting a greater focus on clean fuels strategies by energy providers.
- → Emergent sectors such as green hydrogen have taken a major leap forward in 2024 as business doubled the level of capacity globally to 8.8Mtpa in response to government auctions.

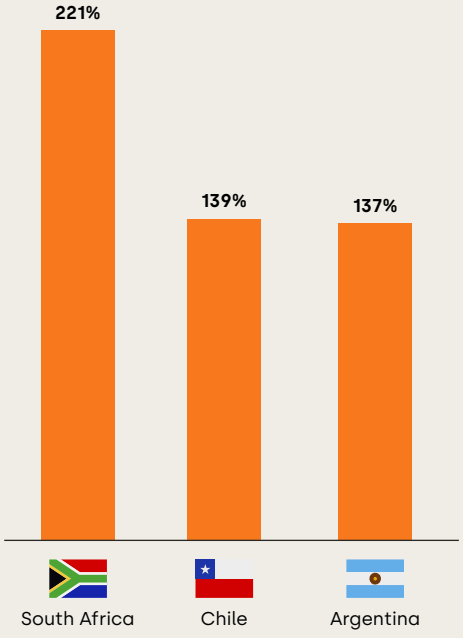
Advances in technologies - particularly batteries - are reshaping industries and expanding electrification opportunities.

- → A massive increase in battery manufacturing capacity combined with cost reductions of up to 40% in the first half of 2024 now places batteries 25% below the price point for EV to ICE price parity, creating enormous potential for mass-market electric vehicles.
- → In the road transport sector, vehicle manufacturers are almost universally planning for an electrified world. This is one of the sectors where businesses most frequently report that they are more ambitious than government.
- → Electrification gained traction in shipping, with an anticipated ~50% increase in short-distance vessel orders this year (primarily ferries and cruise liners).
- → Grid-scale battery storage more than doubled in 2023, enabling better integration of renewable energy into power grids, while also balancing the system in places like California and Texas.

Changing energy supply dynamics are prompting a rethink in traditional supply chains, creating an opportunity for developing countries with abundant renewable potential.

- → Many emerging countries are rapidly expanding their renewable power generation. South Africa, Chile and Argentina have grown their renewable generation share over the past three years by 221%, 139% and 137% respectively.
- → "EV swing states" like Vietnam, Malaysia and Indonesia are doubling or even quintupling year-on-year electric vehicle sales. Strong local policies often coupled with Chinese investments are fuelling a boom in EV adoption, creating a new dynamic in the auto industry.
- → In steel, the high costs of transitioning from traditional coal-fired blast furnaces to DRI plants is triggering business interest in new production hubs in geographies with abundant cheap renewables such as in the Middle East and Africa.

Figure 4: Total growth in share of renewable energy (%, 2020-2023)

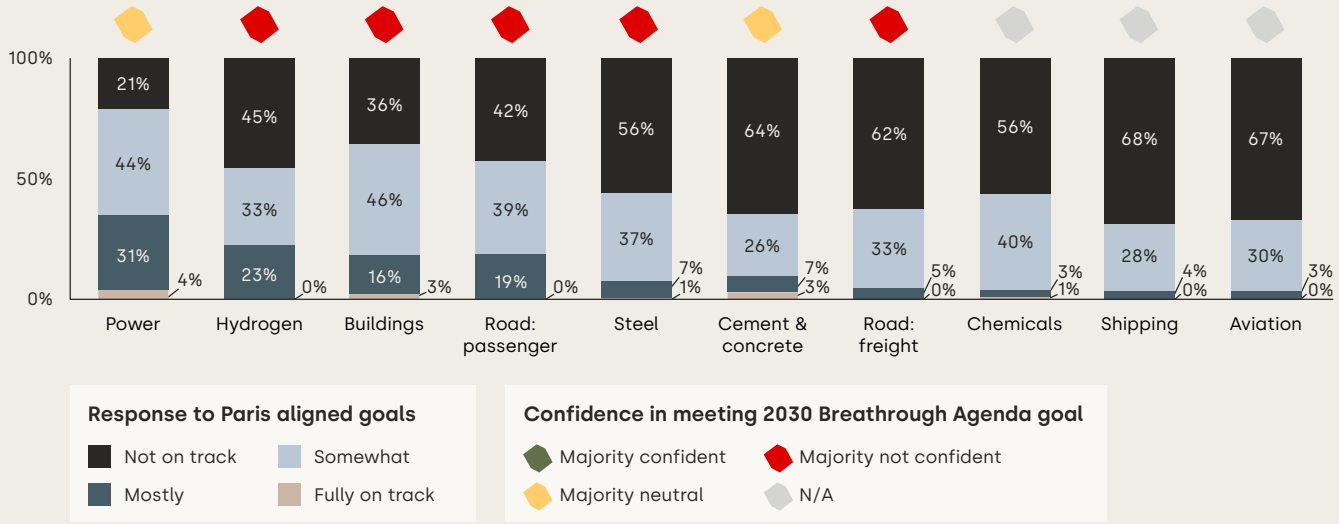


> ***The reality of the [battery] oversupply from China, but also the pricing, could very well be a benefit in terms of providing access to entire countries and societies that cannot afford it otherwise."***
>
> ***Policy Leader, Emerging Economy***

Businesses remain concerned that the transition is not on track. The next set of large-scale investments are at risk with the investment case and slow scale-up of hard infrastructure, such as the grid and charging points, the main barriers slowing the transition.

Only 1% of business leaders consider the transition to be on track for net zero, with no sectors considered on track for the 2030 Breakthrough Agenda goals.

Figure 5: **Business sentiment on sector progress to Paris aligned goals**



In the short-term, businesses are concerned that macroeconomic headwinds are holding back the next set of large-scale investments, which will reduce the ability to get on track to net zero targets.

- → Energy-efficient building investments have dropped 5% over the past year globally, driven by higher financing costs and a slowdown in commercial real estate development.
- → Businesses report a 50% inflation in plant capital expenditure costs and rising renewable energy prices, making it increasingly difficult to meet green hydrogen cost targets and slowing project development.
- → In the EV sector, while growth remains strong in emerging markets, businesses in developed markets are adjusting sales projections, citing slowing government support and the rollback of subsidies.
- → Steel producers point to projects delayed or with scaled-back ambition over the last 12 months due to the challenges in securing approval for investments, with rising capital costs a key issue. Capital initially intended for green projects has been shifted back to traditional business.

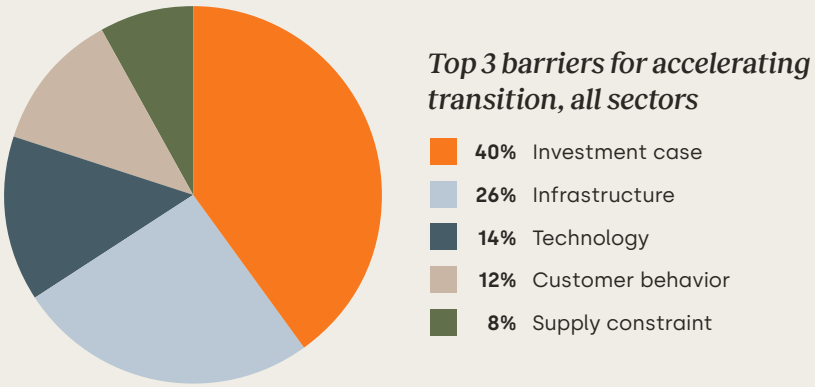
Businesses stressed the importance of scaling renewables for all sectors to get on-track. However, there is a mixed picture, with a slowdown in investments for new projects, despite stabilization and declines in turbine and solar panel prices.

- → In Europe, sector leaders report a weakening in investor sentiment. Although Europe still remains on track for 2030 sector targets, project pipeline has reduced by 13% since last year. Sector leaders are concerned that more of this pipeline could be scaled back or delayed due to slow permitting processes.
- → In the US, investment levels have risen significantly following the Inflation Reduction Act, but businesses are concerned that growing capacity queues are creating a significant bottleneck for deployment.

Businesses are facing fundamental transition barriers in all sectors. Technology is no longer the main challenge, with 66% stating that the investment case and slow scale-up of hard infrastructure are the most urgent barriers to accelerating the transition.

- → In sectors like steel and cement, businesses are hesitant to commit to large-scale decarbonization projects because of the significant upfront costs and uncertain revenue models, particularly for technologies like carbon capture and storage (CCS) and green hydrogen.
- → Businesses in harder-to-abate sectors, such as chemicals and heavy industry, are struggling with limited business customer willingness to commit to long-term binding offtake agreements for clean technologies, as well as challenges around carbon leakage within global commodity markets.
- → Voluntary offtake agreements fell last year for Sustainable Aviation Fuel (SAF) and airlines are concerned about the availability of affordable SAF, particularly due to feedstock constraints.
- → Shipping operators warn that the transition hangs in the balance despite rising orders for low-carbon vessels, as low-carbon fuel supply (such as methanol and green ammonia) is not scaling.
- → In the automotive sector, businesses cite the slow development of charging networks, especially for freight and long-distance transport where it is the major bottleneck to broader adoption.
- → In the renewable energy sector, businesses are facing long grid interconnection wait times and struggling with outdated infrastructure. This is creating critical delay to the integration of new solar and wind capacity, just as load growth in many markets is set to expand rapidly.

Figure 6: Business sentiment to barriers for accelerating net zero transition

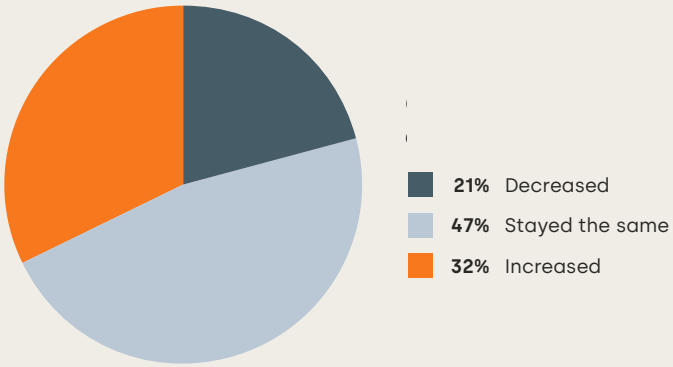


Business confidence in governments addressing these barriers has stagnated over the past three years, with only 32% saying their confidence has increased.

- → Sentiment is not uniform across sectors. Confidence within power and steel players has declined, whereas those in cement, shipping and aviation cite increased confidence, reflecting greater alignment on transition pathways and emerging government policy over the past few years. In chemicals there has been no change, with limited policy push from governments or demand pull.
- → Nevertheless, across all sectors, businesses are increasingly concerned about the deteriorating international trade environment, as rising geopolitical tensions and competing industrial policies are driving fragmentation across major economies.

Figure 7: Business sentiment on confidence in governments' ability to support and enable the net zero transition

Confidence in governments' ability to support and enable the net zero transition has stagnated over the past 3 years



Businesses say more ambitious policy from government would unlock investment to drive the transition further, faster.

Bolder policy measures will result in greater allocation of capital to the transition.

If targeted sector policy measures were implemented, 90% of business executives say they would invest more. 15% indicate their businesses would invest +50% more, with the majority increasing investments by 10-50%.

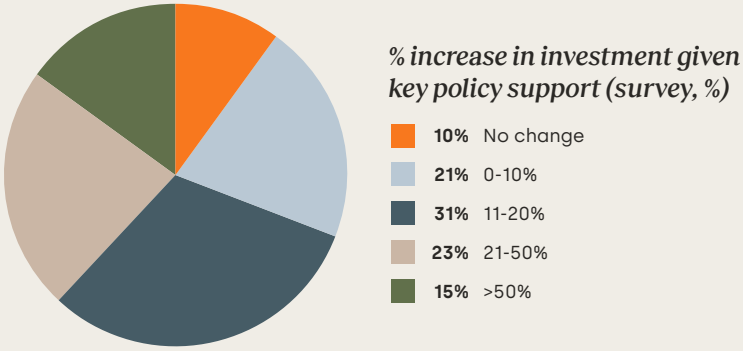
At the domestic level, frontier businesses welcome strong industrial policy, with multi-year transition plans needed backed up by sector-specific policies.

Building out low-carbon power generation and economy-wide carbon pricing will not be sufficient alone. To unlock investment in large-scale energy and infrastructure projects, governments need to work with business to co-create long-term integrated transition plans, backed up by sector-specific policies that remove barriers and provide targeted support for deployment.

- → **Where the transition is investable, governments need to reduce regulatory hurdles:** In sectors like power, fast-tracking and simplified permitting processes for critical infrastructure would significantly catalyze further investment, with early engagement with communities needed to build societal support.
- → **In most sectors, bolder demand creation measures are needed:** We can't wait for a Darwinian process of market evolution. Stronger intervention is needed to drive adoption of near-zero steel, low-emission cement, e-fuels, and green chemicals. Well-designed mandates - with penalties for non-compliance - as well as use of public procurement are crucial to get these markets moving.
- → **Revenue support mechanisms will catalyze markets:** Companies don't want indefinite subsidies, but they do need price certainty. Revenue guarantees are catalytic for early-stage technologies like green hydrogen. Contracts for difference that offer long-term, flexible support tied to market conditions can be more effective than short-term subsidies.

Figure 8: Business sentiment on increase in investment given key policy support

Over 90% of businesses say progress in critical policy areas would positively impact their investment.



- → **Don't count on the invisible hand to fix infrastructure development:** Direct government intervention is needed where infrastructure is lacking, especially in sectors like road transport where adoption could easily outpace the infrastructure build-out. Waiting for the market will only erode investor confidence and slow the transition.
- → **Targeted support for innovation remains important:** In sectors where long-term solutions are underdeveloped - such as cement and chemicals - governments need to provide more funding to share the risks of technology development and scaling.

Businesses stress the need for deeper and more effective coordination between major economies with over three-quarters saying it is highly important for the net zero transition, but only a quarter saying it is currently effective.

- → **Vanguard businesses see a need for more effective multilateral governance:** Global institutions focused on sectoral cooperation are underpowered. Leading economies need to lean in and back dedicated fora to overcome sector-specific challenges.
- → **Harmonized standards and definitions are essential:** Global alignment on standards and definitions for key technologies - such as green hydrogen, steel and batteries - is a prerequisite for market integration. Businesses are frustrated by the pace of development with fragmented approaches slowing investment, technology adoption and hindering cross-border trade.
- → **Stronger demand-side policy coordination would grow new markets faster:** Greater demand-side policy alignment between countries, including on green product mandates, phase-out dates and public procurement targets would accelerate the scale-up and diffusion of technologies through global markets and spread the risks and costs between countries.
- → **Fit-for-purpose and aligned trade rules:** transition leaders are supportive of international trade rules that incentivize decarbonization efforts but are seeking consistency and careful design that avoids distorting global markets and increasing trade tensions and fragmentation.
- → **Cross-border infrastructure development:** for specific sectors including power, hydrogen and road transport, businesses identify the need for stronger regional coordination to enable markets to reach scale faster and deliver benefits to consumers.

Figure 9: Business sentiment on importance of international coordination

85% say that international coordination between governments is very important to enable a net zero transition.

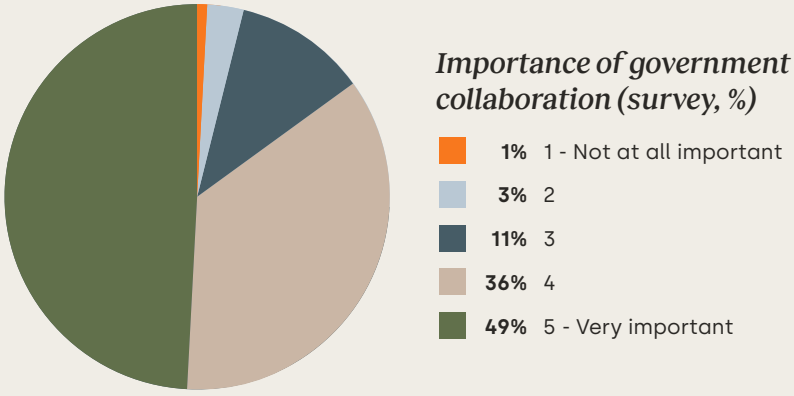
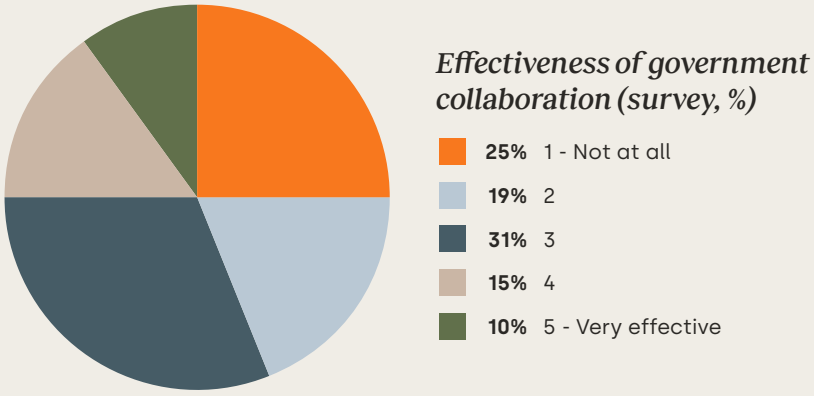


Figure 10: Business sentiment on effectiveness of international coordination

Nearly half (44%) say international coordination between governments is currently ineffective in their sector.



Sector *Barometer*

04.

04. Sector *Barometer*

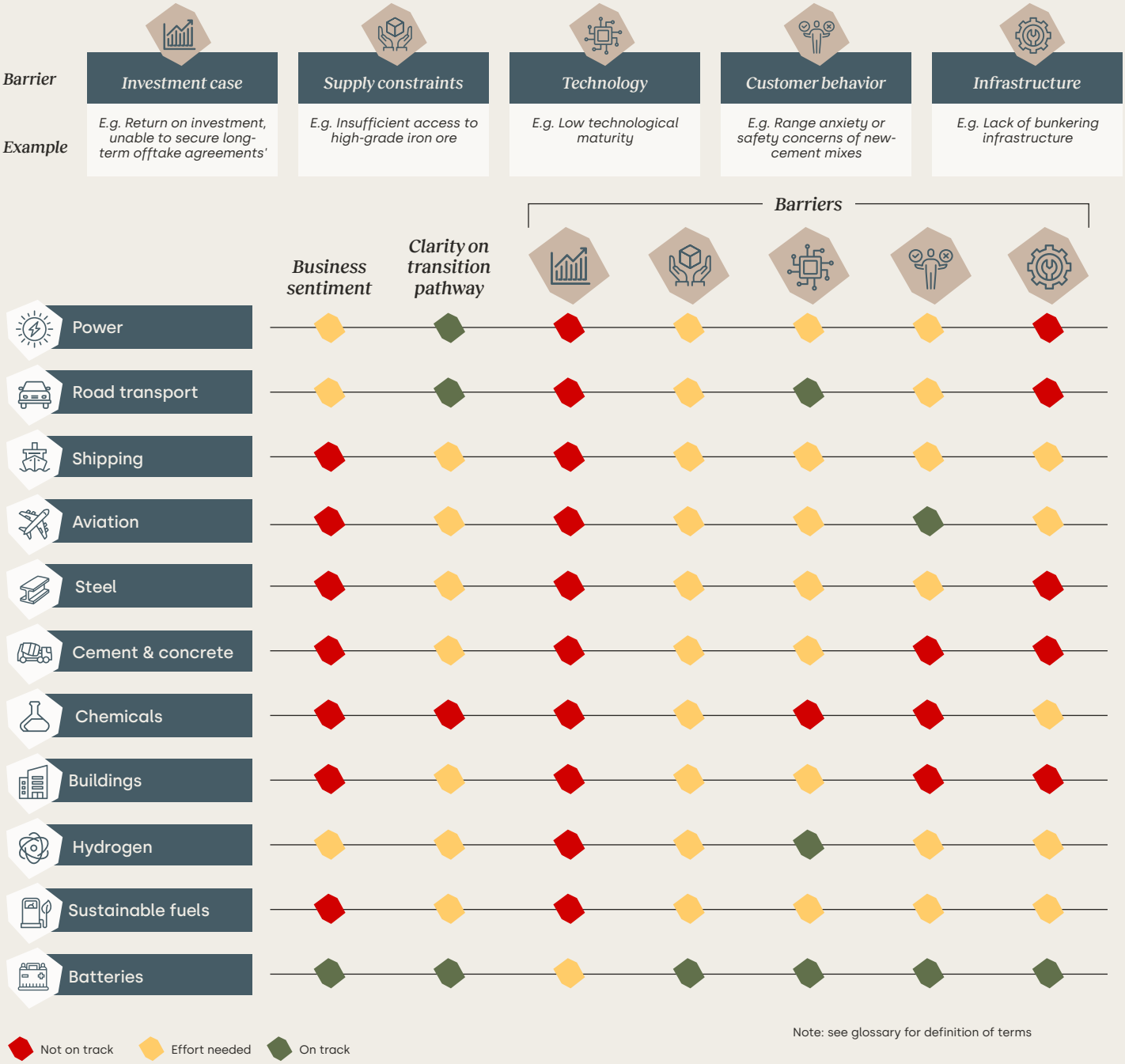
The Sector Barometer provides a snapshot of the views of leading businesses on progress and critical barriers to accelerating action. Whilst individual business views vary, this synthesises sentiment, with further detail provided for each sector in the coming pages.

- → The business sentiment captures the perspective on the overall pace of transition of the sector and the confidence that the barriers to close the gap will be rapidly overcome.
- → Over the past few years there has been rapid development of sector roadmaps, resulting in all except the chemicals sector having some clarity on the transition pathway.

For the power, road transport and batteries sectors the way forward is clearest, whilst in other sectors there are still multiple competing pathways, as technologies are rapidly evolving and with significant feedstock constraints.

- → The main barrier in 2024 highlighted throughout the Barometer and by the vast majority of businesses is the investment case – with revenue models, the cost of capital and policy uncertainty all weighing on the ability to accelerate the transition as fast as many businesses want to.

Figure 11: Sector progress and barrier overview



Note: see glossary for definition of terms

Countries *to Watch*

05.

05. Countries *to Watch*

The countries highlighted below were consistently raised by businesses as those creating the conditions for investment and market opportunity. Each country has specific opportunities in the global net-zero transition based on its natural resources, industrial base and consumer needs with increasing competitiveness as countries seek to capture investment, deliver energy security and tackle climate change.

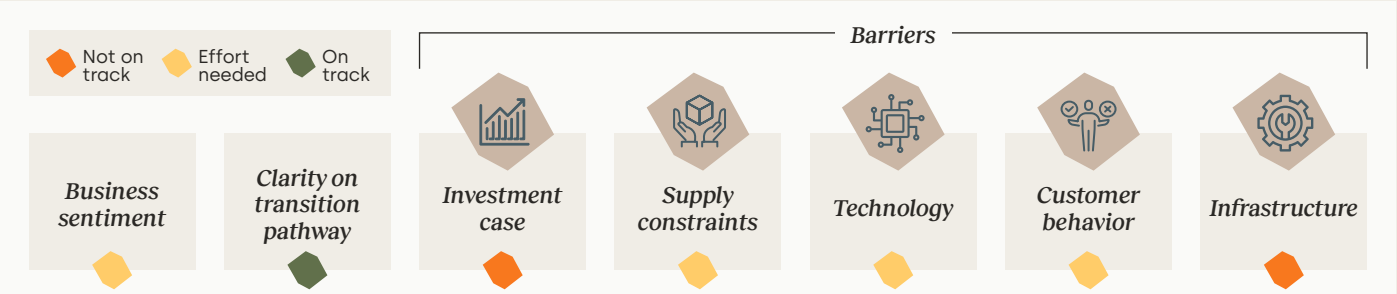
Figure 12: Countries to watch, by sector

Power	Attractive region for renewables **due to tax credits**	Growing demand, abundant resources, and **supportive policy**	Setting ambitious offshore targets while **upgrading grid**
Road transport	Federal investment into **EV charging infrastructure**	**Government support for investment** driving mass production	Rapidly advancing **green fuel cell technology**
Shipping	US and Norway co-led international action on decarbonizing shipping	Domestic operators **leading orders into net-zero vessels**	**Demand aggregator and leading developer** of net-zero bunkering
Aviation	Deploying incentives to establish itself as a **leading SAF producer**	**Unveiled first Alcohol-to-Jet SAF plant,** a key step to expand supply	SAF mandates of 10% by 2030, **among most ambitious globally**
Steel	**State investing jointly with producers** for new facilities	Producers committing to **decarbonized production assets**	**Government pledging capital** to pioneering technologies
Cement and concrete	Nationally mandated **clinker content reduction**	Deployment of **carbon capture projects across region**	All state transport dept approved use of low clinker cement mix
Chemicals	Producers investing into **electrification of key processes**	Broad policy support to scale **low-carbon ammonia use**	**Tax credits** boosting chemical carbon capture and storage
Buildings	**Regulations on maximum embodied carbon in new builds**	**Mandatory whole life carbon assessment** for new builds	**Whole life carbon** limits in place for new buildings
Hydrogen	**Attractive region to set up production** due to tax credits	**FID surge** due to significant hydrogen incentives	Ambitious hydrogen targets supported by **broad policy support**
Sustainable fuels	**Unveiled first Alcohol-to-Jet plant,** a key step to expand supply	**Ambition to lead on Sustainable Aviation Fuels** development	Can leverage **abundant feedstock** supply to scale
Batteries	Explosion of capacity driving **record-lows in battery prices**	**Significant tax credits** to set up domestic battery supply chains	Accelerating pace of battery **energy storage deployment**

Sector *Summaries*

06.

Power | Barriers and Policy Priorities



Key sector barriers

Infrastructure

- Businesses, particularly in North America, point to **physical grid limitations and growing capacity queues** as key barrier
- In Europe, network gaps remain an issue, but sector leaders are more concerned that **regulatory approval processes** (e.g., permitting and siting) are stifling the pace of deployment

Investment case

- Businesses stress that a key barrier is investment uncertainty, as **fluctuating electricity prices and the intermittent nature of renewable energy** makes it difficult to secure reliable returns, and that price and supply volatility are discouraging long-term commitment

Supply constraints

- Industry leaders cite **shortages in critical raw materials,** such as rare earth elements and high-grade silicon, as limiting next-generation renewable energy manufacture
- The sector also notes a **growing shortage of skilled workers** for installing and maintaining new and existing capacity

Policy priorities

Permitting and approvals

Businesses stress that policy intervention in **cutting red tape and expediting permitting** is critical to accelerate renewable energy deployment and ensure reliable returns

Companies agree that **unified interconnection guidelines** will simplify grid integration and reduce delays

Grid upgrades

Companies call for immediate investment in **grid capacity expansion** to manage intermittent renewables, cut curtailment and secure a stable energy supply

Businesses insist that **smarter grids are essential for real-time energy management** and to accelerate the transition

Market reforms

Businesses call for **stronger market integration** through cross-border connections and regulations to ensure fair and efficient energy trade

Companies urge for policy intervention for **reformed energy pricing models that encourage dynamic pricing** and incentivize demand flexibility, to better reflect the availability of renewable energy and reduce costs

Policy focus National International

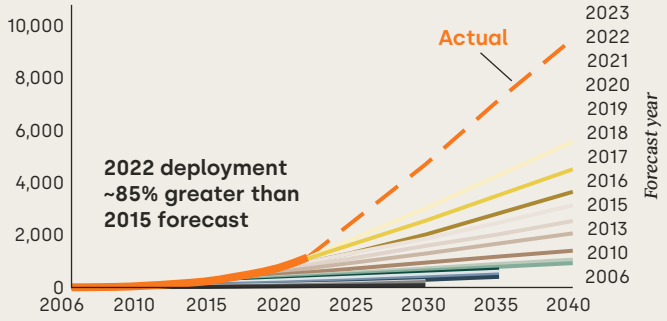
Across sectors, business is most positive about the prospects for the power transition with over 80% indicating that Breakthrough Agenda goals could be met, driven by massive investments and falling material prices. Across sectors, leaders agree renewable power is critical for the broader transition.

1 Renewable generation continues to outpace forecasts: 70% of sector leaders are at least "somewhat confident" that governments will provide sufficient support for building out generation capacity.

2 Sector leaders are most confident that grid investments will keep pace with generation in China and Europe, and least confident in SE Asia.

Figure 13: Solar electricity generation capacity, actual versus forecast deployment, by year

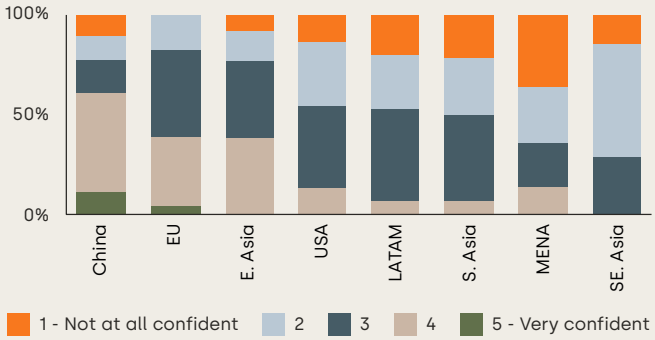
Solar electricity generation capacity (GW)



Bain analysis on IEA data

Figure 14: Business sentiment in tripling renewable electricity capacity, by region

Confidence in tripling capacity (response share %)

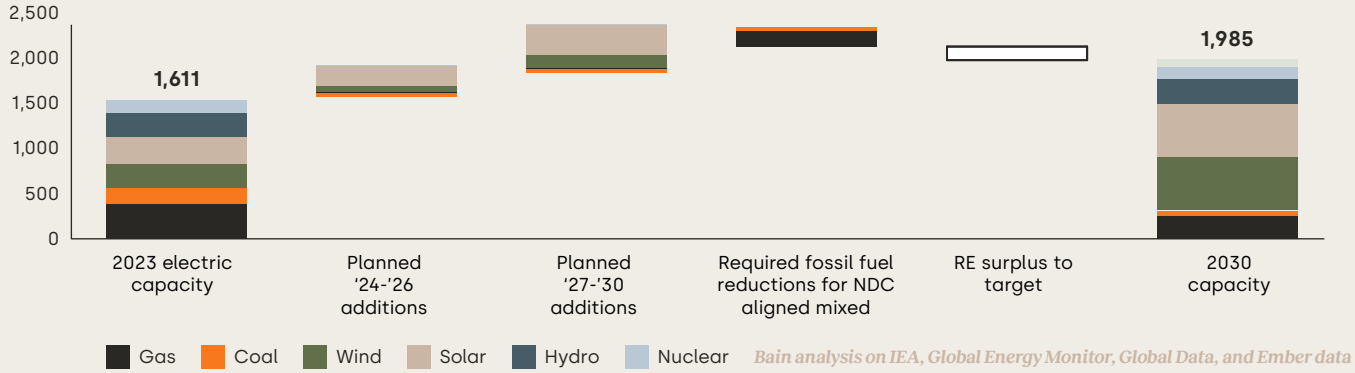


Business Breakthrough Barometer Sector Survey

3 In Europe, sector leaders point to a weakening in investor sentiment, though most remain confident that 2030 targets would still be met with a 150 GW surplus

Figure 15: Actual and planned electricity capacity towards 2030, by source, Europe

Electric capacity by source (GW, Europe)

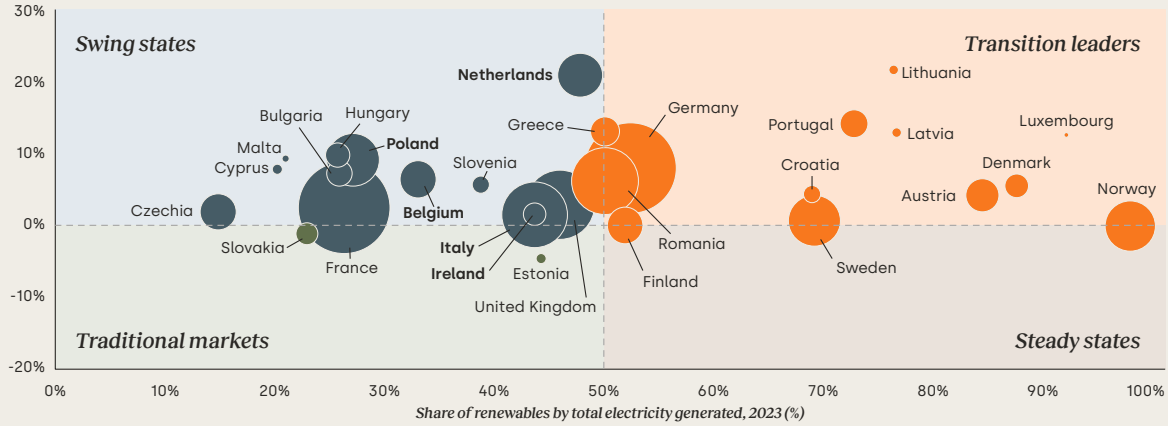


Bain analysis on IEA, Global Energy Monitor, Global Data, and Ember data

4 While the overall market has slowed in Europe, government action is accelerating investment in some markets, for example Belgium, Poland, Italy, Ireland and Netherlands

Figure 16: Renewable energy swing states, Europe

Renewable electricity generation growth, 2020 - 2023 (%)

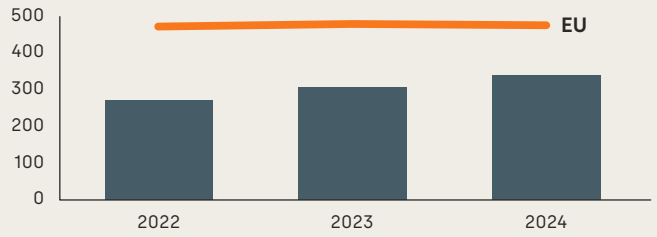


Bain analysis on Our World in Data and IRENA data

5 In the US, projected planned capacity in wind and solar is edging closer to 2030 NDC-aligned targets, with businesses more optimistic about the US market following the introduction of the IRA and subsequent investments. However, there is still a gap to bridge (232 GW) and businesses are wary of growing capacity queues (+27% from 2022 – 2023)

Figure 17: Annual investments in clean energy technology, USA

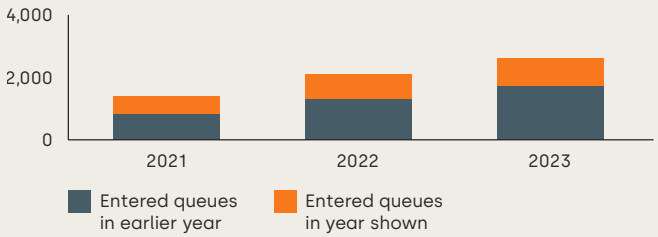
USA investments in clean technology, (USD billions)



Bain analysis on Global Data and IEA data

Figure 18: Cumulative renewable capacity in queue, USA

Cumulative USA capacity in queue, (GW)



Bain analysis on Berkeley Lab data

6 In developed markets, businesses are concerned about maintaining public support through the transition, as the short-term benefits of renewables are not reflected in price drops. Businesses also point to wavering support driven by proximity of infrastructure build out and changes to local job markets.

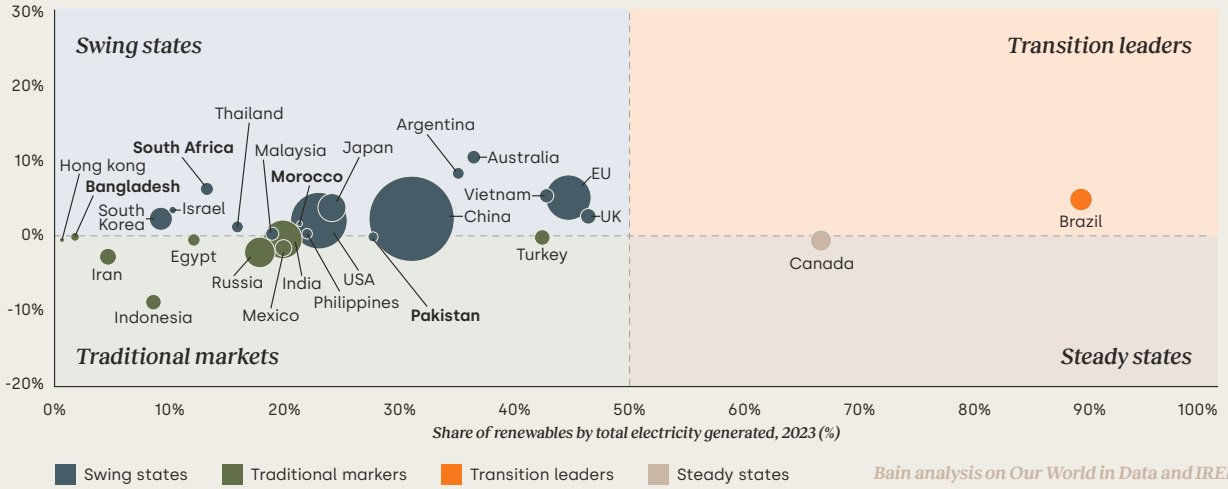
7 Given industry challenges, leaders are focused on doubling down on core markets, with only 4% considering new markets very attractive. This could change if supply chain pressures ease and material prices fall, and where businesses are considering venturing afield, changes in policy are often described as the critical factor driving investment.

> ***"Brazil is a very attractive market because power prices are very low, the economy is growing, and the policy is in place which is driving strong electricity demand."***
>
> ***Director, Power Producer***

8 Effective policy is driving renewable energy investments in swing states: markets where renewables are outpacing power sector growth, for example in South Africa, Argentina, Bangladesh, Morocco and Pakistan where annual renewable share growth has accelerated quickly.

Figure 19: Renewable energy swing states, global

Renewable electricity generation growth, 2020 - 2023 (%)

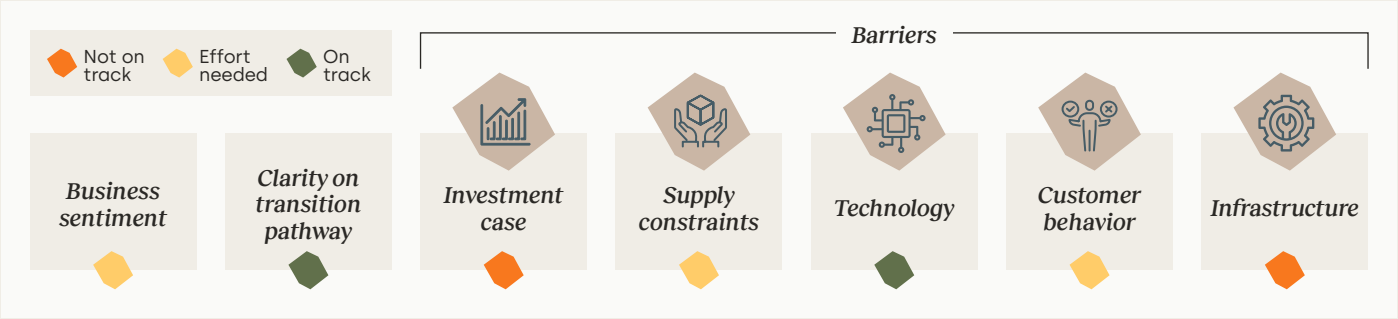


Bain analysis on Our World in Data and IRENA data

9 Business leaders generally view regional coordination as important for the power sector transition to succeed and secure cooperation across fragmented markets.

> ***"There needs to be a lot more regional cooperation between countries just like in Europe. Southeast Asia is one great example where there could be a lot more benefits if the countries worked together instead of by themselves."***
>
> ***Managing Director, Financial Institution***

Road transport | Barriers and Policy Priorities



Key sector barriers

Infrastructure

→ Businesses cite inadequate **charging infrastructure, particularly outside urban centers and along freight routes**, with lack of reliable charging stations fuelling persistent range anxiety

Investment case

→ **Passenger**: Automakers say **high upfront EV costs particularly in the mass market** continue to hinder widespread passenger adoption

→ **Freight**: Businesses stress that in leading markets like the EU there are **limited incentives for freight customers and operators to adopt battery EVs**, which combined with uncertainty around resale values, is slowing deployment

Technology

→ For both passenger and freight, businesses see opportunities to accelerate the transition through **charging speed and battery longevity**, but do not see them as fundamental barriers

Policy priorities

Charging infrastructure

Businesses see the build-out of **charging infrastructure as the top priority** for policymakers

The industry calls for a combination of policy interventions, including **simplifying permitting, and offering financial incentives** to build out charging along key routes through guaranteed floor pricing, and inclusion in public road contracts

Supply chain transparency

Business leaders call for **greater supply chain transparency**, including harmonized material footprints and recycling standards, to level the playing field across geographies as they **decarbonize their own Scope 1 and 2 emissions**

Leaders stress that international coordination on standards and disclosures will **ensure fair competition for those at transition forefront**

Zero-emission vehicle mandates

Businesses note that **zero-emission vehicle mandates have been game-changing in driving investments** from manufacturers

Many manufacturers are calling for more **stable timetables for internal combustion vehicle phase-out**, particularly in public and freight transportation outside of leading geographies

Policy focus National International

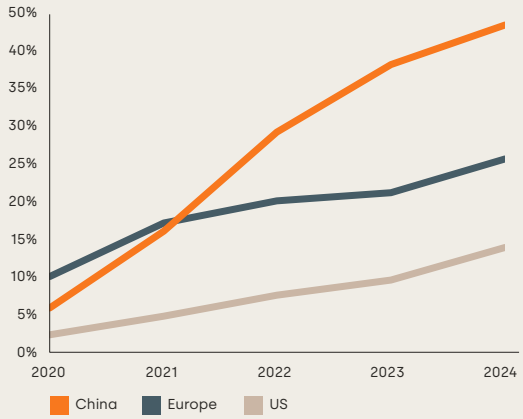
Road transport | Insights

Of all the energy demand sectors, businesses are most positive about the road transport sector transition, with emerging markets rapidly gaining share of EVs. 19% believe the sector is mostly on track for a Paris-aligned transition but worries persist around the build-out of charging infrastructure.

1 Businesses are navigating an accelerating transition: 18% of global light duty vehicles sales are zero-emission or plug-in hybrid vehicles. China is leading growth, whilst in Europe and the US sales continue to increase.

Figure 20: Electric vehicle sales share, by region

EV sales share by region (%)

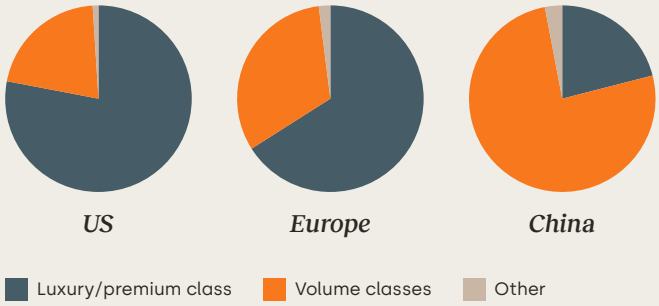


Bain analysis on BofA data

2 Most leading automakers are already planning for a fully electrified world. However, split of the EV market varies, with China leading with mass market vehicles and the US and Europe with premium models.

Figure 21: Electric vehicle class sales mix, by region

2023E LDV unit sales



Bain analysis on IHS and S&P data, Bain EV Market Model

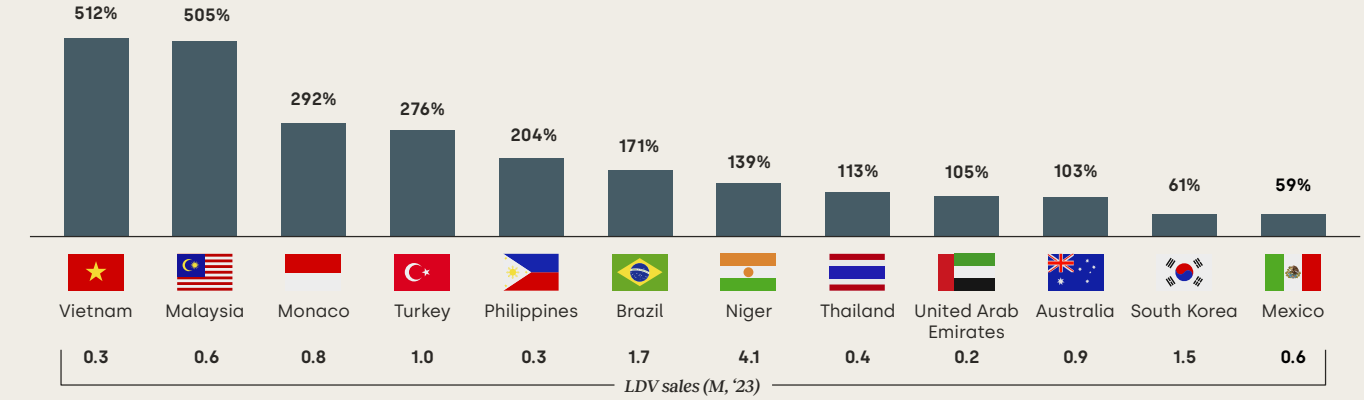
3 Road Transport businesses are among the most likely to see company action as in step with, if not more ambitious than, government policy (94% of respondents). However, business leaders have become sceptical on the future pace of growth as governments roll back commitments, causing some OEMs in the EU and the US to push back targets over the past year.

> ***"It's going to be very tight for some manufacturers to meet 2030 targets they set. We are not seeing the market signals that show sufficient EV adoption by then."***
>
> ***CSO, Freight Automotive Manufacturer***

4 Outside China, Europe and the US, businesses point to growing momentum. Swing states, with limited existing EV penetration, but significant growth potential, will determine the pace of the transition. Leading countries are spurring investments by defining ambitious targets and offering incentives, such as subsidies and tax breaks, for EVs.

Figure 22: Electric vehicle swing states growth and sales, global

Swing States EV growth (%, 2020-2023)



Bain analysis on IEA and BMI data

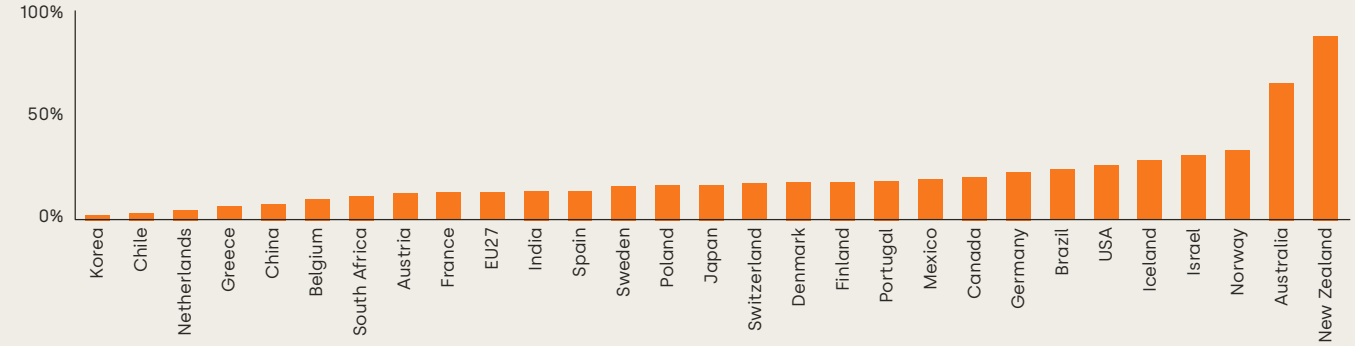
5 The transition faces several barriers, but sector leaders no longer view battery-related range anxiety as a fundamental issue.

> ***"Even though our vehicles now offer a 500 km range, customers are still worried about being able to find adequate charging stations. Range is not the issue – but rather infrastructure."***
>
> ***CSO, Passenger OEM***

6 The biggest barrier to continued momentum is charging infrastructure – automotive manufacturers are concerned as build-out is not keeping pace with sales growth, often resulting in a mismatch between the number of EVs and public chargers available.

Figure 23: Ratio of electric vehicles to public chargers, global

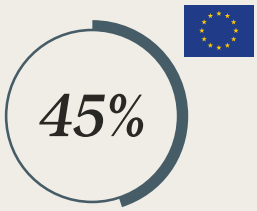
Number of EVs per public charger in 2023



Bain analysis on IEA data

7 Business report a significant increase in EV models available and progress on reaching price parity on premium vehicles. In China, there is an explosion of low-cost EVs which is set to have a profound effect on the global industry, including fragmentation of trade, tariffs and domestic protectionism.

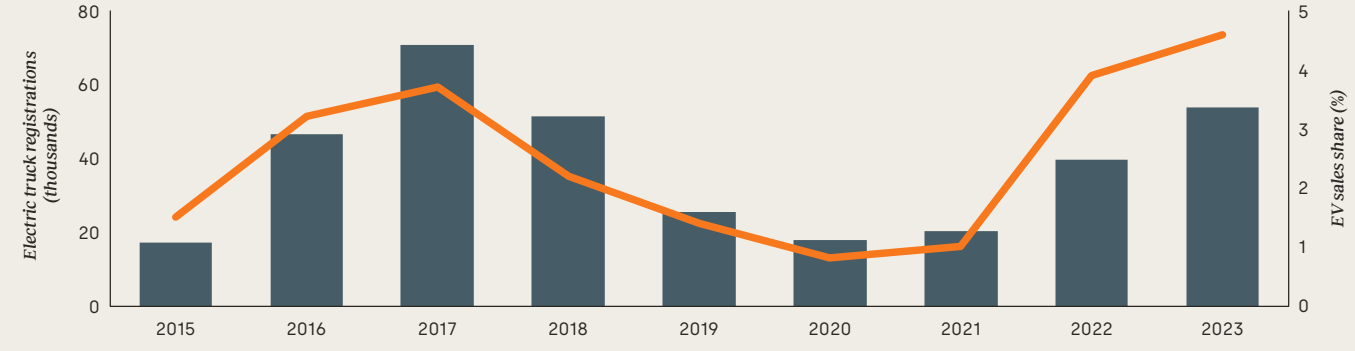
US increase on EV tariff from 25% to 100% announced May 2024



EU tariff on EVs of up to 45% approved by 10 member states October 2024

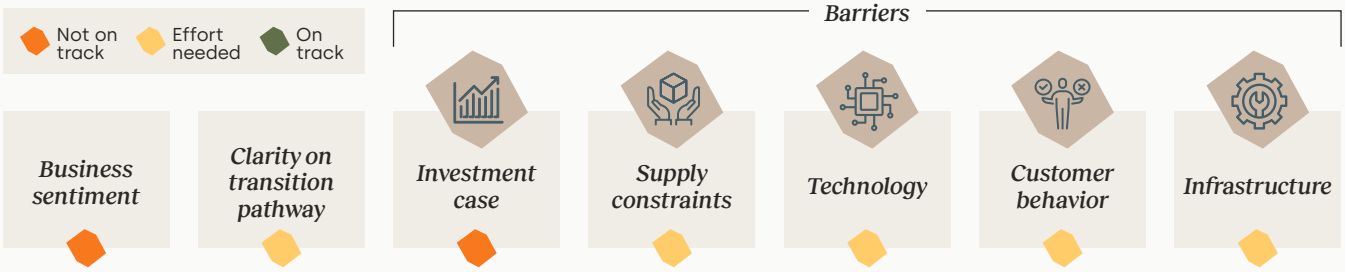
8 Freight EV has seen variable sales penetration over the past decade as adoption has stopped and started. New registrations and sales share are now trending slowly upwards once again, however businesses stress that coordinated investment is needed to support and accelerate the transition.

Figure 24: Electric truck registrations and share of sales, global



Bain analysis on IEA data

Shipping | Barriers and Policy Priorities



Key sector barriers

Investment case

→ Operators point to the **significant cost premium of net-zero fuels** as the top barrier to scale supply and demand, as e-fuel costs are 3-5 times that of conventional fuels

→ Due to the cost differential, **operators are not committing to long-term offtake agreements** at the prices and duration needed by fuel producers to reach final investment decision

Technology

→ Companies constantly point out that **ammonia safety concerns** are holding back further investments, where further developments are needed to allow companies leverage ammonia as a scalable fuel option

Infrastructure

→ **Bunkering infrastructure** commitments increased as green corridor commitments doubled, however, there has been limited progress on deployment, resulting in ship operators exploring the possibility of setting up green bunkering infrastructure themselves

→ **Fuel handling concerns persist due to the lack of global net-zero fuel standards**, but progress is expected as the IMO is set to release ammonia safety guidelines later this year

Policy priorities

Develop fuel supply

Companies see the most pressing need as **addressing the net-zero fuel cost gap**, highlighting incentive-linked demand aggregation, global fuel standard mandates and GHG pricing as key measures to bridge the gap to willingness-to-pay

Incentives for net-zero fuel suppliers are required to de-risk investments into new net-zero capacity (e.g. revenue certainty)

Just and equitable transition

Businesses are calling for **flexibility mechanisms and revenue disbursements** to support vulnerable countries in accelerating their efforts to transition, while also helping them adapt to and mitigate the negative impacts of climate change

Accelerate ship development

Businesses request R&D support on **development of ammonia vessels** and assessing safety concerns to accelerate the timespan when this can contribute to the transition

Net-zero Capable onshore

Port obligations to deploy net-zero fuel bunkering infrastructure are needed to enable net-zero shipping routes

Shipping operators point to the potential of **port access restrictions** to incentivize net-zero fuel investment, with differentiated harbouring fees depending on the vessel type, fuel or GHG emissions.

Policy focus National International

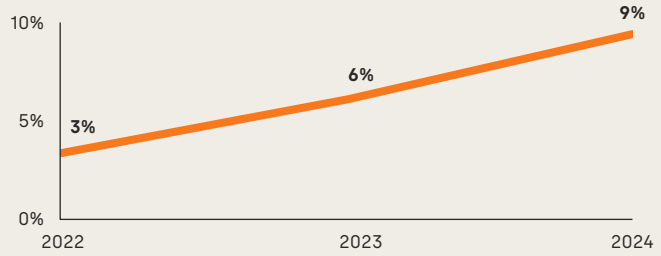
Shipping | Insights

Confidence in a Paris-aligned transition for shipping is the lowest across sectors as net-zero fuel supply is not developing in pace with the net-zero vessel order book, but optimism has improved on policy action in the past three years.

1 The shipping sector is increasing its commitments towards net zero as IMO development drove increased international policy progress, with 9% of the order book capable of operating on net-zero fuels.

Figure 25: Net-zero capable vessel share of total vessel order book

% share of tonnage, 2022-'24

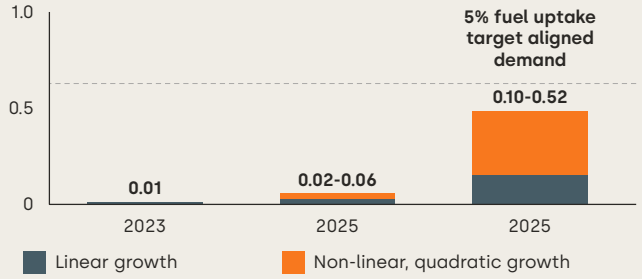


Climate Action in Shipping: Progress towards Shipping's 2030 Breakthrough (2024)

2 Uncertainty remains whether net-zero vessel growth will meet IMO 2030 targets, but recent non-linear growth trends are moving us closer.

Figure 26: Estimated total potential net-zero fuel demand, to 2030

Estimated total potential net-zero capable vessels and implied fuel demand based on fleet growth (in EJ, 2023-2030)

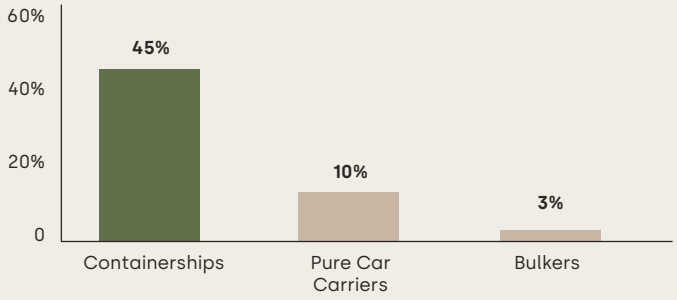


Climate Action in Shipping: Progress towards Shipping's 2030 Breakthrough (2024)

3 Business recognizes there is a divide within the sector, with container operators driving net zero orders as bulk carriers yet to invest in decarbonization at scale.

Figure 27: Share of order book net-zero capable, by segment

Alternative orderbook breakdown by segment (% share of tonnage, 2023)

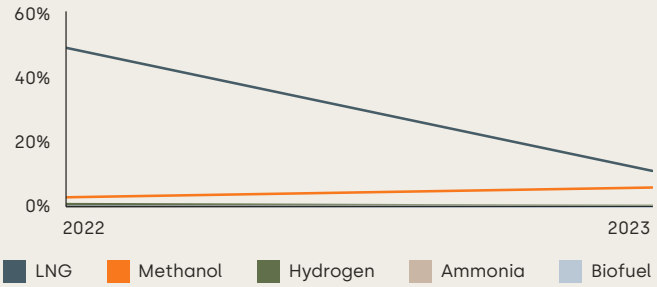


Climate Action in Shipping: Progress towards Shipping's 2030 Breakthrough (2024)

4 Methanol-capable vessels are gaining momentum in the short term, but business believe that multiple low-carbon fuels will co-exist in the future.

Figure 28: Alternate fuel technology share of total vessel orderbook

Alternate fuel technology share of total vessel orderbook (% of tonnage, 2022-2023)



Climate Action in Shipping: Progress towards Shipping's 2030 Breakthrough (2024)

5 Despite order book trends, operators warn the transition hangs in balance as fuel supply is not scaling, due to cost premia and slower-than-required pace of developing long-term scalable fuel technologies such as ammonia.

"Most of our customers are not willing to pay a 3-4x premium for green fuels. Therefore, bridging the price gap between fossil and green is going to be the main factor that will allow shipping to decarbonize on time."

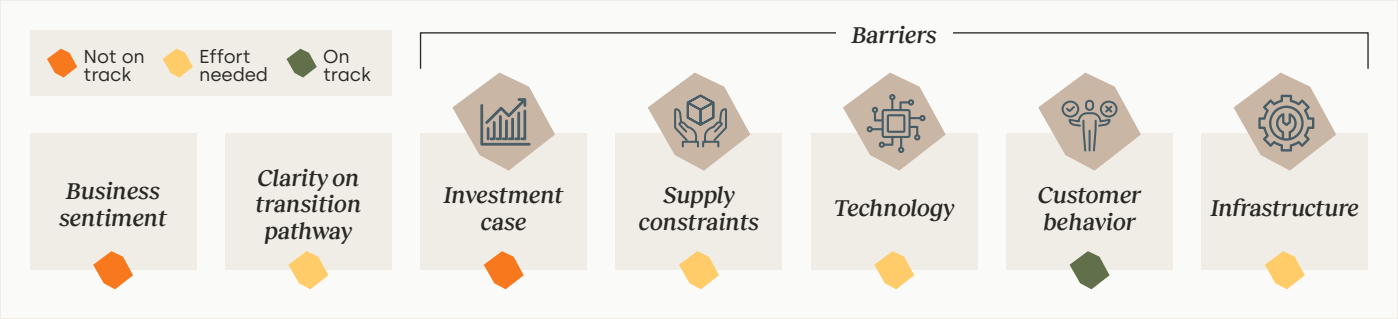
"It is apparent that more needs to be done to overcome the barriers hindering projects seeking to scale zero-emission marine fuel supply to the final investment decision (FID) stage."

Head of Global Partnerships, Public & Regulatory Affairs, Shipping company

"Ammonia has some serious safety concerns, I do not see maritime adoption until more than 10 years in future."

CEO, Hydrogen Technology Provider

Aviation | Barriers and Policy Priorities



Key sector barriers

Investment case

- **Limited availability and high costs of feedstocks** (like waste fats, oils, and greases) is constraining ability of businesses to expand fuel supply
- **High capital expenditure and complexity of sustainable aviation fuel (SAF) production is** deterring investments to expand supply
- **Sustainable aviation fuel has remained 2-3 times more expensive than regular jet fuel in recent years**, with no sign of price convergence. This puts significant pressure on airlines to pass costs to customers, as fuel generally accounts for about 30% of operating costs

Infrastructure

- **Limited infrastructure to enable cross-border procurement and use** of sustainable aviation fuel

Policy priorities

Develop fuel supply

CAPEX support for first-of-a-kind sustainable aviation fuel supply projects is crucial to encourage investment in new production capacity

Developing book and claim systems are fundamental for early-stage adoption and production of sustainable aviation fuels

Catalyze adoption

Mandated demand is critical for building long-term business cases for fuel development and should focus on driving adoption of advanced sustainable fuels leveraging a more scalable feedstock supply

The adoption of sustainable aviation fuel would be most effectively accelerated through **multilateral approaches to aviation regulation**; a voluntary inter-governmental agreement to introduce ratcheting sustainable aviation fuel blending mandates across the major airport hubs by leading governments, which could be a catalyst for wider adoption

Policy focus National International

Aviation | Insights

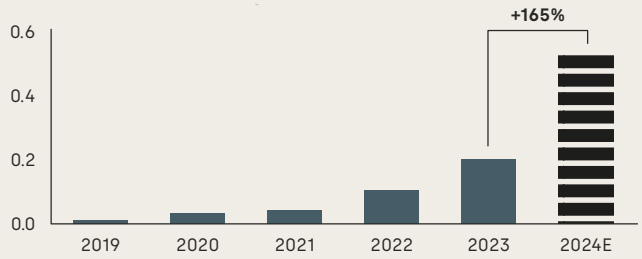
Confidence in a Paris-aligned transition is among the lowest of all sectors as business leaders are concerned about sustainable aviation fuel (SAF) supply scaling to meet future demand, but optimism has increased with regard to policy action in the the past three years

1 Airlines have seen an explosion of SAF deployment, expected to grow by 165% this year, fuelled by rising voluntary demand and policy, linked to increasing ambitions from national governments

> *"We particularly like the mandates on the fuel supply side because it ensures the supply is coming through and gives more certainty to the fuel suppliers in terms of demand."*
>
> ***VP Sustainability Strategy, Engine Manufacturer***

Figure 29: Sustainable aviation fuel as share of jet fuel consumption

Sustainable aviation fuel as share of jet fuel consumption, %



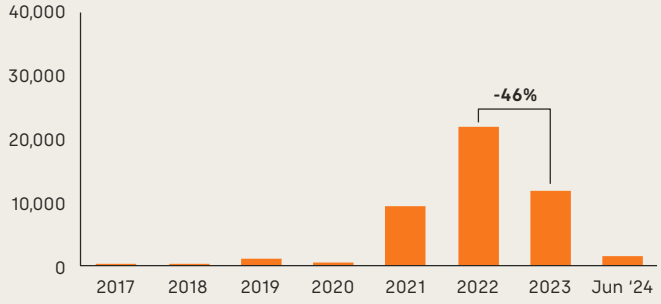
Bain analysis on IATA data

2 Despite advancements, sector leaders express concern that without increased policy intervention, early momentum in SAF deployment could falter, as offtake fell ~50% last year due to SAF supply limitations

3 Aviation leaders are increasingly concerned that SAF markets will remain extremely tight over the next decade due to the lack of investment in supply

Figure 30: Sustainable aviation fuel offtake agreements

Announced sustainable aviation fuel offtake agreements (M litres, 2017-2024 June)



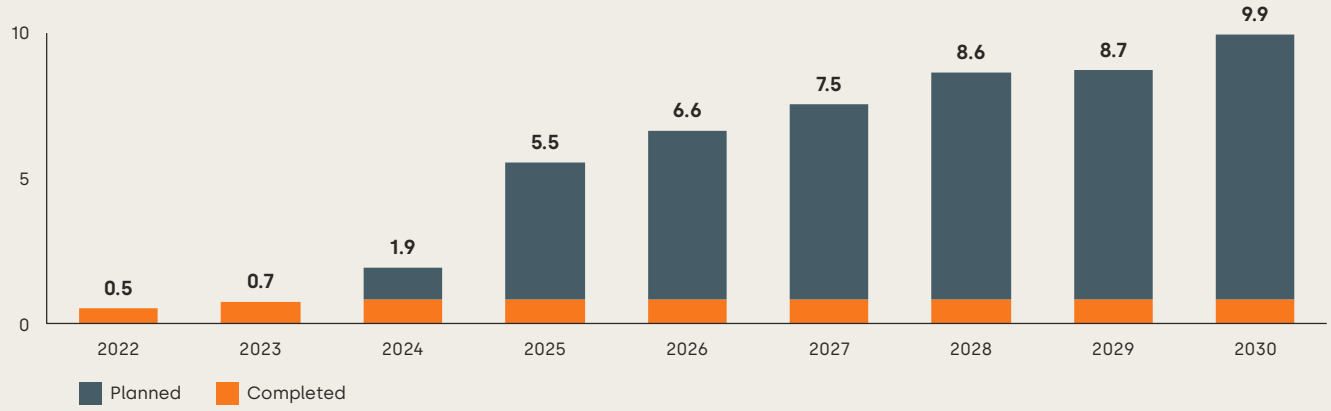
Bain analysis on RMI and ICAO data

> *"There is only so much supply of green fuels from current technologies, new technologies will need to be deployed at large scale to meet increasingly tougher mandates in the next decade. And the first movers need to be supported now to be ready to scale when required."*
>
> ***CEO, Sustainable Fuel Producer***

4 Fuel providers view activating new feedstocks and technologies as the key challenge going forward

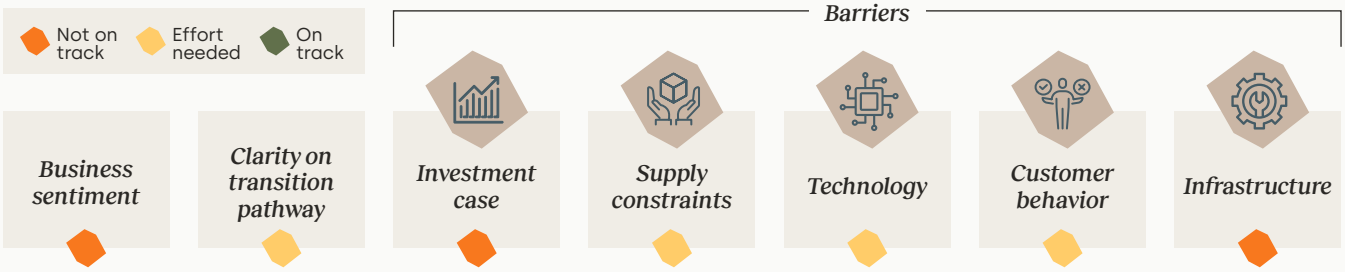
Figure 31: Planned sustainable aviation fuel production capacity

Announced scalable production pathway (eSAF, GTJ & AtJ) capacity by development stage and start year, (in Mt, 2019-'30)



Bain sustainable fuel demand and supply model

Steel | Barriers and Policy Priorities



Key sector barriers

Investment case

- Companies cite limited **willingness of customers to pay a premium for near-zero steel** as key barrier
- At the same time, the **high cost of capital and uncertain return on investment for near-zero steel** is holding back the sector from committing more projects to final investment decisions
- **Operational costs also stand in the way**, with businesses citing that a hydrogen cost between $1.5 - $2 / kg required for a viable business case

Infrastructure

- The lack of common standards for near-zero steel **is slowing the formation of a tradeable market**

Supply constraint

- Companies point to the lack of the **availability of key inputs required for direct-reduced** steel production (H2-DRI-EAF) as a significant barrier (e.g., green hydrogen, high grade iron ore, stable renewable energy)

Policy priorities

Standards and certifications

Business leaders agree that **simplified and internationally aligned certifications** for near-zero steel will ease compliance for consumers

Further, global standards will be key to **facilitating a tradeable and investable market** for near-zero steel producers

Pricing and border adjustment

Industry pioneers note that **carbon pricing and border adjustments must work in tandem with standards and certifications** to avoid emissions leakage and to mitigate the risk of de-industrialization

Steel producers suggest that by implementing and **strengthening carbon pricing and cross border adjustments, policymakers can ease price differentials** and ensure fair competition for near-zero steel

Near-zero steel mandates

Businesses agree that establishing clear mandates for usage of near-zero steel in **public and private sector projects** will secure key early-demand and enable more rapid investment by steel producers

Policy focus National International

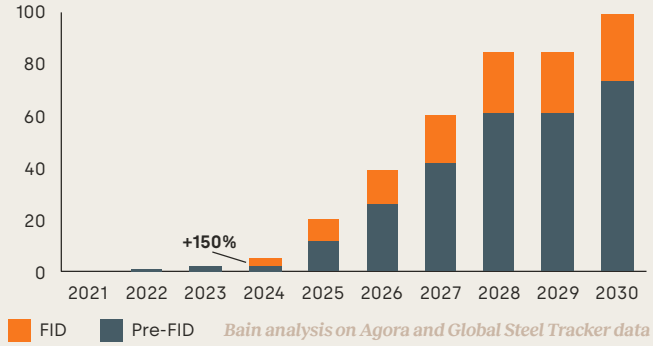
Steel | Insights

Less than half of business leaders believe the sector is somewhat on track for net zero. 70% of leaders report feeling more ambitious than governments and 60% feel little to no confidence in meeting the 2030 Breakthrough Agenda goal as the pace of deployment is lagging.

1 Sector leaders report a surge in capital commitments for near-zero steel with 150% pipeline increase over past year, but some are concerned projects won't materialize

Figure 32: Hydrogen ready Direct Reduced Iron production capacity

H2 ready DRI capacity (mtpa)

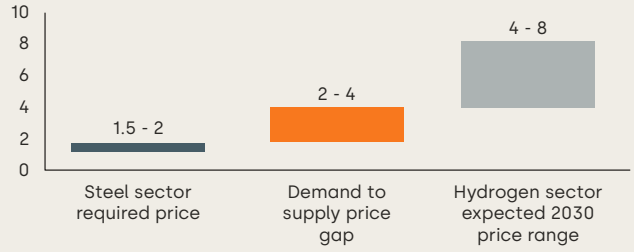


Bain analysis on Agora and Global Steel Tracker data

2 The supply of green H2 is critical, but steel leaders are concerned about prices, with hydrogen sector price forecast 2x required

Figure 33: Demand to supply price gap, green hydrogen

Green hydrogen price (USD/kg)



Bain analysis on interview sentiment

3 On the revenue side, the sector is relying on voluntary demand to de-risk early FID, but this will not be sufficient to scale production

"Last year we sold out the limited volume of emission free steel. We expect to double our capacity, even if it's from low numbers, and we still expect significant interest from our customers."

CTO, Steel Producer

4 The steel sector foresees a significant geographic reshaping of steel supply chains through the transition, with iron making emerging in new markets

"The HBI [Hot Briquetted Iron] pathway will be key in restructuring supply chains – we certainly see a production shift towards the Middle East for DRI."

CEO, Sustainable Fuel Producer

5 The steel sector is among those where businesses see more need for effective international coordination

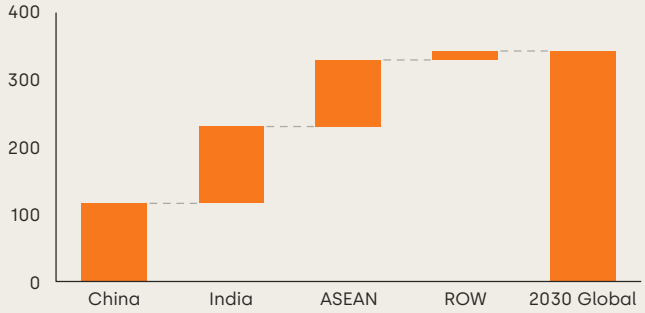
"Steel will need to become much more international because it will become more difficult to produce low-carbon virgin steel in Europe in the next 5 – 10 years. We need international cooperation to figure out exactly how that works."

Sustainability Head, Steel and Mining company

6 Momentum around low-carbon steel is growing, but businesses stress this pales against the large and growing fleet of blast furnaces

Figure 34: Planned blast furnace steel making capacity additions towards 2030, global

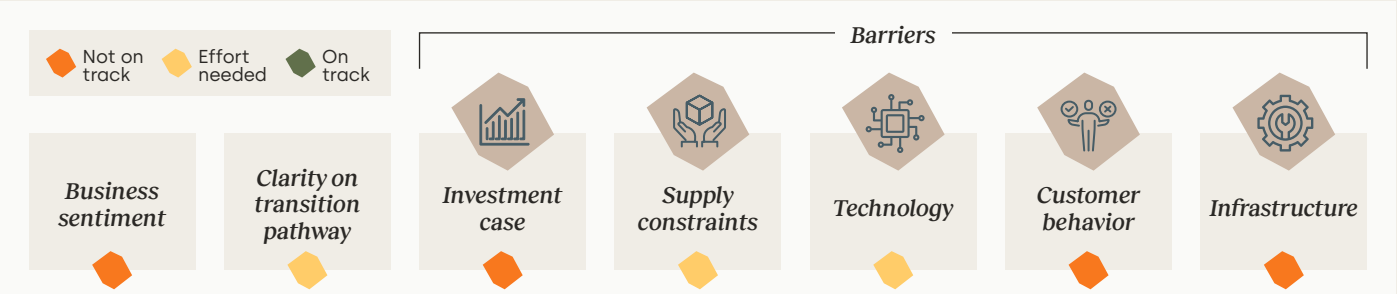
BF-BOF 2030 planned capacity additions (mtpa)



Bain analysis on Agora and Global Steel Tracker data

7 This makes CCUS a potentially critical part of the solution, but businesses remain concerned about the glacial progress of investment and scale of deployment, with less than 1% of global steel production covered even if all projects materialize

Cement and Concrete | Barriers and Policy Priorities



Key sector barriers

Investment case

- Despite limited contribution to overall building material cost envelope, companies cite limited voluntary demand at a premium for low-carbon cement and concrete as key barrier; production costs currently **rise 40 - 120% for low-carbon cement, but translate to a small 1 - 2% increase in total material cost**
- **Venture funding is also lagging**, especially relative to the emissions profile of cement with volume of VC investment many multiples smaller than, for example, batteries

Infrastructure

- The **lack of unified standards for low- and zero-carbon cement**, coupled with reliance upon **recipe-based versus performance-based approval**, is slowing adoption
- **Delays in onshore and offshore carbon storage infrastructure**, as well as varying carbon storage capacity by region, is delaying the deployment of large scale decarbonization efforts

Supply constraint

- Businesses note that the lowest cost **supplementary cementitious materials** (e.g., fly ash, blast furnace slag) to reduce emissions from clinker are becoming constrained as coal and steel industries decarbonize, and that alternatives (e.g., calcined clay) are promising but lack fully established supply chains

Policy priorities

Financial support

Given **the limited premium customers are willing to pay for low-carbon cement and concrete**, businesses say financial support is needed from governments.

Leaders indicate this could be in the form of **research grants, subsidies, and tax credits** that would enable producers to invest in green manufacturing assets

Standars and certifications

Businesses stress that the **lack of common standards for cement and concrete** (for example, low-carbon versus net-zero) is stifling industry cooperation and understanding of the low-carbon options for customers

Pioneers urgently call for **expedited and performance-based assessments of low-emission mixes** to speed up the timeline between R&D and deployment

Public procurement

The sector calls for the use of low-carbon cement and concrete in **public projects (e.g., roads, bridges, buildings)** to create stable and predictable demand

Beyond demand creation, pilot projects serve to **showcase the application of low-carbon cement and concrete, provide data and demonstrate feasibility** to the broader market

Policy focus National International

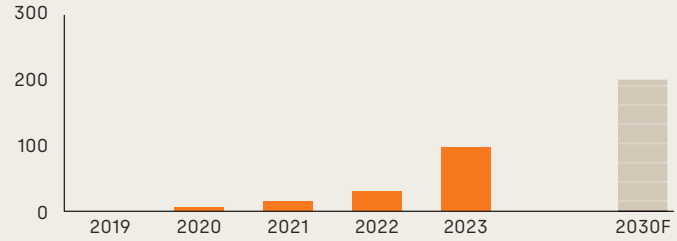
Cement and Concrete | Insights

The majority of businesses believe the cement and concrete sector is off course for net zero. But frontrunners are optimistic about the path ahead; 71% report increased confidence in the government's ability to enable and support the cement transition over the past three years.

1 30% of business leaders report feeling little to no confidence in meeting 2030 Breakthrough Agenda goal (near-zero cement is the preferred choice globally, with growing use); only 2.5-10% of the market is low-carbon, though lack of common agreed definition complicates tracking

Figure 35: Global low-carbon cement production, estimated

Global low-carbon cement production (mtpa)

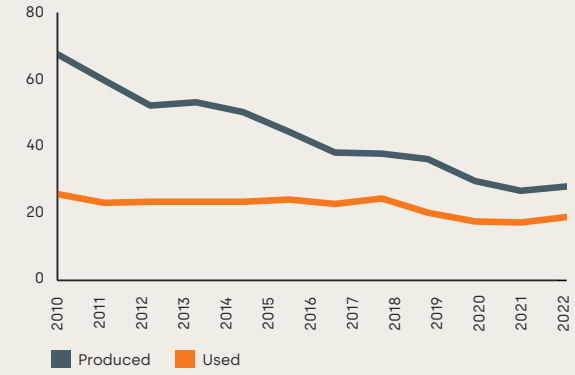


Bain analysis on company, RMI, Statista, IEA, USGS, and World Cement Association data

3 Businesses are unclear if the current pace of progress can be maintained given the supply of key clinker alternatives is dwindling

Figure 36: Fly ash production and utilization, USA

Fly Ash (USA) (mt)

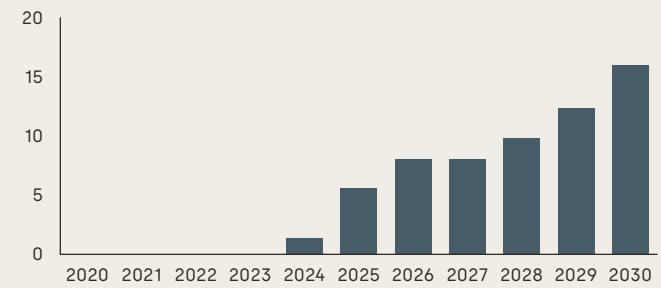


Bain analysis on American Coal Ash Association data

5 Business leaders see significant growth in CCUS enabled cement project pipeline, but are concerned about speed and scale relative to emissions profile as less than 1% of emissions currently covered by 2030 pipeline (with announced capacity and online year)

Figure 38: CCUS enabled cement capacity to 2030

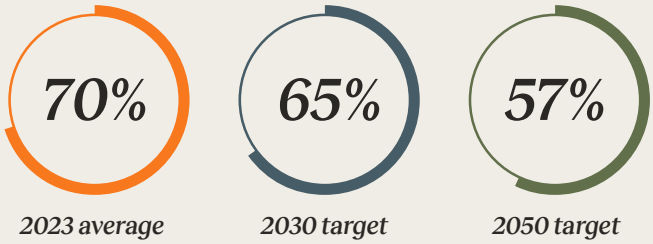
Actual and planned CCUS cement capacity (MtCO2/yr)



Bain analysis on GCCA data

2 The majority of the industry is focused on reducing clinker ratio, the most carbon-intensive element in cement production

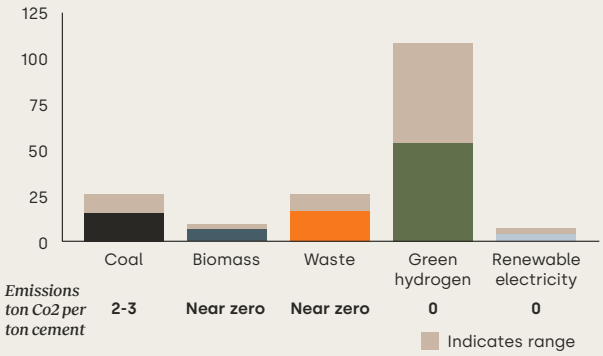
Clinker factor (%)



4 Businesses also struggle with the complexities of transitioning away from fossil fuel-based kiln heating, as electric kilns are 10+ years from large-scale deployment, and near-zero options are slowed by supply chains

Figure 37: Kiln powering costs and emissions, by type

Average fuel cost in 2024 (USD/ton of cement)

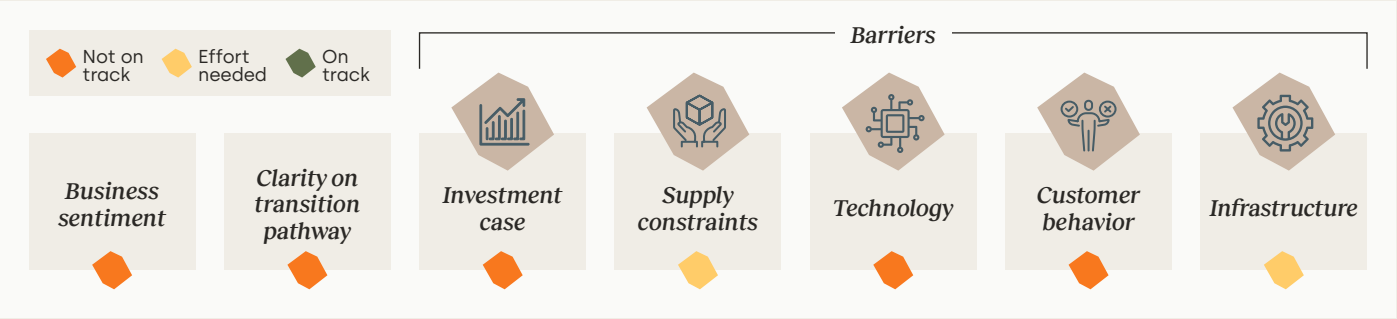


Bain analysis on RMI, World Cement, IEA, UK Govt, Economic Times data

6 The steel sector foresees a significant geographic reshaping of steel supply chains through the transition, with iron making emerging in new markets

> ***"The level of investment flowing into low-carbon cement and concrete technology is in the order of 70 times lower than electric vehicles. If you take a step back the level of investment is quite low relative to the emission profile of the industry."***
>
> ***Strategy Lead, Cement Producer***

Chemicals | Barriers and Policy Priorities



Key sector barriers

Investment case

→ Chemicals is regarded as largely a commodity business with slim margins leading to focus on process efficiency and scale, resulting in **significant CAPEX required to pivot to low GHG emissions processes**

→ As companies are also seeing **little voluntary or regulated demand**, they see little financial incentives in investing heavily in low-GHG emission production

Technology

→ Process energy decarbonization is limited by the energy intensity of **core processes**, making it difficult to electrify

→ **Expanded use of novel feedstocks, such as low-carbon hydrogen, biomass and captured carbon, requires further innovation**, so that these feedstocks and enabling technology like chemical recycling, reach cost parity and meet required quality standards

Infrastructure

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

Policy priorities

Pricing support

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

R&D support

Business points to the need for increased R&D funding for advanced technologies in the forms of CAPEX support to help accelerate early-stage production investments into low-GHG emission chemicals

Mandated use

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

Global collaboration & standards

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

Policy focus National International

Chemicals | Insights

Business confidence in the chemical sector's transition is among the lowest across all sectors as limited policy push or demand pull exists to incentivize low GHG emissions chemicals.

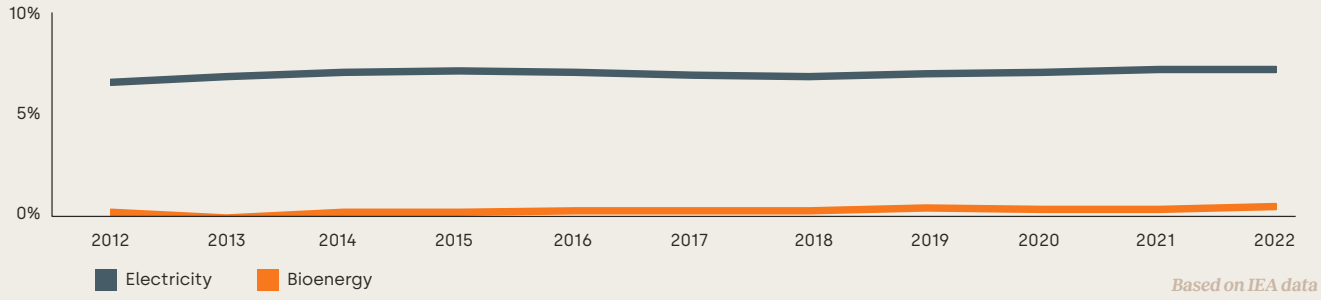
1 Business leaders believe the heterogeneity and complexity of the chemical industry has led to inaction from policymakers and emphasize the need for a broad range of decarbonization levers, including low-carbon sources for process energy, alternative feedstocks and carbon capture

> *"We are targeting high-value sectors like fragrances and food packaging where sustainability narratives are strong, but the industry as a whole moves slowly due to its complexity."*
>
> ***Strategy Lead, Cement Producer***

2 Electrification remains a focal point for reducing process emissions, but with only 7% of the industry's process energy currently electrified and no progress over the past decade, the energy intensity of core processes continues to make electrification difficult

Figure 39: Low-emissions energy source share of process energy for primary chemical production

Low GHG emissions energy sources as share of process energy for primary chemical production (%, '12-22)



Based on IEA data

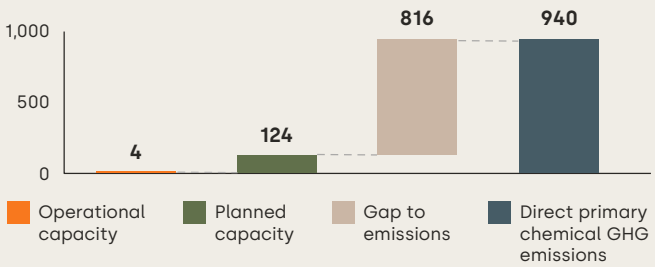
3 The use of alternative and more sustainable feedstock sources over fossil feedstock is currently driven by other sustainability trends but will increasingly support decarbonization in the future.

> *"The customer won't take it [alternative feedstocks] if it's more expensive or compromises quality. Right now, sustainability alone isn't enough to sell."*
>
> ***CO-CEO, Sustainable Chemicals Producer***

4 Business leaders consider incentives vital to accelerate carbon capture and storage deployment in a high-volume, low-margin industry like chemicals, with current operational capacity less than 1% of direct primary chemical emissions.

Figure 40: CCUS enabled chemical production pipeline vs direct primary chemical GHG emissions

Pipeline of CCUS capacity in chemical production vs direct primary chemical emissions (Mt CO2, 2022)

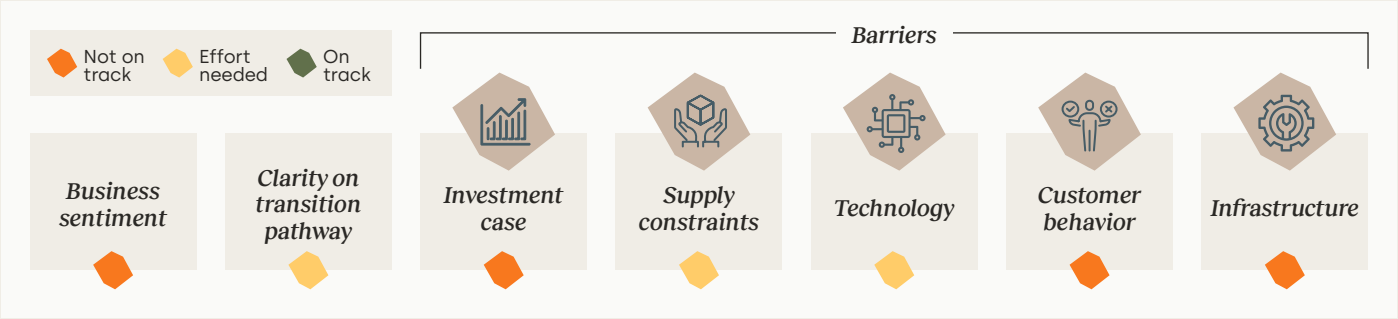


Based on IEA data

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

> *"There is no pressure or incentives to drive low GHG emission [chemical] products."*
>
> ***Strategy Lead, Cement Producer***

Buildings | Barriers and Policy Priorities



Key sector barriers

Investment case

- Businesses confirm structural challenges in the sector (**e.g., increased cost of capital, falling property values, and concerns over financial viability which have intensified due to economic headwinds**) have caused sector-wide investments to stall
- Sector leaders say the **lack of sustainable finance remains a significant hurdle**, as the industry struggles to align traditional funding with long-term sustainability goals
- Building owners and operators cite **upfront capital required for efficiency upgrades and new technology** integration as a key barrier, despite positive returns on investment

Customer behavior

- Sector leaders say there is **limited demand from consumers to reduce embodied carbon** within building materials, as most are concerned with the decarbonized energy and operational efficiency impacting their own Scope 1 and 2
- Businesses also point **to misconceptions (e.g., concerns over poor performance, inefficiency and durability) as well as the general lack of awareness** surrounding low embodied carbon alternatives as hindering buyers from making informed choices

Policy priorities

Financial mechanisms

Businesses stress the importance of addressing green financing given **interest rate hikes and slowdown in investments** over the past two years

Leaders point to government intervention through **incentives, green bonds, rebates and subsidies**

Building mandates

Sector leaders are adamant that **building performance mandates must be put in place**, as well as reporting mandates to allow users to make informed decisions

Clear requirements for building electrification and minimum energy efficiency will send clear signals to the broader market and encourage investment

Standards and codes

Beyond financing and mandates, businesses are clear that common **building codes and standards** must be defined to simplify compliance for developers

Leaders note that expediting and simplifying **international certification processes** for buildings and materials can ease and encourage cross border investment in sustainable construction

Life cycle assessments

Looking further ahead, the sector is calling for **whole life carbon assessments for construction materials and methods** to reduce lifetime impacts and embodied carbon

Policy focus National International

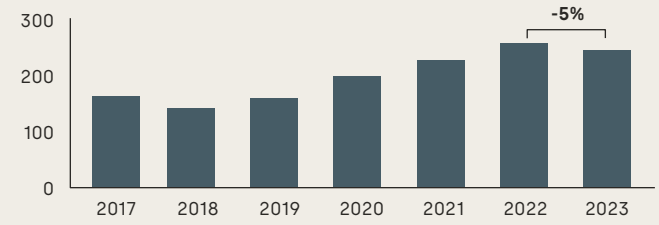
Buildings | Insights

More than half of leaders believe the sector is completely off course for net zero, and none feel very confident in meeting the 2030 Breakthrough Agenda goal of near-zero emission and resilient buildings as the new normal. Businesses stress policy signals have been mixed, and that greater focus on embodied carbon is needed looking forward.

1 Businesses are concerned about slowdown in global energy efficiency investments over the last year (-5%), where Europe leads in both absolute and per capita investment

Figure 41: Global investments in building energy efficiency

Annual global building efficiency investment (USD, billions)



Based on IEA data

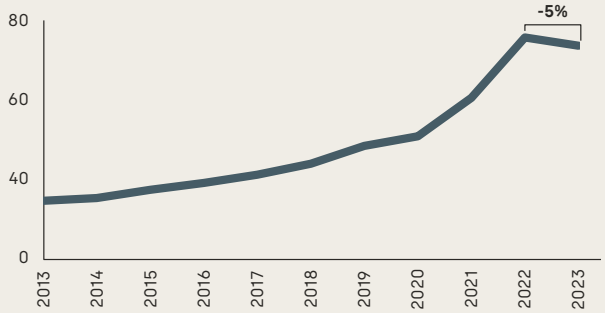
2 Businesses say customers are still reluctant to commit capital upfront for residential and commercial retrofits, despite significant energy bill savings

> *"Demand-side technologies generally have a short return, but where the payback periods are longer, investors and consumers are generally reluctant to invest in these new and efficient technologies. Ideally, we need support and regulation from governments to ease the transition."*
>
> ***Head of Government Affairs, Energy Management Company***

3 Businesses faced short-term head winds in HVAC deployment with a 5% decline in Europe following a decade of growth.

Figure 42: Annual heat pump sales, Europe

Thousand heat pumps sold per year (Europe)

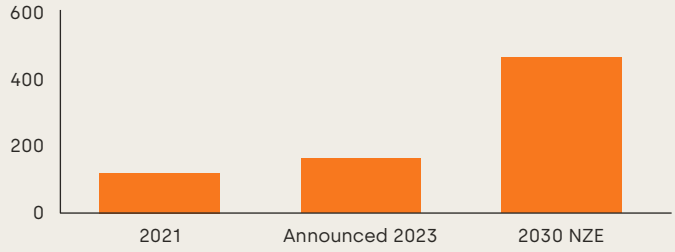


Bain analysis on EHPA data

4 Looking further ahead, businesses warn insufficient heat pump manufacturing capacity could slow the transition

Figure 43: Global heat pump manufacturing capacity

Global heat pump manufacturing capacity (GW)



Bain analysis on IEA data

5 Across markets, businesses are optimistic about community & residential on-site power generation for meeting rising electricity demand

+183%

Annual small-scale solar PV capacity addition (2018 - 2023)

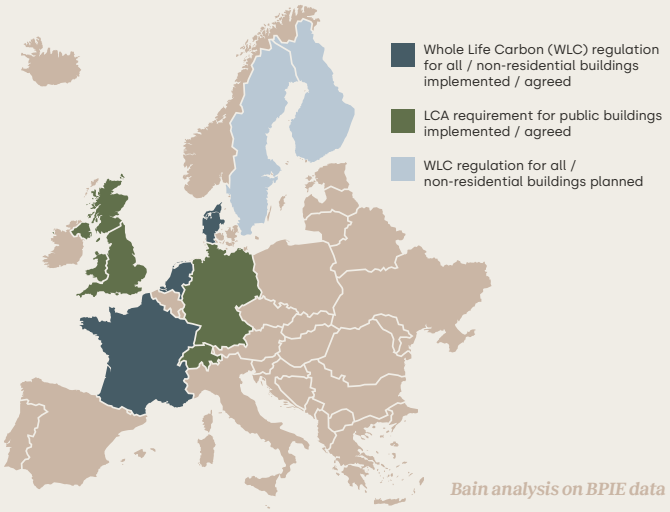
+91%

Total installed capacity of small-scale solar PV (2018 - 2023)

6 Businesses view city-level regulation, such as in Paris, New York and Singapore, as the primary drivers for lower carbon investments due to their faster decision-making ability, integrated urban planning, public-private partnerships and deployment of technology

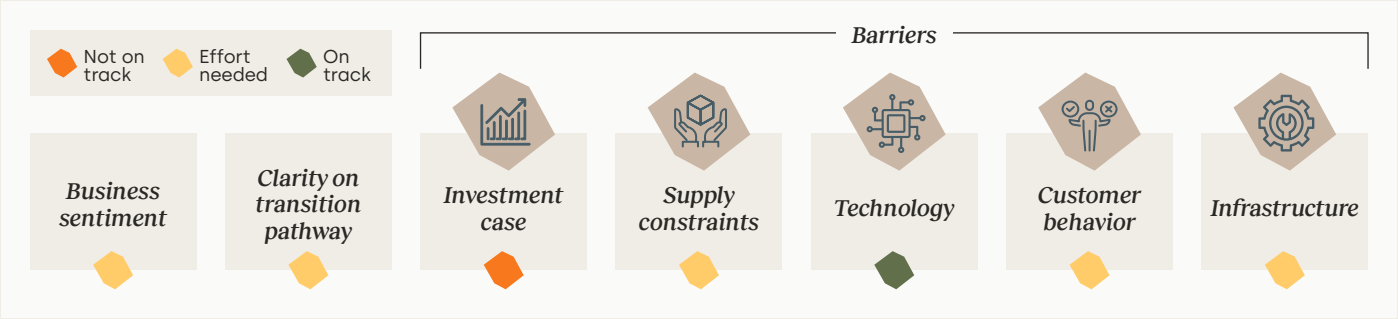
7 Business warn national policymaking on buildings is seriously lagging other sectors, though point to some progress in the EU, for example around embodied carbon regulation

Figure 44: Building embodied carbon regulations, Europe



Bain analysis on BPIE data

Hydrogen | Barriers and Policy Priorities



Key sector barriers

Investment case

- Companies cite **inflation sensitivity** as plant CAPEX and renewable electricity prices increased by 50% in some cases, worsened by immature value chains and the high-risk profile of first-of-a-kind projects
- **Companies see limited voluntary demand**, with less than 1% of announced low-carbon hydrogen capacity having a binding offtake agreement as offtakers are waiting for prices to drop, with **insufficient policy pushing for adoption**

Infrastructure

- Companies point to infrastructure as especially lagging, being **short by $175B to meet IEA assessed need** in 2030 as investors await certainty on scale of future need
- Companies also point to a **lack of aligned international standards** for low-carbon hydrogen, limiting their ability to capture a premium

Customer behavior

- **End-users prefer shorter-term offtake contracts instead of the long-term agreements** needed by producers to get financial backing from investors to take projects to final investment decision (FID)

Policy priorities

Demand Support

Establish demand certainty by **mandating specific sectors to utilize low-carbon hydrogen or its derivatives**, either through traded certificates or production volume obligations, depending on regional contexts

Pricing support

Create price certainty with **guaranteed strike prices** through mechanisms such as Contracts for Difference (CfDs) or hydrogen auctions

Standards & Trade policy

Clear international coordination on green product trade can help to determine the optimal locations for producing hydrogen and its derivatives, as well as the most efficient methods for transportation

Establish mutually recognized international standards, definitions and certification schemes for hydrogen facilities and low-carbon hydrogen production to enable efficient international markets

Policy focus National International

Hydrogen | Insights

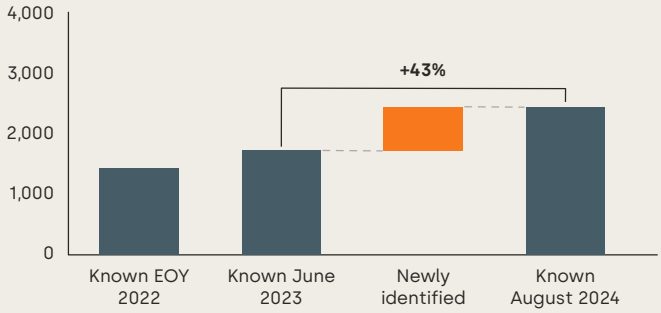
Business confidence in the hydrogen transition is among the highest across all sectors, but few expect that the 2030 Breakthrough Agenda goal will be met as low-carbon hydrogen costs will remain too high for voluntary demand to drive offtake.

1 There is growing investor momentum in the sector, as the number of announced projects increased by 43% from June 2023 to August 2024

2 Alongside the project pipeline, projects reaching financial approval also doubled this year, with companies largely crediting a step change on price support by governments

Figure 45: Global low carbon hydrogen project overview

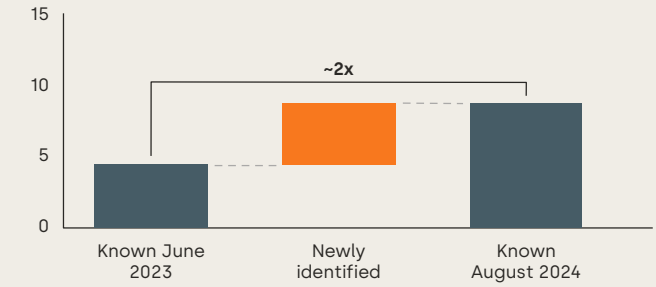
Global low-carbon hydrogen projects (count)



Bain analysis on GlobalData database

Figure 46: Global low carbon hydrogen capacity, passed FID

Global low-carbon hydrogen project capacity passed FID (Mtpa, June '23 - August '24)

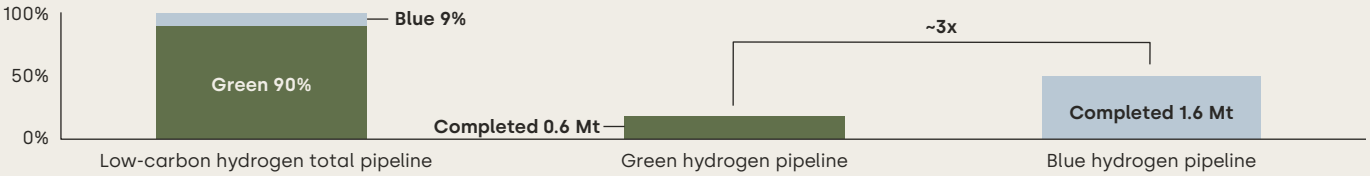


Bain analysis on GlobalData database

3 Most industry players view green hydrogen as the stronger solution compared to blue, but also see blue deploying faster short-term as operational capacity is roughly triple that of green production

Figure 47: Blue versus green hydrogen pipeline and deployed capacity

Low-carbon hydrogen pipeline (as of Aug 2024, Mt)



Bain analysis on GlobalData database

4 Overall, company expectations for deployment continue to fall short of government targets, as prices remain higher than the willingness-to-pay

5 In the short-term, producers are targeting high-margin industries to drive offtake and enable project deployment

"2 years ago, the sentiment was that 2030 low-carbon hydrogen targets would be met, that has changed, 2030 deployment forecasts are down 50-60% now vs 2022."

Head of Energy Transition Strategy, Hydrogen Producer

"Food producers have been our main offtaker of low carbon ammonia produced with low-carbon hydrogen, as the cost increase around 10 cents of, for example, a beer made using clean wheat grown with our clean ammonia is so low it does not make a difference to the end customers."

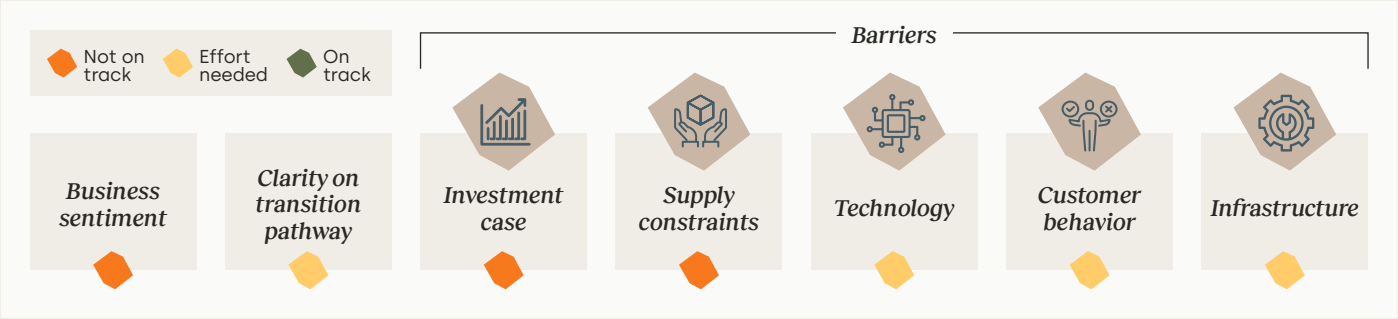
SVP Clean Fuels, Sustainable Fuels Producer

6 Longer term, businesses see the role of government as critical, given that costs are expected to remain too high for voluntary demand to support supply, and regulatory measures to drive scaled demand are expected to emerge post-2030

"You need some very strong tailwinds in interest rates to get below 4 $/kg by 2030."

Head of Energy Transition Strategy, Hydrogen Producer

Sustainable fuels | Barriers and Policy Priorities



Key sector barriers

Investment case

- Companies are **struggling with profitability** given volatile feedstock prices (waste fats, oils, and greases) and therefore dampening investment in further supply
- **High CAPEX requirements for advanced technologies** are a key barrier for getting projects past final investment decision (FID)
- This is exacerbated by a perception of **regulatory instability**, and in some jurisdictions weak measures to create and sustain robust demand

Supply constraints

- **Availability of mature feedstocks (first generation oil crops, used cooking oil & animal fat) are constrained by current regulation**, resulting in a tight market fighting over existing supply according to suppliers. Greater direct support for breakthrough technologies is critical

Infrastructure

- **The lack of harmonized international standards** for sustainable fuels forces producers to navigate varying regulations, increasing compliance costs and creating uncertainty

Policy priorities

Demand Support

Mandates for sustainable fuels targeting specific demand sectors, favoring fuel types with the most long-term potential

Advanced technology support

R&D funding and tailored support programs to support development of advanced technologies like direct air capture and power-to-liquid

CAPEX support for first-of-a-kind advanced sustainable fuel supply projects is crucial to encourage investment in unconstrained pathways

Developing **book and claim systems** is critical for scaling early production of sustainable fuels as it enables production to occur in the most cost-efficient locations

Standards & certifications

Establish **consistent global standards and definitions** for sustainable feedstocks to ensure a level playing field

Clarify and simplify certification processes for sustainable fuels to reduce administrative burdens and enhance transparency

Policy focus National International

Sustainable fuels | Insights

The sustainable fuel sector is increasingly positive about the investment environment, but few expect 2030 supply to be sufficient, as mature production pathways are regulatory constrained, and there is pessimism about scalable pathways expanding near term without policy support.

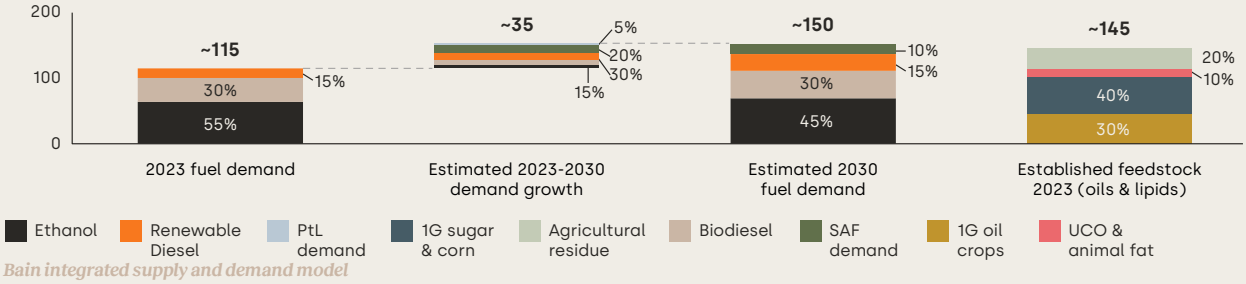
1 Businesses are responding positively to recent policy shifts aimed at driving demand and improving the investment climate for sustainable fuels, playing a key role in decarbonizing aviation

> ***"RED III will drive sustainable fuel demand, it creates significant penalties for not meeting set targets, especially in Germany."***
>
> ***VP Sustainability Strategy, Engine Manufacturer***

2 Despite policy advancements, companies remain deeply concerned about the limitations of feedstock supply in existing technologies, as ~40% of feedstock volumes come from 1st gen. sources that compete with food supply. Without this supply, 2030 demand would exceed available feedstocks by ~2x

Figure 48: Sustainable fuel demand by fuel and feedstock availability

Global Sustainable Aviation Fuel (SAF), Renewable diesel, Ethanol and Biodiesel demand vs. HEFA, FAME & Ethanol pathway practically available feedstock (Mtoe/yr, 2023)

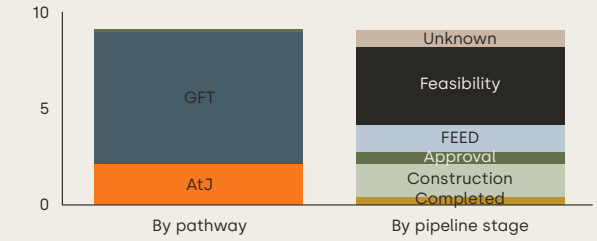


Bain integrated supply and demand model

3 Across the value chain, fuel producers tend to be pessimistic on the near-term scaling of novel production technologies such as Alcohol-to-Jet (AtJ) and Gasification Fischer-Tropsch (GFT) as pipeline capacity is less than 10 Mt

Figure 49: Global Alcohol-to-Jet and Gasification Fischer-Tropsch refinery capacity pipeline

Global GFT & AtJ refinery capacity pipeline (Mtoe, As of 2024-Jan)



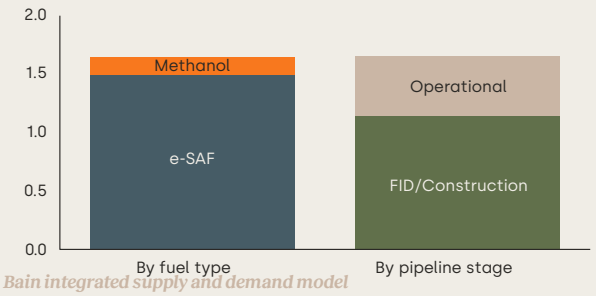
Bain integrated supply and demand model

> ***"We need long-term fixed-price offtakes to secure the project funding needed to unlock large-scale investment in green fuels ... Mandates alone aren't enough; we need mechanisms that help our customers to commit to the green premium needed for long-term offtake ."***
>
> ***CEO, Sustainable Fuel Producer***

4 Longer term, businesses see strong potential in Power-to-Liquid (PtL) due to its ability to leverage a near unlimited feedstock supply, but progress has been slow with less than 2 Mt passed FID

Figure 50: Global Power-to-Liquid capacity pipeline, passed FID

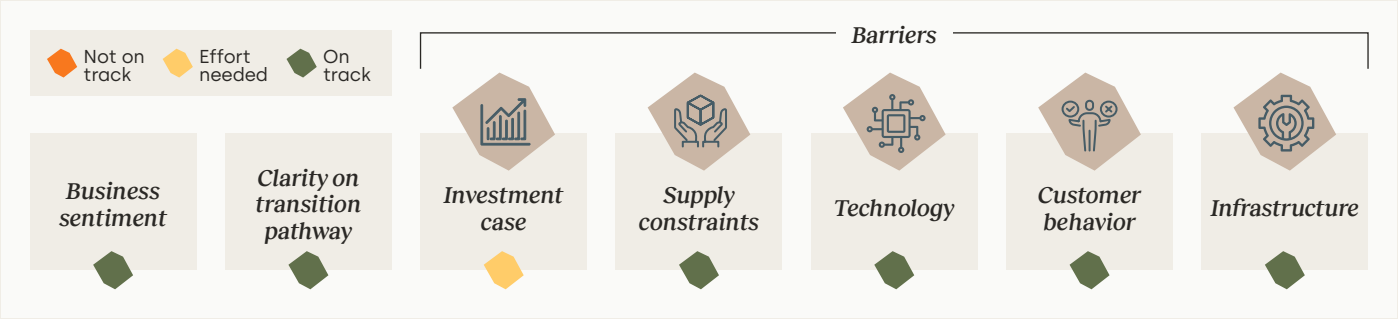
Global Power-to-Liquid capacity pipeline passed FID (Mtoe, As of 2024-May)



Bain integrated supply and demand model

> ***"The PtL routes can be the long-term solution to green fuels at scale, but very few first movers are building these now because they're not commercially viable without a large green premium. It's going to take another three to five years before the scale can really come in and start to drive down costs. Supporting early movers to bridge the cost gap now is essential."***
>
> ***CEO, Sustainable Fuel Producer***

Batteries | Barriers and Policy Priorities



Key sector barriers

Investment case

→ Companies point to recent **uncertainty around EV demand** as key barrier for investing into further supply. This is further complicated by **recent trade uncertainties** with multiple tariffs being put in place

→ As projects are highly dependent on scale to deliver required return on investment, **recent cost inflation has significant impacts** on project viability

Supply constraints

→ **Achieving economies of scale of production while maintaining required quality** remains a significant challenge for manufacturers, with over 10% of planned European capacity being delayed due to quality issues

→ Although **supply constraints of key minerals** (e.g. lithium) have lessened, it remains a key concern of business in the long-term for scaling deployment

Customer Behavior

→ Companies still cite **considerable misconceptions on battery reliability** among consumers holding back EV adoption, but according to leading auto manufacturers, this is driven by a lack of charging infrastructure rather than the range of the vehicles themselves

Policy priorities

R&D Support

Increasing **R&D support for novel battery technology** to accelerate further performance gains in, for example battery EV range, or unlock novel use-cases, such as long-term battery storage

Simplified permitting

Simplifying regulatory standards for production to increase confidence in construction timelines as several key projects have been delayed due to lengthy permitting processes

Standards & certifications

Establish a **stable investment environment** for battery manufacturers with defined vision and commitments to domestic production of strategic industries, supported by a clear policy framework

Policy focus National International

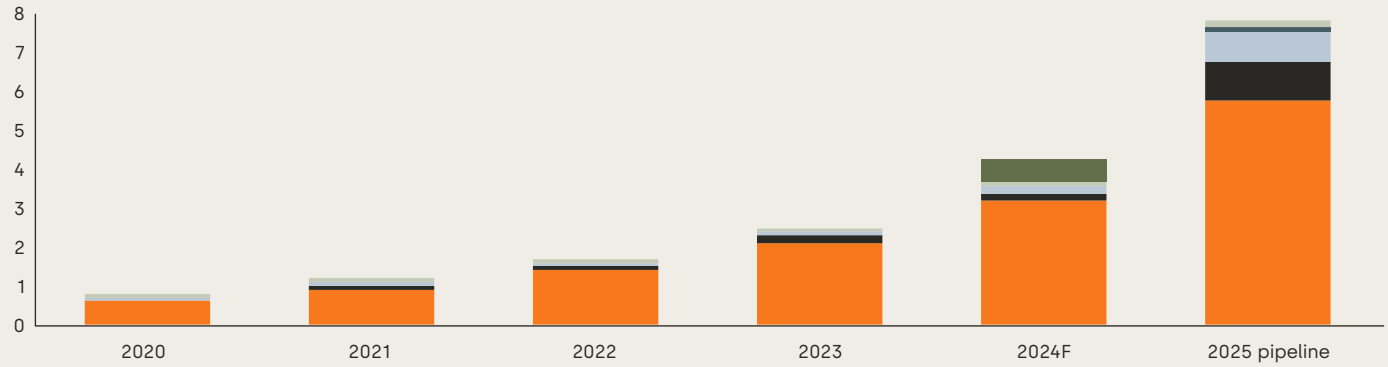
Batteries | Insights

Battery companies report strong progress on decarbonization targets, with over 40% considering their ambitions to surpass those of governments, and expect the recent surge in capacity to have dramatic effects across battery demand sectors.

1 Battery manufacturers are experiencing an explosion in manufacturing capacity over the last year, largely driven by Chinese manufacturers who announced over 800 GWh of projects during the first half of 2024. The country's dominance in supply is fueling concerns over rising trade tensions

Figure 51: Lithium-ion battery manufacturing capacity, by largest producers

Lithium-ion battery manufacturing capacity and pipeline by largest producers (TWh, 2020-'25F)

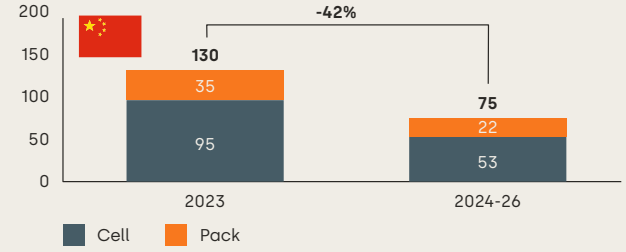


Bain analysis on BNEF data

2 Despite trade frictions, businesses believe that the supply increase and cost reduction in Chinese batteries of more than 40% will have disruptive effects across demand sectors

Figure 52: Lithium-ion LFP average battery price, China

Chinese lithium-ion LFP volume-weighted average battery price ($/kWh, 2023-2024/06)



Based on BNEF data

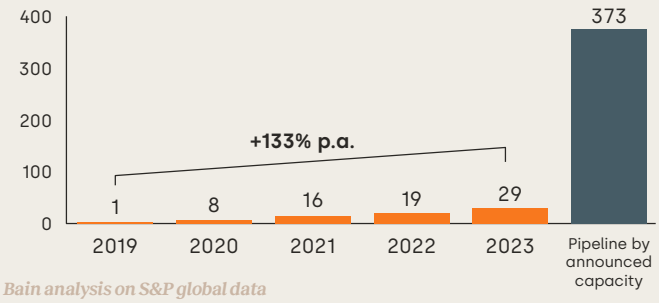
3 The automotive sector is expected to feel the bulk of the impact, primarily benefitting mass-market battery electric vehicles

> ***"The reality of the [battery] oversupply from China, but also the pricing, could very well be a benefit in terms of providing access to entire countries and societies that cannot afford it otherwise."***
>
> ***Policy Leader, Emerging Economy***

4 The surge in battery supply is also fuelling growth in the energy storage market, with +350 GWh of storage capacity announced

Figure 53: Installed battery energy storage system capacity and pipeline, global

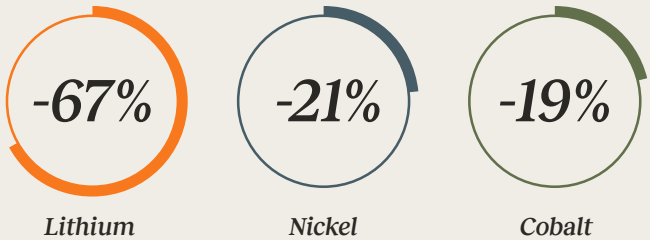
Annual installed battery energy storage capacity and announced pipeline of projects (GWh, 2019-'23)



Bain analysis on S&P global data

5 Looking ahead, businesses are optimistic about the battery production outlook as key material prices dropped by +20% in the past 12 months

Battery raw material price development last 12 months, (%, as of August 2024)



Methodology, Glossary *and References*

06.

04. Methodology, Glossary and References

Methodology

This report examines the pace of the transition based on the insights from businesses leading the transition. The Barometer will be continued on an annual basis, providing up-to-date insights and leading indicators of progress over the previous year.

Research Framework

The approach integrates three sources of information: **Business Insights, Quantitative Data Collection** and **Literature Review**, for a comprehensive view of the transition.

Business Insights

Insights were gathered through qualitative research methods to understand the subjective and experiential dimensions of the transition by businesses across the value-chain within each sector.

- → **Survey of Senior Executives:** A comprehensive survey was conducted with 250 senior executives from businesses at the forefront of the transition and across the value chain. This gauged overall business sentiment as well as sector-specific insights, identifying perceived challenges and sector progress.
- → **In-Depth Interviews:** 65 one-on-one semi-structured interviews with senior leaders from frontier companies were conducted. These interviews provided deep insights into sector-level barriers and dynamics. Leaders shared specific developments, barriers and priorities for policymakers.
- → **Sector Group Dialogues:** Business groups were formed, bringing together industry leaders from both specific sectors and across sectors to test and review survey and interview findings.

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.

Literature Review

The literature review provided additional context to our findings through an analysis of industry reports and academic studies. We reviewed sector-specific and overarching publications to understand the latest trends, technological advancements and policy developments.

Segmentation by Industry

The report was structured by sector, focusing each analysis on three key areas:

2024 Sentiment: Based on quantitative, survey and interview data, we assessed how sector leaders perceive current progress, and the challenges associated with the transition.

Barriers: Sector-specific barriers slowing the transition were segmented into investment case, supply constraints, technology, customer behaviour and infrastructure barriers

Policy priorities: Key policy areas where interventions could accelerate the transition were identified, focusing on the sector-specific needs as expressed by industry leaders.

Data Validation and Triangulation

Reliability of the findings was ensured by synthesizing survey results, interview insights and secondary data. Cross-sector workshops with international sector groups further validated the trends and conclusions. Findings were finally reviewed by business and industry organizations to validate that the material represents a coherent business view on 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).
- **Technology** – State of technology required for low-carbon operations (e.g., technological maturity, efficiency, scalability, general consensus on technological pathways).
- **Customer behavior** – Actions, preferences, 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).
- **Infrastructure** – Fundamental physical and/or organizational structures (e.g., power grids, storage capacity, charging infrastructure, as well as standards, codes, permitting processes).
- **Business sentiment** – Overarching view from businesses on the pace of the transition in the sector and the commitment to overcome barriers in the near-term.
- **Power Swing State** – Markets with limited penetration but high RE growth potential, expected to capture high share of market in short to medium-term (Criteria: 1. Renewables share of total electricity generated (2023) between 0 – 50%; 2. Change in renewable electricity generation share (2020 – 2023) is greater than 0%).
- **EV Swing State** – Markets with limited EV penetration but high EV growth potential, expected to register high EV growth rates in the short to medium-term (Criteria: 1. EV sales share (2023) <25% of total passenger vehicle sales; 2. Total EV sales (2023) >10,000 units; 3. EV growth rate (2020 - 2023) >50% CAGR).
- **Sustainable fuels** – Fuels (e.g., 1st, 2nd, 3rd-gen biofuels, SAF, e-fuels) produced from renewable resources and designed to replace traditional fossil fuels in various sectors.

References

- → **Agora Industry** – Global steel transformation tracker
- → **American Coal Ash Association** - Coal Ash Recycling Rate Increases Slightly in 2021; Use of Harvested Ash Grows Significantly
- → **Clean Energy Council** – Clean Energy Australia 2024
- → **Bain** – Sustainable fuels supply and demand balance model
- → **Berkeley Labs** – Generation, Storage, and Hybrid Capacity in Interconnection Queues
- → **BMI** – Auto Industry Research
- → **BNEF** – Announced lithium-ion battery manufacturing capacity in 2025
- → **BNEF** – BloombergNEF's annual battery price survey
- → **BPIE** – Whole-life Carbon: Challenges and solutions for highly efficient and climate-neutral building
- → **Breakthrough Agenda Report 2024**
- → **Credit Suisse** - Sustainable Aviation Fuels Primer, March 2023
- → **DNV** – Maritime Forecast to 2050 (2024)
- → **DNV** – Alternative Fuels Insights
- → **DNV** – Energy Transition Outlook 2023
- → **DNV** – Shaping the future of sustainable steel
- → **EEA** – Global bio-based plastics production capacity
- → **EHPA** – 2024 market report
- → **EIA** – IEO2021 Issues in Focus: Energy Implications of Potential Iron- and Steel-Sector Decarbonization Pathways
- → **EIA** – Estimated Small Scale Solar PV Capacity and Generation
- → **Ember** – Yearly electricity data
- → **EU Hydrogen Bank** – Pilot auction results
- → **Eurofer** – Green steel as key driver to Net Zero industry
- → **GABC** – Cement sustainability guidelines
- → **Gasgoo** – List of new power battery projects in the first half of 2024
- → **GGCA** – 2050 Net Zero Roadmap
- → **GCCA** – Green Cement Technology Tracker
- → **Global Maritime Forum** – 2023 Annual Progress Report on Green Shipping Corridors
- → **Global Maritime Forum** – Climate action in shipping: Progress towards shipping's 2030 breakthrough (2024 ed.)
- → **GlobalData** – Hydrogen Plant database (August 2024 update)
- → **GlobalData** – Refinery database (January 2024 update)
- → **HEIPA** – Year-end review of Chinese green hydrogen projects in 2023
- → **IATA** – SAF Production to Triple in 2024 but More Opportunities for Diversification Needed
- → **ICAO** – Tracker of SAF offtake agreements
- → **IEA** – Cement and concrete overview
- → **IEA** – Emissions Factors 2024
- → **IEA** – Global Energy and Climate Model 2023 key input data
- → **IEA** – Global EV Outlook 2024
- → **IEA** – Global investment in clean energy and fossil fuels, 2015-2024
- → **IEA** – CCUS database (February 2024 update
- → **IEA** – Iron and steel
- → **IEA** – Net Zero roadmap: a global pathway
- → **IEA** – Process energy for primary chemical production
- → **IEA** – Trends in electric cars
- → **IEA** – Trends in electric vehicle charging
- → **IEA** – World Energy Outlook (2006 - 2023
- → **IEA** and **UN Climate Change High-Level Champions** – The Breakthrough Agenda report 2024
- → **IRENA** – Renewable energy statistics 2024
- → **Mærsk Mc-Kinney Møller Center for Zero Carbon Shipping** – Fuel Cost Calculator
- → **Methanol institute** – Renewable methanol database
- → **OECD** – Global Plastics Outlook
- → **Our World in Data** – Renewable energy
- → **PlasticsEurope** – Plastics – the fast Facts 2023
- → **RMI** – Five Insights on the Concrete and Cement Industry's Transition to Net Zero
- → **S&P Global** – Commodity insights
- → **S&P Global** – Storage plant database
- → **S&P Mobility** – S&P Global Mobility: January 2024 US auto sales feel the chill

→ **SEIA** – A tale of two solar markets

→ **SEIA** – Solar Market Insight Report 2023 Year in Review

→ **SystemIQ** – Planet Positive Chemicals

→ **Transport & Environment** – One in four EVs sold in Europe this year will be made in China

→ **UK Office for National Statistics** – RPI: Ave price - Coal, per 50 Kg

→ **UNCTAD** – Review of Maritime Transport 2023

→ **US EIA** – Record U.S. small-scale solar capacity was added in 2022

→ **USGS** – Cement Statistics and Information

→ **World bank; ICAO -** Number of passengers on airlines worldwide in 2021, by registration country

→ **World Steel** – World Steel in Figures 2024

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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 organizations 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.

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About the Breakthrough Agenda

The Breakthrough Agenda was launched at COP26 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 initiatives and countries 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 seven major emitting sectors: power, road transport, steel, hydrogen, agriculture, buildings and cement and concrete, covering over 60% of global emissions. At COP28, governments welcomed a new partnership with World Business Council for Sustainable Development to strengthen private sector engagement to deliver the Breakthrough Agenda goals. The insights from the Barometer will support this partnership by identifying the business priorities for international collaboration.

About the Marrakech Partnership

Under the leadership of the High-Level Climate 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, playing a key role in deepening engagement between Parties and non-state actors. Many organizations in the industry group have contributed to the development of the Business Breakthrough Barometer and this will be used to inform work together.

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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