BREAKTHROUGH AGENDA

BREAKTHROUGH AGENDA SPECIAL REPORT **2026**

Strengthening international collaboration to accelerate delivery

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Climate High-Level Champions

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CLIMATE HIGH-LEVEL CHAMPIONS

The Climate High-Level Champions – mandated at COP 21 and appointed annually by COP Presidencies – drive ambitious climate action by connecting governments with voluntary solutions led by cities, regions, businesses, investors, Indigenous peoples and civil society. They oversee delivery of the Marrakech Partnership five-year plan, flagship campaigns such as Race to Zero and Race to Resilience, and now the Action Agenda – a unified roadmap aligning non-state actors around delivery of the Global Stocktake outcomes. Mr Dan Ioschpe and Mr Samed Ağırbaş serve as the current Climate High-Level Champions for COP 30 and COP 31.

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ABOUT THIS REPORT

Since its launch at COP 26, the Breakthrough Agenda has served as a framework for strengthening international collaboration across major emitting sectors. Participating countries have endorsed shared "Breakthrough" goals to make clean technologies and sustainable practices more affordable, accessible and attractive than their alternatives by 2030 across the power, road transport, hydrogen, steel, cement and buildings sectors.

The Breakthrough Agenda establishes an annual cycle to track progress towards these goals, identify where stronger or more co-ordinated international action is needed, and support collective efforts to accelerate deployment. Central to this process is the recognition that many barriers to progress – including fragmented standards, weak demand signals, financing constraints and infrastructure gaps – cannot be addressed through national action alone, and require targeted international collaboration.

To support this cycle, world leaders tasked the IEA and the Climate High-Level Champions to develop an annual Breakthrough Agenda Report that provides an independent evidence base and expert analysis of progress and priorities. From 2022 to 2024, the reports assessed the state of international collaboration across sectors and identified priority actions. The 2025 report placed greater emphasis on implementation, introducing sector-specific success statements to clarify what meaningful progress looks like in practice.

The Breakthrough Agenda Special Report 2026 builds on this foundation in the context of an increasing focus on delivery under the Global Climate Action Agenda. This year's report examines how Plans to Accelerate Solutions (PASs) are designed and how effectively they translate shared objectives into actionable steps. It identifies cross-cutting insights on strengthening implementation, alongside a focused set of near-term priorities to support delivery across key sectors in the lead-up to the next Global Stocktake.

FOREWORD

The global energy system is undergoing profound change against a backdrop of economic uncertainty, evolving geopolitical dynamics and rising demand for secure, affordable energy. The challenge facing governments and stakeholders is no longer whether solutions exist, but how to deliver them at scale and at speed.

This year's *Breakthrough Agenda Special Report* is published at a moment when international efforts are increasingly focused on action and delivery. The Global Climate Action Agenda is designed to reflect this shift, connecting governments with non-state actors to ensure that what is agreed in negotiation rooms is delivered on the ground: more renewables, cleaner cities, resilient infrastructure, and finance flowing to where it is needed most. By aligning initiatives, strengthening co-ordination and supporting delivery across sectors, the Action Agenda seeks to ensure that commitments are realised through tangible progress on the ground.

International co-operation is central to this effort. Many of the barriers to progress – from fragmented standards to insufficient demand signals and financing constraints – cannot be addressed through national action alone. Well-targeted co-operation can help align markets, mobilise investment and create the conditions for deployment across borders. This has been a consistent finding of the Breakthrough Agenda process and remains at the heart of this report.

In 2025, the Global Climate Action Agenda introduced Plans to Accelerate Solutions as a mechanism to help develop such co-operation. These plans bring together diverse actors to identify priorities and co-ordinate action. As this report shows, the plans represent an important step in organising collective efforts. Their effectiveness, however, depends on how clearly ambition is translated into action, how well decision-makers – particularly governments – are engaged, and how precisely collaboration is focused where it can add the greatest value.

Looking ahead to COP 31 and the next Global Stocktake, the priority is to move from mobilisation to delivery. This report contributes to that objective by focusing efforts where they can have the greatest impact. We hope it will support everyone making informed decisions about creating safer communities, stronger economies, and a more stable future.

Dr Timur Gül
Chief Energy Technology Officer
International Energy Agency

Dan Ioschpe
COP 30 Climate High-Level Champion

Samed Ağırbaş
COP 31 Climate High-Level Champion

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The principal IEA contributors were (in alphabetical order): Matthildi Apostolou, Jose Miguel Bermudez Menendez, Elizabeth Connelly, Axel Nordin Fürdös, Andrew Ruttinger and Tiffany Vass.

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Daniel Weaver	Department of Energy Security and Net Zero, United Kingdom
Edward Webber	Department of Energy Security and Net Zero, United Kingdom
Matthew Wittenstein	UNESCAP
Judy Zakreski	International Code Council

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THE NEXT PHASE OF INTERNATIONAL COLLABORATION IS FOCUSED ON DELIVERY

With long-term goals and sectoral targets established in many countries, the focus of international energy and climate collaboration has shifted. The primary priority of collaboration is no longer articulating new commitments, but delivering outcomes within this decade. This shift has been most prominent in recent international processes, including the Conference of the Parties (COP), where the focus has moved towards mechanisms and initiatives intended to support delivery across sectors of the global economy.

In addition to emissions reductions, many governments are considering energy transitions for reasons of energy security, affordability and job creation. Against this backdrop, there is growing interest in how practical international collaboration can help advance these objectives. The Global Climate Action Agenda reflects this shift, placing greater emphasis on mobilising co-operation, aligning efforts and supporting action across key areas of the global climate and energy system through an approach that enables countries to collaborate without requiring universal consensus. The period leading up to the next Global Stocktake concluding in 2028 – when countries assess collective progress towards the Paris Agreement goals – represents a critical window to drive efforts across sectors and places a premium on delivery-oriented collaboration.

MANY OPPORTUNITIES FOR COLLABORATION EXIST, BUT PLANS FOR IMPLEMENTATION REMAIN UNCLEAR

The collaboration landscape spans hundreds of initiatives, platforms and coalitions, involving governments, businesses and civil society. This reflects broad recognition that many energy system challenges cannot be addressed through national action alone. At COP 30 last year, hundreds of such initiatives came together to create Plans to Accelerate Solutions (PASs) intended to translate high-level objectives into more concrete actions by identifying priority technologies, policy enablers and areas for collaboration across sectors and value chains. This report reviews a subset of the nearly 120 plans, examining how they translate shared objectives into actions, how they incorporate appropriate priorities for international collaboration, and how they can be strengthened to better support near-term implementation across the energy system.

Overall, the plans largely demonstrate a strong alignment with key levers for international collaboration that can address the challenges facing each sector. For example, hydrogen, steel, cement and concrete, and fertilisers are all sectors where strong international signals for investment are important for market growth for clean energy options. The related plans appropriately identify aggregated demand creation and standards interoperability as priority levers for international collaboration. In the road transport sector, plans identify international assistance with financing and investment in emerging markets as an area of focus, reflecting the importance of investment in charging

infrastructure in emerging markets and developing economies. In the buildings sector, plans identify capacity and skills as an important lever, highlighting the importance of institutional capacity in order to update building codes and regulations. However, not all forms of international collaboration are equally well represented. Trade stands out as a lever that may be especially important to the transitions in sectors that are particularly exposed to international competition, such as steel and fertilisers, and that is not well addressed in current plans.

Three challenges are particularly apparent that will determine the extent to which these plans contribute to mobilising investment, deploying clean technologies, and advancing the transition. These are: i) the participation and leadership of governments; ii) clarity about the related roles of national action and international collaboration; and iii) alignment between desired outcomes and planned actions.

STRONGER GOVERNMENT ENGAGEMENT IS REQUIRED TO TRANSLATE PLANS INTO ACTION

The participation and leadership of governments in international initiatives is essential for the strongest forms of international co-operation to be realised. Similarly, government participation and leadership will be required for PASs to realise their potential as effective co-ordination frameworks that materially support implementation. Government leadership will be critical to ensure that identified actions in this new co-ordination mechanism translate into concrete policy, investment, and market signals, while working in partnership with private sector and other non-state actors that play a central role in implementation.

To date, national government involvement in the development of Plans to Accelerate Solutions has been limited and uneven across sectors. Many plans have been primarily shaped by international organisations and other non-government actors. Effective implementation depends on actors with decision-making authority, particularly governments, that can set policy frameworks, create demand, and mobilise and direct finance. Governments need to consider what role they are able to play in agreeing future iterations of these plans; ideally, the plan for a particular sector should be developed with the involvement of countries most able to positively influence the global transition in that sector, as well as those that may have less influence but much at stake.

Governments also need to consider which specific collaboration initiatives they can most usefully participate in, to advance both national interests and global transitions. Over the past 4 years, governments participating in the Breakthrough Agenda process have met regularly in sector-focused groups to discuss the state of international collaboration in each sector, and to identify the priority areas where further or different collaboration is needed. Ensuring that substantive, effective collaboration takes place will benefit from maintaining and strengthening such engagement processes. The Global Green Industrialization Agenda, as set out under the *Belém Declaration on Global Green Industrialization*, has been designed as a platform to continue this mode of engagement in some sectors. The governments that supported this declaration at COP 30 expressed their intention to work together in close alignment with the relevant Plans to Accelerate Solutions. If successful, this could help strengthen coherence across initiatives, strengthen government engagement, and support more co-ordinated delivery across sectors.

The effectiveness of the next phase of international collaboration will depend in large part on whether governments take a more active role in shaping, endorsing and implementing these plans. This report highlights areas where additional focus, co-ordination or sequencing at the international level could help unlock progress during this decisive phase of the transition.

GREATER CLARITY IS NEEDED ON THE RESPECTIVE ROLES OF NATIONAL AND INTERNATIONAL ACTION

Given that most policies that advance energy transitions are implemented at national and subnational levels, international collaboration adds value only when it is well-targeted and focused on opportunities that cannot be addressed through domestic action alone. These opportunities include the greater efficiency in global markets that can come from harmonised or interoperable standards, stronger investment signals that can be generated by aligned policies on procurement and trade, and greater finance mobilisation supported by international concessional lending. They can also include greater cross-border functioning of clean technologies through infrastructure connections (such as electricity interconnectors or electric truck charging networks) and faster policy and technology innovation that can come from the sharing of best practice.

Some parts of the Plans to Accelerate Solutions lack clarity about the respective roles of national and international action. This carries the risk of missing opportunities for an international process to play a helpful role. In the domestic policy-making process, governments have many other sources of advice to which they can turn. In this international process, with which most governments have relatively little capacity to engage, it is essential to be as specific as possible about the form of collaboration and the unique contribution that it can provide.

PLANNED ACTIONS MUST BE CONSISTENT WITH INTENDED OUTCOMES

Many of the plans show a mismatch between the ambition of the intended outcomes stated, and the ability of proposed actions to deliver them. While many PASs articulate outcomes that clearly describe the desired transformation of a sector, the actions associated with those outcomes are often insufficient in scale, scope or authority to produce the implied level of change, particularly within the near-term implementation window.

This outcome-action misalignment most commonly arises where actions remain focused on preparatory activities. Such preparatory activities typically involve studies, dialogues, frameworks or pledges, while intended outcomes assume the mobilisation of finance, deployment of infrastructure or establishment of bankable projects. Foundational activities are necessary for long-term transition pathways, but on their own they do not constitute delivery mechanisms capable of shifting investment or deployment decisions at scale.

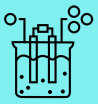
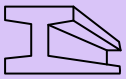
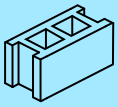
To go further, there is a need to sharpen the connection between intended outcomes and planned actions. This includes ensuring that high-impact outcomes are supported by at least some actions that go beyond preparatory steps, clarifying the roles and authority

of participating actors, and grounding expectations of international collaboration in its feasible practical effects rather than in the achievement of high-level targets.

A FOUNDATION TO BUILD ON

As a first iteration of this approach, the Plans to Accelerate Solutions provide a useful foundation. Their design, governance and role in supporting delivery are likely to evolve as experience grows. The review in this report highlights a set of recurring design features that could strengthen the role of PASs in facilitating and prioritising international collaboration on sectoral transitions. These principles are drawn directly from observed practice across sectors and are intended as practical guidance rather than prescriptive requirements. Clear alignment between intended outcomes and actions, explicit allocation of roles, appropriate use of international collaboration levers, attention to sequencing, and well-resourced facilitators to ensure multi-year continuity between COPs will all be critical for translating collective intent into effective action.

NEAR-TERM SECTOR PRIORITIES

Hydrogen 	Governments use international platforms to **aggregate demand creation**, while private actors scale sector-specific demand aggregation to enable firm offtake agreements.	Governments set emissions intensity thresholds for support schemes, aligned with **international standards**, and enable mutual recognition of certification.	Governments, MDBs and DFIs scale up **concessional finance and direct support** to flagship hydrogen projects in EMDEs to unlock final investment decisions.
Road transport 	Governments support **knowledge-sharing** to encourage the publication of hosting capacity maps for charging infrastructure.	Governments, MDBs and DFIs establish a **funding assistance programme** to allocate capital to zero-emission commercial vehicle purchases.	Governments agree on minimum quality and performance **standards** for used vehicle imports to further strengthen demand for used or new electric vehicles.
Steel 	Governments advance and **aggregate demand creation** policies to enable firm offtake commitments for near-zero and low-emissions steel from both public and private sector actors.	Governments, MDBs and DFIs target **financial and technical assistance programmes** to mobilise investment in the first commercial near-zero emissions steel projects.	Governments establish a strategic dialogue to agree on **trade partnerships**, underpinned by agreement on standards and competitiveness safeguards.
Cement and concrete 	Governments advance and **aggregate demand creation policies** to enable firm offtake commitments for near-zero and low-emissions cement and concrete.	Governments, MDBs and DFIs target **financial and technical assistance programmes** to mobilise investment in the first commercial near-zero emissions cement projects.	Governments support the adoption of **interoperable standards** and definitions for near-zero and low-emissions cement and concrete in policy, procurement and implementation applications.
Buildings 	Governments use international platforms to develop **roadmaps** for energy performance regulations for renewable energy and energy efficiency in buildings and for NZERBs.	Governments and MDBs strengthen **engagement and exchange** with financial institutions to integrate NZERB and BEERI criteria into lending and investment practices.	Governments and public authorities strengthen **public procurement practices** for NZERB-aligned buildings and technologies, sharing knowledge and building institutional capacity.
Fertilisers 	Governments intensify and align efforts to **create demand** for near-zero and low-emissions fertilisers.	Governments and initiatives develop **internationally consistent standards** and certification schemes for near-zero and low-emissions fertilisers and for soil health and protection.	Governments, MDBs and DFIs target **financial and technical assistance programmes** to mobilise investment in low-emissions fertiliser production and use.

Notes: MDBs = multilateral development banks; DFIs = development finance institutions; EMDEs = emerging market and developing economies; NZERBs = near-zero emission and resilient buildings; BEERI = building efficiency, electrification, and renewable integration. These priorities have been shortened for the Executive Summary.

FROM PROGRESS TO DELIVERY

This chapter sets out the current state of energy transitions and the broader context in which they are unfolding, highlighting areas of progress and the constraints that continue to shape outcomes across sectors. It situates these developments within a growing focus on how agreed goals are delivered in practice, including through the evolving structure of the Global Climate Action Agenda and its Plans to Accelerate Solutions (PASs). This context establishes the link between global energy trends and the analysis contained in the subsequent chapters.

STATE OF ENERGY TRANSITIONS

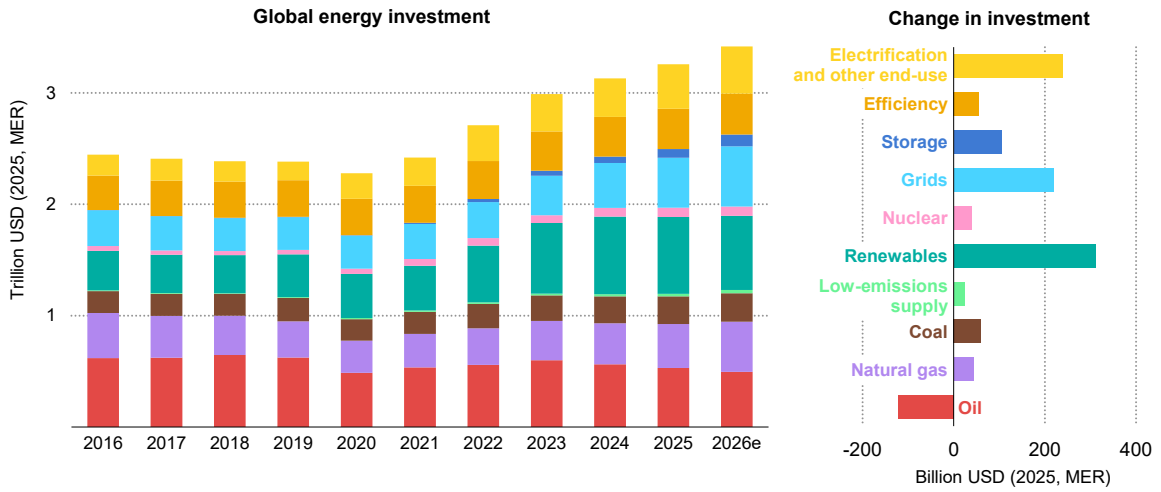
The global energy system continues to operate in a complex and uncertain geopolitical environment. Recent years have seen heightened tensions, trade frictions and disruptions affecting energy markets and supply chains. These dynamics have reinforced energy's central role in economic stability and national security, shaping policy priorities and investment decisions across regions. At the same time, they do not define energy transitions as a whole. Instead, they form the backdrop against which long-term structural changes in energy demand, investment and technology deployment are increasingly unfolding.

Recent data underscore both progress and constraint. Global energy demand growth slowed in 2025 to 1.3%, just below the average for the previous decade, reflecting softer economic conditions, milder weather, and continued improvements in energy intensity. Deployment of low-emissions technologies reached new highs. Renewables and nuclear power met nearly 60% of incremental energy demand growth, with solar PV alone contributing more than one-quarter – marking the first time that a modern renewable source made the largest contribution to meeting global energy demand growth.

Electricity continues to be at the core of today's energy sector changes. Global electricity demand grew by around 3% in 2025, more than twice the rate of total energy demand, confirming the notion that the world has entered the "age of electricity". Solar PV delivered its largest annual increase, adding around 600 GW of capacity, while annual renewable capacity additions reached a new record of about 800 GW. Battery storage was the fastest-growing power technology, with capacity additions rising by around 40% in a single year to over 100 GW of new storage capacity.

Investment trends reflect these changes. Total global energy investment is expected to reach USD 3.4 trillion in 2026, a 5% increase from 2025. Around USD 2.2 trillion is expected to go collectively to renewables, nuclear, grids, storage, low-emissions fuels, efficiency and electrification, and some USD 1.2 trillion to oil, natural gas and coal. Investments in electricity supply and infrastructure alone are poised to reach USD 1.6 trillion in 2026 and rise to USD 2 trillion when spending on end-use electrification is included.

Figure 1.1 Global investment in energy and change in investment, 2016-2026e



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Notes: MER = market exchange rate. 2026e = estimated. Oil, natural gas and coal includes both supply and generation investment.

Source: IEA (2026), World Energy Investment.

This is having a strong impact on the global market for clean energy technologies, which has grown rapidly in recent years and continues to develop at pace. The combined market for key technologies[1] expanded at an average annual rate of nearly 20% between 2015 and 2024, driven overwhelmingly by the electric car market. The market is estimated to have grown by nearly 25% in 2025, pushing the value to nearly USD 1.2 trillion – overtaking the coal market and approaching the scale of the natural gas market.

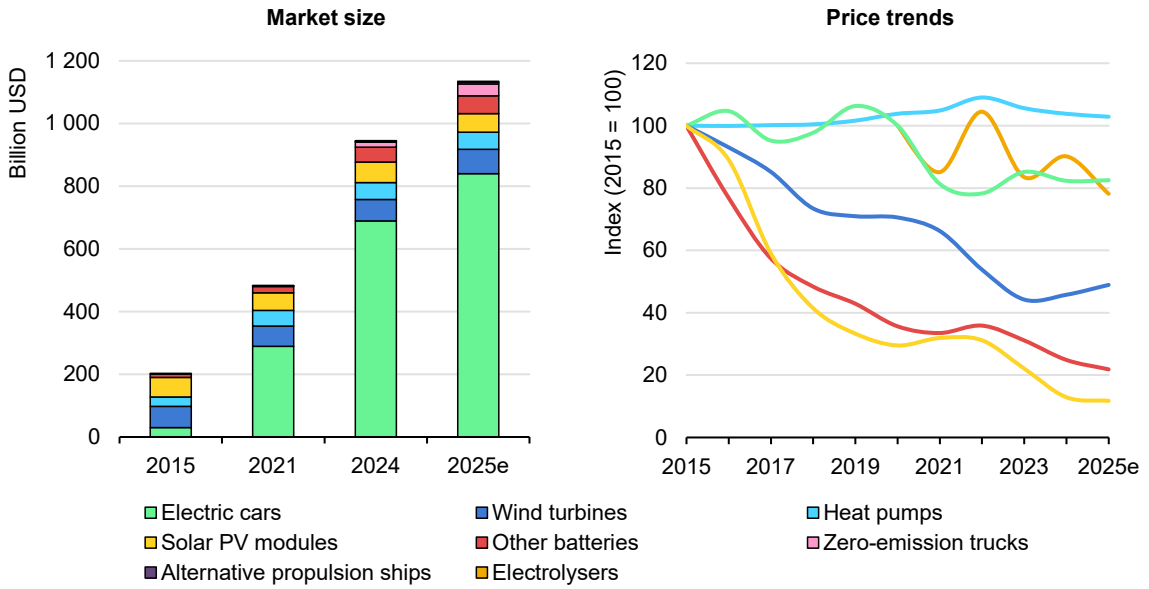
Despite this progress, global energy-related CO_2 emissions continued to grow in 2025, albeit modestly, by around 0.4%, reaching a new record. Rapid deployment of renewables, nuclear power, electric cars and heat pumps avoided an estimated 3 gigatonnes of CO_2 emissions in 2025, equivalent to around 8% of global energy-related emissions annually. Without these clean energy gains, emissions growth would have been substantially higher.

Overall, current policy trajectories remain unaligned with international climate goals: if all energy-related components of existing nationally determined contributions (NDCs) were met, global energy-related emissions would decline by only around 0.3% per year to 2035.

These trends highlight a central challenge for the next phase of transitions: while progress in technologies, markets and investment is accelerating, translating this momentum into deployment at the pace and scale required remains uneven across sectors and regions. This reflects not only differences in policy frameworks and market conditions, but also the complexity of co-ordinating action across value chains and stakeholders. In this context, international collaboration has an important role to play in supporting delivery, including by helping to align approaches, address shared constraints and focus collective effort on areas where it can have the greatest impact.

[1] Electric cars, zero-emission trucks, other electric vehicle batteries and stationary batteries, solar PV modules, wind turbines, heat pumps, electrolysers and alternative propulsion ships.

Figure 1.2 Global market size and price trends for selected clean energy technologies, 2015-2025e



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Notes: 2025e = estimated. Heat pumps are residential only (the industrial heat pump market remains negligible). Wind turbines include towers, nacelles and blades. Electrolysers refer to the stack. Other batteries for market size include electric vehicle batteries for vehicles other than cars and trucks, as well as stationary storage batteries; and for price trends include lithium-ion batteries. Sales of wind turbines, solar PV modules, heat pumps and electrolysers are measured in terms of GW; sales of electric cars, zero-emission trucks, and alternative population ships are measured in terms of number of vehicles or vessels; sales of other batteries are measured in terms of GWh.

Source: IEA (2026), Energy Technology Perspectives.

COP 30 AND IMPLICATIONS FOR IMPLEMENTATION

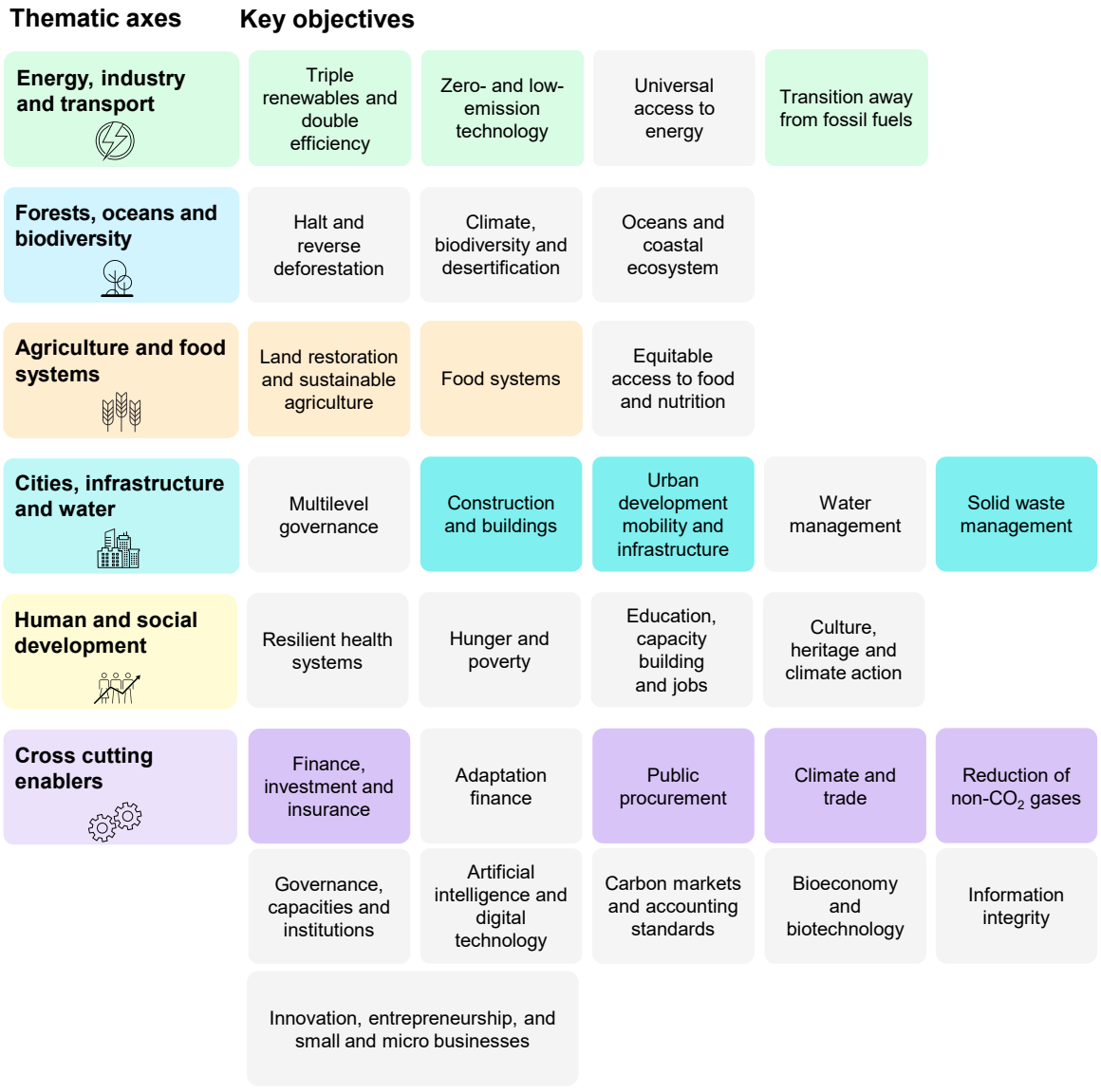
The 30th Conference of the Parties (COP 30) took place against a backdrop of recognition that the central challenge facing global energy transitions is one of implementation. With long-term goals and sectoral targets widely established, discussions focused less on articulating new commitments and more on how existing ones might be delivered in practice over the remainder of the decade. This shift was reflected in renewed emphasis on implementation-oriented initiatives under the Global Climate Action Agenda (Action Agenda).

The Action Agenda is intended to support delivery of outcomes already agreed by governments, especially the Global Stocktake, by bringing together governments, international organisations, industry and other non-state actors around sector-specific and cross value chain initiatives, partnerships and voluntary commitments. Rather than creating new intergovernmental obligations, it aims to accelerate progress by mobilising co-operation, aligning efforts and supporting action across key areas of the global climate and energy system.

The Action Agenda is an enabling architecture that strengthens the work of many initiatives, platforms and coalitions. Responsibility for turning commitments into outcomes remains distributed across this ecosystem. This reflects a desire for strong engagement, but also introduces complexity, particularly where initiatives overlap, rely on shared enablers or

address interdependent parts of the energy system. As a result, clarity around leadership, prioritisation, sequencing and accountability has become increasingly important.

Figure 1.3 COP 30 themes and objectives covered in the Breakthrough Agenda Special Report



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Source: Adapted from the COP 30 Action Agenda.

THE ACTION AGENDA AND PLANS TO ACCELERATE SOLUTIONS

Within the Action Agenda, Plans to Accelerate Solutions (PASs) have been proposed as a central organising instrument for implementation-oriented co-operation. PASs summarise key actions that are intended to accelerate implementation.

The plans were developed through a consultative process under the Action Agenda by international organisations, sectoral initiatives, industry alliances and other non-state actors active in each area. In practice, the degree of government involvement has varied across sectors and has generally been limited. In some cases, one or two proactive governments contributed to shaping individual plans, while in others engagement was largely confined to the COP Presidency and affiliated teams. With few exceptions, PASs have not been formally discussed or agreed among groups of governments. As a result, they currently reflect an aggregation of existing initiatives and voluntary actions rather than a co-ordinated set of government-led implementation priorities.

The new five-year vision for accelerating implementation (2026-30) of the Action Agenda was developed by the Climate High-Level Champions of the COP 29 and COP 30 Presidencies. It supports the implementation of the Global Stocktake and institutionalises the PASs by establishing a more permanent framework over the medium term. The plans translate high-level *objectives* into concrete *actions* that can contribute to real on-the-ground progress. They identify priority technologies, policy enablers and areas for collaboration across sectors and value chains. In the energy system, these plans typically span multiple technologies and involve a diverse range of stakeholders, reflecting the interconnected nature of transition pathways. The Climate High-Level Champions operationalise this new Action Agenda, and the Climate Champions Team provides the institutional support to successive COP Presidencies, connecting them with all Action Agenda actors and the teams behind each PAS and associated actions.

PASs could provide a useful structure for mobilising action, but their effectiveness depends on how they are designed and led. Clear alignment between outcomes and actions, explicit allocation of roles, appropriate use of international collaboration levers, attention to sequencing, and adequately resourced facilitators to ensure multi-year continuity between COPs are all critical for translating collective intent into delivery. The participation and leadership of governments in international initiatives is essential for the strongest forms of international co-operation to be realised and, similarly, will be needed for PASs to realise their potential as effective co-ordination frameworks that materially support implementation.

Taken together, the Action Agenda and its associated PASs articulate a broad and forward-looking vision for accelerating progress during a critical phase of the transition. However, on their own they do not resolve how priorities should be set, how overlapping efforts should be aligned, or how international co-operation can most effectively support the national decisions on policy, investment and deployment that ultimately determine outcomes.

A GROWING NEED FOR CLARITY, CO-ORDINATION AND FOCUS

The number of PASs and related initiatives underscores the positive desire to enhance collaboration across a range of topics, yet at the same time it raises questions about coherence across approaches and the effectiveness of delivery. Many plans involve overlapping stakeholders, assume the availability of shared infrastructure or finance, or address similar points along interconnected value chains. Without greater clarity on how these efforts relate to one another, there is a risk that resources are spread thinly, responsibilities remain diffuse and opportunities for alignment are missed.

This matters in practice because many governments have limited capacity for international engagement, and such a complex landscape makes it difficult for them to know where to

prioritise their efforts. At the same time, the capacity of governments to engage deeply in multiple international processes may be constrained in the current energy and geopolitical context, which shapes the level and form of their participation. Strengthening government leadership over time will therefore be important for enhancing the effectiveness of these frameworks, while recognising the progress represented by their initial development.

An additional consideration is that energy system transitions hinge on progress across multiple domains. Advances in clean power, electrification, fuels or industrial transformation depend on parallel developments in grids, infrastructure, markets, finance and policy. When efforts are strongly concentrated on one part of the system but not on another, implementation bottlenecks can persist even in the presence of strong commitment and funding.

There is therefore a growing need to look across the landscape of PASs to identify common strengths and weaknesses, clarify where international collaboration adds the greatest value, and distil practical lessons that can strengthen implementation. This includes identifying how clearer prioritisation and sequencing of actions can help focus international efforts on the areas most critical for near-term delivery. Addressing these questions is essential to move from mobilisation to delivery and to ensure that the Action Agenda contributes effectively to tangible progress over the next 5 years.

BUILDING ON THE BREAKTHROUGH AGENDA REPORT SERIES

Since its launch at COP 26, the Breakthrough Agenda has served as a framework for strengthening international collaboration across major emitting sectors. Participating countries endorsed shared “Breakthrough” goals aimed at making clean technologies and sustainable practices more affordable, accessible and attractive than their alternatives by 2030. To support delivery, an annual reporting cycle was established to track progress towards these goals and highlight where stronger or more co-ordinated international action is needed.

From 2022 to 2024, the Breakthrough Agenda Reports focused on assessing the state of international collaboration across sectors and identifying priority actions to accelerate progress. These reports helped establish a common evidence base and a shared understanding among governments, international organisations and other stakeholders of where collective efforts were most critical, particularly in relation to technology development, standards, finance and demand creation.

The 2025 Breakthrough Agenda Report marked a further evolution in this work by sharpening the focus on implementation. It introduced sector-specific success statements linked to the 2030 goals, combining quantitative indicators with qualitative examples to define what meaningful progress looks like in practice. These success statements provided a clearer reference point for assessing delivery and have since informed elements of the COP 30 Action Agenda and the development of some PASs.

The Action Agenda and its associated PASs therefore build on an existing analytical foundation developed under the Breakthrough Agenda framework. As the emphasis in climate diplomacy has continued to shift from ambition-setting to execution, the central question has become how well these new implementation-oriented plans are designed to support delivery. This report responds to that ongoing shift by examining how PASs

translate shared objectives into actions, how they incorporate appropriate priorities for international collaboration, and how they can be strengthened to better support near-term implementation across the energy system.

In the Breakthrough Agenda process over the past 4 years, alongside the analytical work of the annual Breakthrough Agenda Reports, governments have engaged in regular sectoral consultations that brought together countries to review progress across international initiatives and identify priority areas requiring further or different collaboration. This process provided a forum for collective government oversight across a fragmented landscape of initiatives, helping to shape shared priorities beyond the scope of any individual platform. Maintaining and strengthening this form of engagement over time could play an important role in ensuring that substantive international collaboration takes place, addresses governments' priority challenges for the transition, and supports effective delivery.

Recent developments point to emerging efforts to further strengthen structures for international co-ordination building on the Breakthrough Agenda. The Belém Declaration on Global Green Industrialization, launched at COP30, sets out a pathway towards a Global Green Industrialization Agenda, intended to bring together governments, industry, academia and international initiatives to align priorities, identify gaps and scale up support. As this framework develops towards COP 31, governments involved have expressed an intention for it to incorporate and build on the Breakthrough Agenda, including through closer alignment with relevant PASs. This could help reinforce coherence across initiatives, strengthen government engagement, and support more co-ordinated delivery across sectors.

PURPOSE AND SCOPE

This report responds to the growing emphasis on implementation of the Action Agenda updated at COP 30 by assessing how PASs are designed and how effectively they support delivery across the energy system. Its focus is not on the ambition of plans as articulated, but on the extent to which their actions, structures and use of international collaboration are suited to enabling near-term progress.

Rather than reviewing PASs in aggregate, the analysis examines a selected group of plans in depth to identify strengths and weaknesses in action design, cross-sector coherence, the deployment of international collaboration levers and emerging patterns that affect implementation outcomes. The review covers 16 PASs across six core energy sectors, two closely related sectors and three cross-cutting themes. This selection was designed to capture diversity in sectoral scope, maturity and implementation challenges, while recognising that it represents only a subset of the nearly 120 PASs submitted under the Action Agenda in the run-up to COP 30.

This assessment focuses on PASs as they are currently articulated, recognising that they provide a partial representation of a broader and evolving landscape of international initiatives. In many cases, participating organisations and others are advancing additional activities, partnerships and delivery efforts that are not fully captured within PAS documentation. The analysis therefore concentrates on how plans frame objectives, actions and collaboration, while acknowledging that implementation dynamics inevitably extend beyond what is reflected in the plans themselves.

The assessment is based on a structured analytical framework grounded in areas of international collaboration previously identified through the Breakthrough Agenda Report series. Using this framework, the report examines how PASs articulate outcomes, translate those outcomes into actions, allocate roles to participating actors, address interdependencies across sectors and value chains, and consider timing and sequencing in relation to delivery. The aim is not to compare or rank individual plans, but to distil cross-cutting insights that are transferable across sectors and relevant to the wider Action Agenda.

The review establishes an analytical architecture that could be applied more broadly to other PASs over time. The resulting insights (covering recurring design gaps, areas of emerging good practice and common enabling conditions) provide a basis for strengthening the quality, coherence and impact of future PASs without being prescriptive about governance arrangements or institutional models.

Building on this assessment, the report identifies a small set of near-term implementation priorities for each of the six core sectors reviewed. These priorities adopt a broader sectoral perspective that goes beyond individual PASs, focusing instead on actions that could realistically be advanced over the next 2 to 3 years and that would materially improve conditions for investment, deployment and market development ahead of the next Global Stocktake in 2028.

STRENGTHENING THE PLANS TO ACCELERATE SOLUTIONS

Plans to Accelerate Solutions (PASs) are a central component of the COP 30 Action Agenda's approach to implementation. As voluntary, multi-stakeholder plans, their ability to contribute meaningfully to delivery depends on how clearly their outcomes are translated into actions, how responsibilities are allocated, and how international collaboration is used to address binding constraints.

This chapter assesses the design and coherence of a selected group of PASs. The focus is on identifying recurring strengths and weaknesses in plan design rather than on evaluating individual plans or comparing performance.

Taken together, the findings provide an evidence-based view of where PAS design is effectively supporting implementation, where gaps persist, and which features appear most important for strengthening delivery over the remainder of the decade. These insights form the basis for the design principles highlighted later in this chapter and for the sectoral priorities identified in the next chapter.

WHAT DOES A PLAN INCLUDE?

Plans to Accelerate Solutions are instruments under the Action Agenda, intended to support delivery of sectoral transition objectives through international co-operation. PASs are voluntary and non-binding, and are structured to set out how collective action by governments, international organisations, industry and other stakeholders can help address barriers that slow deployment, investment and market uptake. They have typically been put together by organisations that are particularly active in international co-operation in the relevant sector or part of the value chain, through a consultative process.

Most PASs share a broadly common set of components. This includes a definition of the scope and objectives of the plan, noting the sectors or value chains covered, the geographic reach, and the outcomes the plan seeks to advance. The objectives are typically linked to existing international reference points, such as Breakthrough targets, Global Stocktake priorities or Sustainable Development Goals, situating the PAS within the wider implementation architecture of the Action Agenda.

The PASs then identify a set of priority levers for international collaboration. These levers reflect areas where co-ordinated action across countries or institutions can add value beyond national efforts alone, such as standards and certification, demand creation, finance mobilisation, infrastructure co-ordination, research and innovation, capacity building, or trade co-operation. In many PASs, the relative maturity of these levers is assessed to highlight where constraints are most binding and where progress is more advanced.

A central element of each PAS is its portfolio of actions. Actions are generally described in terms of their scope, time horizon and responsible or facilitating actors. They range from

analytical and co-ordination activities (for example, developing common frameworks, methodologies or platforms for dialogue) to more implementation-focused measures, such as pilot programmes, procurement initiatives, financing mechanisms or deployment support in specific regions. In principle, these actions are intended to translate stated objectives into steps that can be advanced through existing institutions and partnerships.

PASs also outline the roles of participating actors, including governments, international initiatives, industry alliances, financial institutions and civil society organisations. Rather than establishing new governance structures, plans typically rely on existing coalitions, with leadership or facilitation roles assigned to host initiatives. This reflects the decentralised nature of the Action Agenda.

Finally, many PASs include elements related to expected impact, indicators or milestones, often linked to 2030 targets. These elements are intended to provide reference points for tracking progress over time, even where formal accountability mechanisms remain limited.

A REVIEW OF SELECTED PLANS

The findings in this chapter draw on a structured review of 16 PASs. The review focused on six core sectors (hydrogen, road transport, steel, cement and concrete, buildings and fertilisers) and five related and cross-cutting sectors. While the latter sectors were examined as they related to the core sectors, the focus of the analysis remains on the core sectors.

The plans reviewed span a range of technologies, steps in the value chain and implementation contexts, reflecting the diversity of challenges associated with delivering the energy transition across sectors. Several of the plans included in this sample have been led or supported through the Breakthrough Agenda, and as such reflect a more mature collaboration ecosystem.

The relationship between stated outcomes and the actions set out in the PASs should also be interpreted in the context of differing sectoral starting points. Across the portfolio, sectors vary in terms of the stage of the transition that they have reached, institutional complexity and the current level of international alignment. The most effective forms of collaboration vary over the course of each sector's transition, with the focus shifting from R&D, through deployment and diffusion, to wider system adjustments. At the same time, in sectors where international collaboration is less established, actions that focus on dialogue, capacity building and the development of shared frameworks may represent a necessary first step before stronger forms of collaboration become possible. In sectors where these softer forms of co-operation have been in practice for some time, there is greater potential for substantial joint actions to accelerate deployment of clean technologies. These distinctions underscore that the form of effective international collaboration will differ across sectors, including between those focused on accelerating immediate deployment and those currently building the foundations for future delivery.

Table 2.1 Plans to Accelerate Solutions included in the review

Sector	Reviewed Plan	
Core sectors		
Hydrogen	Plan to Accelerate Renewable and Low-Emissions Hydrogen and its Derivatives	Activation Group 4
Road transport	Plan to Accelerate Road Transport Decarbonisation	Activation Group 2
	Scaling Up Public Transport and Sustainable Transport in Cities	Activation Group 13
Steel	Plan to Accelerate the Decarbonisation of Steel	Activation Group 2
Cement and concrete	Plan to Accelerate Cement & Concrete	Activation Group 2
Buildings	Near-Zero Emission and Resilient Buildings	Activation Group 12
	Building Efficiency, Electrification and Renewable Integration	Activation Group 1
Fertilisers	Plan to Accelerate Fertilisers Solutions	Activation Group 8
	Regenerative Agriculture for Healthy Soil and Healthy Diets	Activation Group 8
Related and cross-cutting sectors		
Electrification	Plan to Accelerate Electrification Solutions	Activation Group 1
Green industry	Green Industry Support to Emerging Markets and Developing Economies	Activation Group 2
	Plan to Accelerate Green Industrial Hubs and Corridors	Activation Group 2
Finance	Plan to Accelerate Financing of Clean Industrial Projects	Activation Group 20
	Plan to Accelerate Creation and Adoption of Transition Plans for Financial Institutions	Activation Group 20
Trade	Harnessing Trade Policy for NDCs, Low-Carbon Economic Diversification and Climate Resilience	Activation Group 24
Public procurement	Plan to Accelerate Sustainable Public Procurement	Activation Group 22

USE OF INTERNATIONAL COLLABORATION LEVERS

International collaboration is most effective when it targets areas where co-ordinated action can deliver outcomes that national efforts alone cannot. The Breakthrough Agenda Report series has, over recent years, highlighted many examples of these opportunities in each of the major emitting sectors.

Levers of international collaboration (such as standards alignment, demand aggregation, finance mobilisation, infrastructure co-ordination or trade) vary in relevance across sectors. They depend on the specific barriers to delivery that international action is well placed to address. See the Annex for a full list of the levers and their relevance for collaboration.

Table 2.2 Priority areas of collaboration identified in the Breakthrough Agenda Reports

	Hydrogen	Road transport	Steel	Cement	Buildings	Fertilisers
Standards and certification	X		X	X	X	X
Demand creation and management	X		X	X	X	X
Finance and investment	X	X	X	X	X	X
Research and innovation	X		X	X	X	X
Trade conditions		X	X			X
Infrastructure		X				
Long-term vision		X				
Supply chains		X				
Capacity and skills					X	

Notes: The priority areas of collaboration were identified in past Breakthrough Agenda Reports and translated into Priority International Actions by countries. For example, the Road Transport Breakthrough translated the long-term vision lever into one on demand creation; while the lever names may differ, the priorities under the levers remain the same. As such, levers included in PASs may not be reflected in this table.

Most of the reviewed PASs reflect this framing at a high level and include collaboration levers that align broadly with their sectoral challenges. However, the assessment of PASs highlights important differences in how deliberately these levers are selected, prioritised and operationalised. In some cases, PASs focus collaboration on areas with clear added value relative to national action. In others, international co-operation is emphasised in areas where domestic policy action is important but the value-add of international collaboration is less clear.

The Road Transport PAS portfolio provides a strong example of relatively well-targeted use of collaboration levers. It prioritises demand aggregation, infrastructure co-ordination and delivery support in emerging markets and developing economies (EMDEs), linking co-operation to named countries, corridors and deployment programmes. This reflects a

strong understanding of where cross-border co-ordination and pooled action can accelerate progress. Co-ordinated investment in charging infrastructure along cross-border road freight corridors is a clear example of where international co-operation can achieve more than national action alone.

The Hydrogen PAS illustrates another example. The selection of collaboration levers (standards and certification, demand creation, finance mobilisation, etc.) is broadly well aligned with the sector's needs and reflects realistic expectations of where international alignment is essential. Its institutional architecture brings together governments, multilateral development banks, standards bodies and industry initiatives, and it anchors collaboration around concrete mechanisms such as mutual recognition of certification schemes, cross-border infrastructure corridors and concessional finance for early projects. This reflects a realistic understanding that hydrogen market formation depends on international alignment well beyond what individual countries can achieve alone.

By contrast, some PASs under-utilise collaboration levers that Breakthrough Agenda analysis has consistently identified as critical. Clear next steps to collaboration on trade conditions are a notable gap in the steel and fertiliser sectors. Both are globally traded commodities with complex competitiveness dynamics, yet trade-related collaboration receives limited attention in the relevant PASs. This represents a missed opportunity to address risks of market fragmentation and policy misalignment that could slow deployment.

In other cases, PASs place stronger emphasis on international collaboration in areas where national policy action is likely to remain decisive. In the buildings sector, outcomes imply mandates, regulatory reform and large-scale investment, while many associated actions remain focused on analytical work, voluntary frameworks or information-sharing at the international level. Here, there is a need to recognise international co-operation more clearly as a complement to, but not a substitute for, domestic implementation, and to identify its role with greater specificity. Overall, the effectiveness of international collaboration depends less on the number of levers activated than on how sharply collaboration is focused on high-impact pressure points. PASs are most likely to support delivery where they concentrate international effort on a limited set of levers that address binding constraints, involve actors with decision-making authority and are linked to concrete pathways for implementation.

ALIGNMENT BETWEEN OUTCOMES AND ACTIONS

A recurring finding across the reviewed PASs is a mismatch between the ambition of stated outcomes and the ability of proposed actions to deliver them. While many PASs articulate outcomes that clearly describe the desired transformation of a sector, the actions associated with those outcomes are often insufficient in scale, scope or authority to produce the implied level of change, particularly within the near-term implementation window.

This outcome-action misalignment most commonly arises where actions remain focused on structural or preparatory activities (such as studies, dialogues, frameworks or voluntary pledges) while outcomes assume the mobilisation of finance, deployment of infrastructure or establishment of bankable projects. Foundational activities are necessary for long-term transition pathways, but on their own they do not constitute delivery mechanisms capable of shifting investment or deployment decisions at scale.

Stronger alignment is evident where outcomes are matched with actions that specify delivery pathways, identify responsible actors (crucially, including governments) and activate collaboration levers capable of removing concrete barriers to implementation. In such cases, outcomes are framed in terms of what actions can plausibly achieve in the near term, and international co-operation is directly linked to enabling deployment rather than to general co-ordination.

The Road Transport PAS portfolio provides the clearest example of this alignment. Outcomes related to zero-emission vehicle uptake and corridor development are supported by actions that name participating governments, identify specific corridors and deployment programmes, and mobilise demand aggregation and derisking instruments. Here, international collaboration functions as a delivery vehicle rather than as a framework for intent.

In contrast, several PASs illustrate different forms of outcome-action mismatch. In the Hydrogen PAS, outcomes imply rapid deployment across industrial and transport applications supported by firm demand signals. However, demand actions rely primarily on declarations, advocacy platforms and exploratory initiatives, while binding offtake arrangements and policy instruments remain limited. Given the persistently low rates of conversion from announced projects to final investment decisions, this gap between ambition and mechanism could be particularly consequential.

A similar pattern appears in the Cement and Concrete PAS, where targeted finance outcomes are framed at an implementation level, but actions focus largely on analytical work, mapping exercises and toolkits. These are important first steps, but they alone cannot mobilise investors, particularly in emerging markets.

In the Buildings PAS portfolio, outcome-action misalignment is especially pronounced for demand creation and finance. Outcomes imply regulatory mandates, large-scale investment flows and market transformation, while most actions remain analytical. In these cases, international collaboration is implicitly positioned as a substitute for national policy adoption, rather than as a mechanism to support, enable or de-risk domestic decisions.

Improving alignment between intended outcomes and planned actions does not require lowering ambition. Instead, it requires sharpening the connection between outcomes and the actions needed to deliver them. This includes ensuring that high-impact outcomes are supported by at least some actions that go beyond preparatory steps, clarifying the roles and authority of participating actors, and grounding expectations of international collaboration in what it can realistically deliver in practice. Where PASs strike this balance, they are better positioned to function as effective tools for implementation rather than as co-ordination platforms alone.

It is important to recognise that at present, PASs largely reflect the aggregation of actions defined by participating initiatives, typically led by international organisations or NGOs that operate within their own mandates, resources and governance structures. As such, the ability to introduce new or more delivery-oriented actions within PASs is inherently shaped by these constraints, and may remain so unless governments take on a stronger leadership role in the process.

OVERLAP OF ACTIVITIES

Overlap of activities across the reviewed PASs is common and, in many cases, expected. Overlap is not inherently problematic, but instead reflects the cross-cutting nature of key enabling challenges such as finance, standards, infrastructure and demand creation. These challenges can apply across multiple sectors, and parallel initiatives can reflect healthy experimentation or different coalitions exploring complementary approaches.

The distinction that matters for implementation is whether overlap is functional or whether it risks fragmenting action and weakening delivery. Functional overlap occurs where different PASs address complementary aspects of the same challenge, target different stages of a value chain, or share institutional participants in ways that support alignment. In such cases, overlapping activity can reinforce coherence and reduce siloed decision-making.

Concerns arise when multiple PASs pursue similar objectives using parallel processes that target the same actors, resources or investment pipelines without clear co-ordination or division of roles. In these cases, overlap can create confusion about where governments, investors and delivery partners should engage, and can dilute collective effort, or slow progress by fragmenting decision-making.

The Green Industry PAS portfolio illustrates this risk. Both the Green Industrial Hubs and Corridors PAS and the Green Industry Support to EMDEs PAS include actions aimed at convening investors, structuring finance and mobilising capital for industrial hubs. While the latter aims to establish “hubs” in a virtual sense for capacity building, the former is focused on the physical development of hubs. It remains unclear if the virtual hubs are enablers of the physical ones, posing a risk of parallel finance mobilisation and duplicating engagement with the same investors. Greater co-ordination or consolidation of financial pathways could strengthen delivery without constraining diversity of participation or ideas.

By contrast, overlap across hydrogen related PASs is largely functional. Hydrogen appears across multiple sectoral plans, reflecting its role as a cross-cutting energy carrier and industrial feedstock. In most cases, different PASs address distinct parts of the value chain (such as supply conditions, standards, infrastructure or specific applications) while involving shared institutions that help align approaches.

Shared institutional participation across PASs can be a strength rather than a weakness. For example, the involvement of the same alliances and organisations across the Hydrogen and Electrification PASs helps align actions and avoid siloed approaches, even where individual activities are referenced in more than one plan. In these cases, overlap does not appear to impede delivery or create confusion about ownership, and instead supports coherence across interdependent transitions.

Overall, overlap becomes a delivery risk when it obscures responsibility, fragments engagement or targets the same decision points through multiple unco-ordinated channels. Where PASs are explicit about roles, leadership and complementarities, overlapping activity can instead support system-wide alignment and accelerate implementation.

TIMELINE OF DELIVERY

Limited clarity on timing and sequencing in relation to near-term delivery is a common challenge. While many PASs articulate long-term visions extending to 2030 and beyond, actions are often framed without clear differentiation between what is intended to be advanced in the immediate implementation window and what is expected to occur later. This limits the practical usefulness of plans for governments and other actors seeking to prioritise effort, allocate resources or assess progress over the next few years.

Stronger plans tend to differentiate more clearly between short-term actions and longer-term objectives and help focus attention on what can be delivered within the next few years. In these cases, actions are more likely to specify milestones, near-term outputs or decision points that are logically sequenced to enable subsequent phases of implementation. This approach supports momentum by linking long-term ambition to concrete steps that can be advanced quickly through international collaboration.

The Road Transport PAS portfolio provides a clear example of effective use of timelines. Its actions are anchored to defined delivery horizons ahead of 2030, including interim milestones for zero-emission vehicle deployment, freight corridors and EMDE-focused programmes. This sequencing allows pilot initiatives to inform scale-up and enables progress to be tracked against tangible outputs rather than deferred commitments.

In contrast, timing misalignments across related PASs can weaken delivery even where individual actions are well designed. In the finance PAS portfolio, actions aimed at supporting final investment decisions for industrial projects are expected to mature earlier than the standards, disclosure and transition planning frameworks intended to underpin investor confidence. This creates a temporal gap in which projects may need to proceed without the alignment mechanisms meant to support them, reducing the effectiveness of both initiatives.

Demand-supply timing mismatches also pose risks. In the Hydrogen PAS, announced investment volumes and project pipelines extend towards 2030, while demand creation mechanisms remain largely non-binding and early-stage. The absence of near-term demand actions increases the likelihood that projects struggle to reach final investment decision, even where supply-side ambition is high.

Several PASs also include quantitative outcome indicators, aligned with those proposed under the Breakthrough Agenda Report 2025, which in principle provide a form of interim accountability and reduce the risk that long-term goals function solely as aspirations. However, two limitations appear across plans. First, PASs do not specify who is responsible for tracking progress against these indicators or how monitoring will be resourced. Second, it is often unclear whether governments have adopted these indicators as targets they intend to contribute to, as opposed to metrics defined by international initiatives or secretariats. Without clarity on ownership and adoption, the motivational and accountability value of such indicators remains constrained.

INTERDEPENDENCIES ACROSS SECTORS AND VALUE CHAINS

Across the reviewed PASs, delivery depends heavily on progress in multiple, interconnected parts of the energy system. While many PASs implicitly recognise these

interdependencies, recognition is not always translated into co-ordinated or sequenced actions. As a result, plans often assume the availability of enabling inputs, such as low-emissions electricity, fuels, infrastructure or demand, without specifying how constraints in those areas will be addressed through collaboration.

The Hydrogen PAS illustrates this challenge most clearly. Hydrogen is positioned as a critical enabling input across several sectors, including steel, fertilisers and fuels, while its own low-emissions deployment depends on parallel advances in clean power generation, grid capacity and infrastructure. The PAS is designed in some respects to reflect these two-way dependencies. For example, the Hydrogen and Electrification PASs both cover "green" hydrogen – a clear interdependency between the two sectors. The actions are complementary and are led by the same stakeholder, the Alliance for Industry Decarbonization, aligning the work between the two PASs.

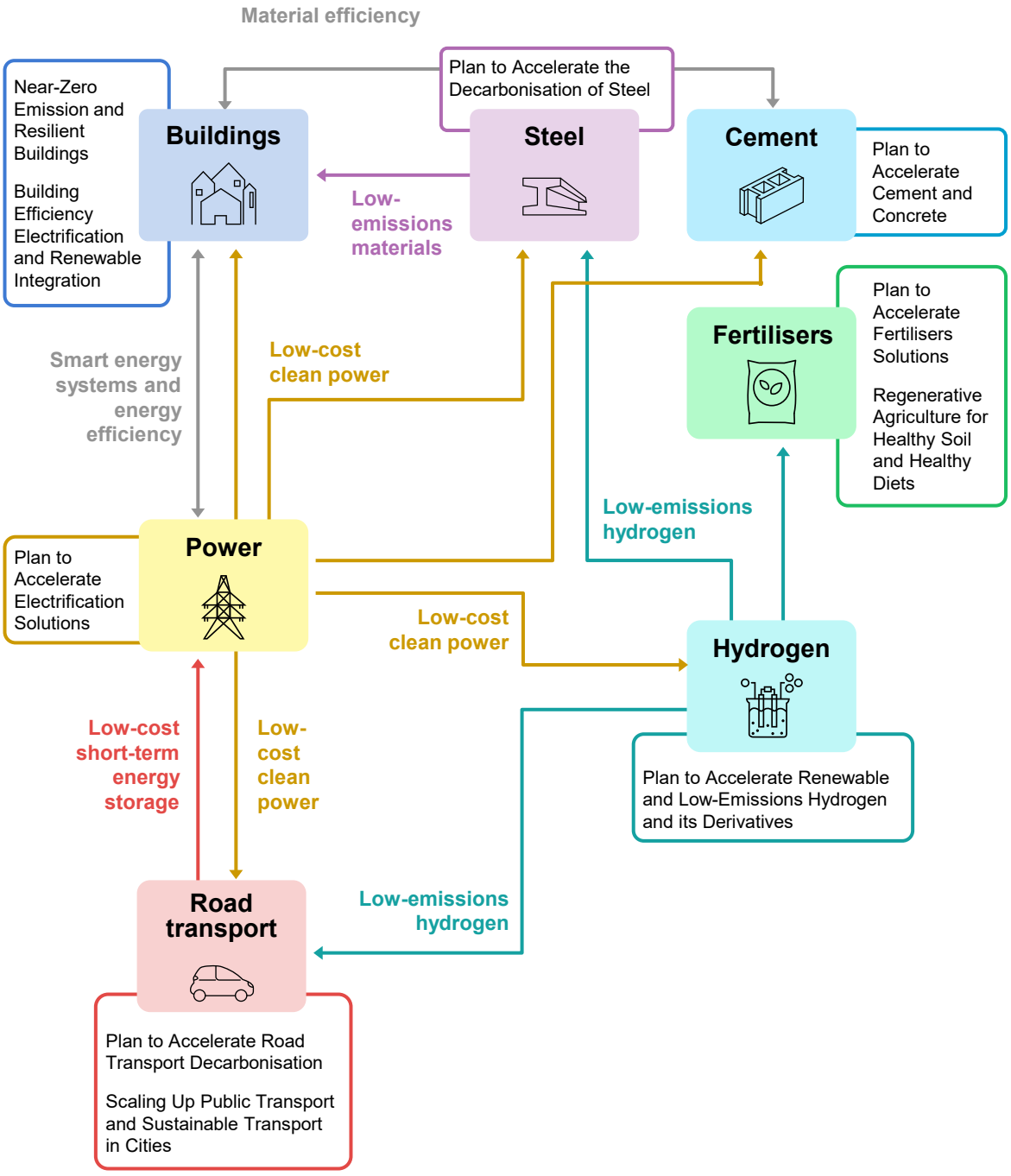
Some PASs demonstrate recognition of cross-sector linkages by focusing on specific bottlenecks rather than broad references to system integration. In these cases, actions are typically framed around shared infrastructure, demand aggregation or policy alignment. The most effective examples tend to identify dependencies that can be addressed through relatively tractable actions in one sector to enable transitions in another.

The Buildings PAS portfolio provides a clear illustration. By embedding low-emissions cement and concrete definitions into public construction standards and procurement frameworks, the buildings-related PASs link directly to the work under the Cement and Concrete PAS. This work also links to the Public Procurement PAS, supporting coherence across government policy on procurement and reducing emissions from industry and the built environment. While international alignment is important, different definitions and thresholds can coexist, tailored to specific policy uses, while remaining coherent and interoperable where possible. For example, different definitions could exist between procurement policies and those that are covered under a carbon border adjustment mechanism. Downstream action in one of those areas can reduce market uncertainty for upstream producers. The Building Efficiency, Electrification, and Renewable Integration (BEERI) PAS also plays a system-level role in linking buildings and power systems by integrating electrification, energy efficiency, renewable energy uptake, and grid readiness and flexibility. This cross-sector function is central to enabling demand-side decarbonisation while supporting power system transformation.

In industry, the Green Industry PAS highlights the role of co-located industrial hubs in addressing shared infrastructure needs across steel, cement, hydrogen and fertiliser production. The value of this approach lies less in the hub concept itself than in its explicit recognition that co-ordinating investment in electricity supply, hydrogen networks and CO_2 transport can reduce risk and transaction costs across multiple sectors simultaneously.

Overall, the review suggests that the most valuable cross-sector insights are those that identify leverage points where relatively easy actions in one domain can enable more difficult transitions elsewhere. Public procurement emerges most clearly as such a leverage point across the reviewed PASs. Governments already have authority in this area, and procurement standards can be deployed in ways that directly affect multiple value chains, particularly in cement and steel, if public agencies are able and willing to adapt procurement procedures to prioritise non-cost factors such as emissions performance. Where PASs highlight these leverage points explicitly, they are better positioned to support delivery than where interdependencies remain implicit or diffuse.

Figure 2.1 Interconnections between sectors and value chains



IEA. CC BY 4.0.

BEST PRACTICE ACROSS PLANS

The review of PASs highlights a set of recurring design features that appear to strengthen the contribution of international collaboration to implementation. These principles are drawn directly from observed practice across sectors and are intended as practical guidance rather than prescriptive requirements.

ADOPT AN APPROPRIATE SCOPE

PASs can be defined across different types of scope, depending on their objective and sectoral context. These include sectoral scopes (for example, covering a specific part of the economy such as road transport) or technological scopes (focusing on particular solutions such as electrification, hydrogen or carbon capture). Each approach may offer different advantages in terms of clarity, coherence and alignment with existing initiatives, but some are likely to be more effective than others.

If the scope of a PAS is too broad, it will be difficult to focus on the most important collaboration levers, prioritise critical actions, and bring together a critical mass of influential actors in an effective way. If the scope is too narrow, important levers of international collaboration may be left unconsidered. The most appropriate scope is likely to be the level of a GHG-emitting sector of the economy, such as steel or road transport. It is at this level that the system transitions to clean technologies and their associated physical, financial and social infrastructure take place, and where most of the opportunities for effective international collaboration can be found. This clarity of scope can support more effective co-ordination across initiatives and provide a stronger foundation for tracking progress over time.

FOCUS COLLABORATION ON WHERE IT ADDS THE GREATEST VALUE

Effective PASs are selective. Rather than attempting to address all dimensions of a sector's transition, they concentrate on the points where international collaboration can accelerate progress beyond what national action alone can achieve. This typically involves prioritising a limited number of collaboration levers (such as standards interoperability, demand aggregation, co-ordinated infrastructure investment or trade) aligned with the sector's most binding constraints. This should include forms of collaboration that are difficult but high-impact, not only those that are relatively easy but low-impact.

PRIORITISE ACTIONS THAT CAN UNLOCK DELIVERY

Strong PASs ensure that at least some actions go beyond preparatory or analytical activities and can influence near-term decisions on policy adoption, investment or technology deployment. While foundational work remains important, it is most effective when clearly linked to mechanisms that can shift behaviour or reduce risk for implementing actors. While analytical work, co-ordination platforms and voluntary pledges remain important enablers, strong PASs ensure these activities support, rather than substitute, actions that can change investment or deployment decisions.

ANCHOR PARTICIPATION OF ACTORS WITH DECISION-MAKING AUTHORITY

PASs will be most effective if they are created and led by governments and public institutions that collectively represent a critical mass of production, demand, investment or

regulatory influence in the relevant sector, and when their participation is linked to concrete collaborative actions. This is not yet the case, but may need to be in the future if PASs are to play a strong role in shaping international collaboration and advancing progress in transitions. Broad coalitions can support alignment, but delivery depends on involving actors with the mandate and capacity to implement change.

CLARIFY ROLES, LEADERSHIP AND ACCOUNTABILITY FOR DELIVERY

Clear attribution of responsibility supports implementation in voluntary international frameworks. Effective PASs distinguish between facilitation and decision authority, assign leadership to specific governments, organisations or coalitions, and make responsibilities visible. This clarity helps manage overlap across initiatives and supports follow-up and learning. Clarifying which governments will take the lead in convening their peers to attempt specific forms of co-operation is likely to be particularly important.

Clear roles also help manage overlap across initiatives. Where multiple PASs reference similar actions or institutions, explicit attribution makes it easier to understand how efforts are intended to complement one another, and where leadership sits. This supports coherence without constraining diversity of approaches or competition of ideas.

LINK AMBITION TO PATHWAYS FOR ADOPTION AND IMPLEMENTATION

Strong PASs are distinguished by how clearly they connect high-level commitments to mechanisms that support adoption and implementation. Best practice is evident where PASs articulate how international collaboration is intended to help move from shared goals, standards or pledges towards use in concrete policy instruments, market arrangements or investment decisions.

Across sectors, substantial progress has already been made on developing definitions, standards and analytical frameworks. Effective PASs build on this foundation by focusing attention on how these tools are taken up, for example through public procurement rules, eligibility criteria for support schemes, trade arrangements or common approaches to policy design. This emphasis on adoption helps ensure that technical alignment translates into conditions that reduce uncertainty for producers, investors and buyers.

USE TIMELINES TO FOCUS EFFORT ON THE NEAR TERM

Good practice does not require detailed multi-year workplans, but it does depend on clarity about what is intended to be done in the immediate implementation window. Across the plans reviewed, PASs that have the greatest practical value tend to articulate short-term objectives or milestones linked to specific actions, alongside broader longer-term goals. This differentiation supports prioritisation, enables monitoring, and helps governments and partners allocate time and resources towards decisions that can realistically be taken in the near term.

Implementation pathways are unlikely to progress linearly, particularly in sectors dependent on evolving policy frameworks, international co-operation and large-scale infrastructure investment. Political, economic and geopolitical developments can significantly influence both the pace and sequencing of actions. In this context, longer-term objectives continue to play an important role in providing strategic direction, while near-term milestones can support prioritisation and accountability within the current implementation window. Strengthening delivery timelines therefore requires a balance between clearer sequencing of actions and sufficient flexibility to adapt to changing circumstances.

Taken together, these principles point to an approach to PAS design that preserves ambition while sharpening focus on delivery. They underscore that the effectiveness of international collaboration depends not on the number of initiatives launched, but on how well actions are targeted, sequenced and connected to the decisions that ultimately determine outcomes.

Implementing these principles will also depend on the capacity, resources and mandates of PAS leadership teams and participating initiatives. In this context, clearer guidance, practical tools and opportunities for peer learning may be important to support the translation of best practices into concrete changes in PAS design and delivery. Strengthening such support structures could help ensure that the lessons identified in this report are progressively reflected in future iterations.

DRIVING SECTORAL PROGRESS

TRANSLATING PLANS INTO SECTORAL PROGRESS

The previous chapter examined how Plans to Accelerate Solutions (PASs) are designed and how effectively they draw on international collaboration to support implementation. That assessment highlighted a strong convergence around long-term objectives across sectors, alongside recurring gaps in how actions are prioritised, sequenced and connected to delivery. Taken together, the findings suggest that the central implementation challenge is now less about defining ambition and more about concentrating effort on a limited set of levers that can translate plans into tangible progress.

This chapter builds on those insights to identify near-term priorities for the six core energy sectors reviewed in this report: hydrogen, road transport, steel, cement and concrete, buildings and fertilisers. The focus is not on assessing individual PASs. Instead, the analysis adopts a broader sectoral perspective, drawing on the PAS review, IEA analysis and earlier Breakthrough Agenda work to identify where international collaboration can most effectively support delivery over the next 2 to 3 years.

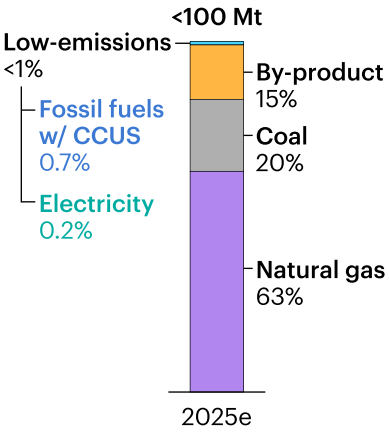
For each sector, the chapter brings together three elements: an overview of the current state of the transition, key observations on how existing international initiatives – including PASs – can better support implementation, and a small set of near-term priorities. These priorities are intended to be focused on actions that could materially improve conditions for investment, technology deployment and market development ahead of the next Global Stocktake.

The priorities identified are not prescriptive and do not substitute for national policy choices. Rather, they highlight areas where additional focus, co-ordination or sequencing at the international level could help unlock progress during this decisive phase of the transition, recognising that effective implementation ultimately depends on decisions taken by governments and market actors domestically.

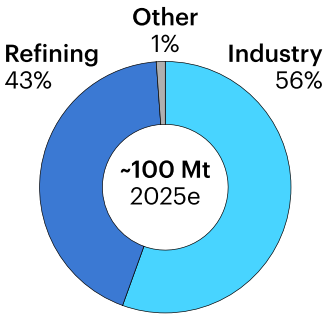
Hydrogen

State of the sector

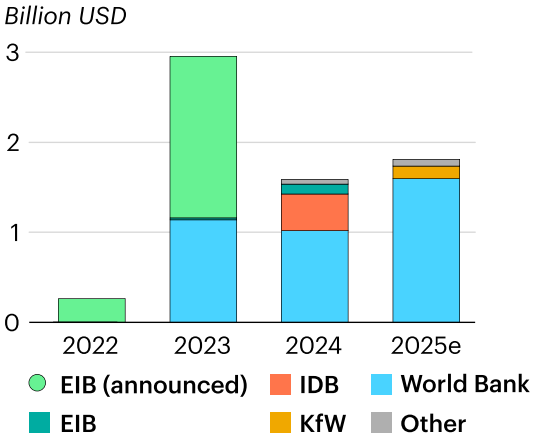
Production



Demand

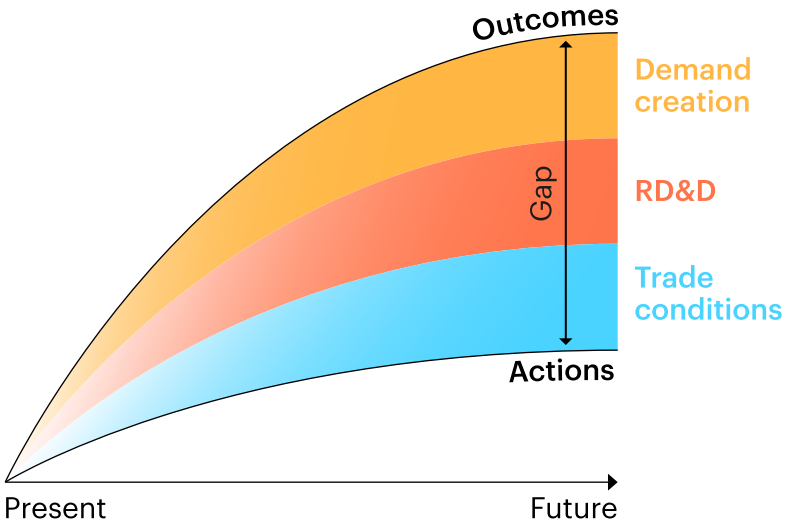


Direct foreign investment



Design of plans to accelerate solutions

Closing the outcome-action gap



Learning from good design

- ✓ **Collaboration levers** are aligned to the sector's needs
- ✓ Integration of **sector interdependencies** within choice of stakeholders
- ✓ **Institutional architecture** reflects understanding of market dynamics

Near-term sector priorities

Governments move beyond commitments to implement **demand creation policies**, using international co-operation platforms to aggregate efforts, while private actors scale sector specific demand aggregation to enable firm offtake agreements for renewable and low emissions hydrogen.

Governments implement clear rules setting emissions-intensity thresholds for eligibility for hydrogen support schemes, aligned with international standards, and work through international platforms to enable **mutual recognition of certification**.

Governments, multilateral development banks and development finance institutions scale up **concessional finance** and direct support to flagship hydrogen projects in EMDEs to unlock final investment decisions.

STATE OF THE SECTOR

Global deployment of low-emissions hydrogen continues to grow, albeit from a very low base. In 2025, production is estimated to have reached close to 1 Mt, accounting for less than 1% of total hydrogen supply. Production is estimated to have increased by roughly 30% year-on-year, driven both by electrolytic hydrogen, led by China, and fossil-based hydrogen equipped with carbon capture. Around 30% of low-emissions hydrogen is used in ammonia and methanol production, with limited penetration into other end uses.

Cost dynamics remain a central constraint. The sharp fall in natural gas prices between 2023 and 2025, combined with higher-than-expected electrolyser costs due to inflation and slower deployment, has widened the cost gap between low-emissions hydrogen and conventional production routes. As a result, support schemes are required for longer than previously anticipated, particularly to enable early projects to reach final investment decision (FID).

The conflict in the Middle East has added uncertainty to the outlook for low-emissions hydrogen deployment. It has contributed to an increase in natural gas and liquefied natural gas (LNG) prices in key importing regions, raising the cost of hydrogen production from unabated fossil fuels and narrowing the cost gap with renewable hydrogen in the short term. However, these effects alone are likely to be insufficient to drive investment decisions, which depend on longer-term price expectations and policy support. At the same time, inflationary risks may slow cost reductions for electrolysers and increase project costs, adding to existing challenges around investment uncertainty and delayed project development.

While the announced project pipeline remains large, rates of conversion to FID remain low. Many projects face uncertainty around future demand, infrastructure availability and regulatory treatment across markets. Overall, momentum is building, but the transition remains constrained by weak demand signals, persistent cost gaps and uneven implementation across regions.

IMPROVING PAS DESIGN

The Hydrogen PAS is one of the most developed under the Action Agenda, with broad participation from governments, multilateral development banks, standards bodies and industry initiatives. It appropriately prioritises international collaboration levers where alignment across borders is essential; however, the PAS assessment highlights several design gaps.

Several of these design gaps arise in a context where hydrogen markets remain at an early stage of development. Many PAS actions therefore focus on structural readiness, alignment and framework building. While appropriate at this stage, this market immaturity heightens the importance of prioritising early demand-pull mechanisms that can translate alignment into bankable investment decisions.

Outcome-action mismatch is the most common design gap across several important collaboration levers. The most consequential gap concerns **demand creation**. PAS outcomes imply rapid deployment across existing and new hydrogen end uses and the translation of commitments into firm offtake agreements. In contrast, demand creation actions envisaged in the PAS rely heavily on declarations, advocacy platforms and exploratory initiatives, while few concrete mechanisms exist to aggregate demand or underpin bankable offtake at scale. For example, the PAS includes the COP 30 Public

Private Statement on Demand Creation, advocacy in industry leadership fora and a number of country-level demand measures whose stakeholder assignments remain undefined pending post-COP engagement. These actions provide alignment frameworks but do not yet constitute delivery mechanisms. This mismatch is particularly important given persistently low FID rates.

A similar pattern appears in **research, development and demonstration**. While the PAS establishes frameworks for joint R&D, pre-normative research, and participation in demonstration concepts such as hydrogen valleys, actions are not consistently linked to co-funded programmes, dedicated multi-year budgets or shared infrastructure. Demonstration is framed primarily as participation rather than as formal programmes with named financing.

For **trade conditions**, current actions appropriately focus on enabling frameworks, including clarification of regulatory treatment, identification of relevant World Trade Organization rules and potential updates to the Harmonized System code for hydrogen derivatives. At this stage of market development, such measures represent important progress in establishing the foundations for international trade, particularly in the absence of significant cross-border volumes, settled certification standards and a mature offtake landscape. Over time, these efforts will need to evolve towards more formalised arrangements as markets scale, but in the near term they provide a necessary basis for reducing uncertainty and supporting early investment.

PRIORITIES

PRIORITY 1 – DEMAND CREATION

Governments move beyond commitments to implement demand creation policies, using international co-operation platforms to aggregate efforts, while private actors scale sector-specific demand aggregation to enable firm offtake agreements for renewable and low-emissions hydrogen.

Lack of demand for renewable and low-emissions hydrogen is limiting investment in production projects. This is preventing rapid deployment and scale-up, which is fundamental to enable cost reductions and reduce the cost gap with incumbent fuels and technologies. Timely demand-pull policies in industry, refining and new applications (such as shipping and aviation) and efforts to aggregate demand are fundamental to provide investor confidence in the future marketplace for hydrogen. The private sector can also play a role in aggregating and scaling up demand through sectoral initiatives for the development of lead markets for sustainable end-products. Many of these products present small cost premiums that can be more easily absorbed by a significant share of final consumers and can unlock significant demand for renewable and low-emissions hydrogen in the near term.

In practice, this can involve aggregating demand across sectors and actors through co-ordinated public-private commitments, buyer coalitions and centralised intermediaries that pool offtake and provide longer-term price and volume signals to producers. Examples highlighted in the PAS include the use of contracts-for-difference mechanisms, competitive auction platforms and sectoral offtake initiatives, which aim to reduce counterparty risk, align time horizons and support the emergence of more bankable demand structures across markets.

This priority builds on previous Breakthrough Agenda Report recommendations and existing efforts in the Hydrogen PAS, such as the *COP 30 Public Private Statement on Demand Creation for Low-Emissions Hydrogen and Its Derivatives in Lead Markets* (identifying governments as key stakeholders to take the next step in meeting the commitments of that declaration) and from other sectoral PASs, like the Fertilisers PAS, and the global Low-Emission Ammonia-based Fertilizer buyers' alliance (identifying private sector stakeholders as the key partners to unlock offtake for sustainable end-use products).

PRIORITY 2 – STANDARDS, DEFINITIONS, CERTIFICATION

Governments implement clear rules setting emissions-intensity thresholds for eligibility for hydrogen support schemes, aligned with international standards, and work through international platforms to enable mutual recognition of certification.

Uncertainty around rules and methodologies for the emission levels that countries consider acceptable to determine eligibility for support schemes has delayed investment, as private sector investors perceive a risk of non-compliance. Potential producers aiming to participate in a global market for hydrogen and hydrogen-based fuels and products must also deal with diverging rules and methodologies, which increase transactional costs and can lead to market fragmentation, limiting trade to bilateral agreements. In addition, differences in institutional capacity to implement, verify and enforce these methodologies – particularly in EMDEs – can create practical barriers to consistent application and increase perceived risk for project developers. Referring to emissions intensities and using common methodologies to determine them in the rules that establish eligibility criteria can minimise these risks and facilitate mutual recognition of certificates.

This priority builds on long-standing work by the International Organization for Standardization (ISO) and The International Partnership for Hydrogen and Fuel Cells in the Economy (IPHE), as well as commitments under the Hydrogen PAS such as the *COP 28 Declaration of Intent on mutual recognition*. A practical next step in this regard could be to jointly develop a conformance template to the recently published ISO 19870-1 and launch a pilot programme between country signatories of the *COP 28 Declaration*.

PRIORITY 3 – FINANCE AND INVESTMENT

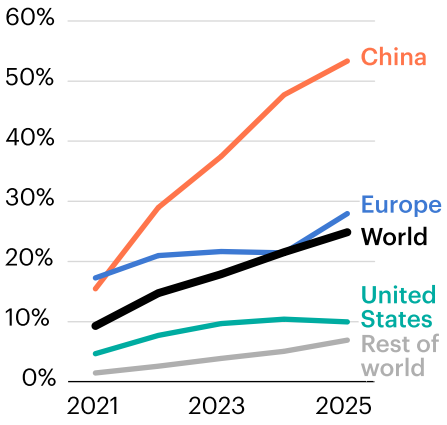
Governments, multilateral development banks and development finance institutions scale up concessional finance and direct support to flagship hydrogen projects in EMDEs to unlock final investment decisions.

EMDEs represent a significant share of the global hydrogen project pipeline but face disproportionately high barriers to investment, including higher financing costs, limited infrastructure, weak offtake and reliance on export-oriented business models. While development finance commitments for low-emissions hydrogen have increased significantly in recent years, support has focused largely on technical assistance rather than direct support for project development. While maintaining technical assistance for policy development remains important for the creation of robust regulatory frameworks, an increase of the direct funding and assistance to flagship projects is a fundamental next step to unlock investments. This does not necessarily have to be for large-scale projects, but can also be for first-of-a-kind and demonstration projects, involving local academic institutions and bringing additional benefits to communities such as the creation of training programmes and a skilled workforce. This priority builds on existing delivery platforms under the Hydrogen PAS, including the World Bank's 10 GW Lighthouse Initiative, by shifting emphasis towards direct support for first-of-a-kind, demonstration and early commercial projects that can establish new value chains, support skills development and enable inclusive growth.

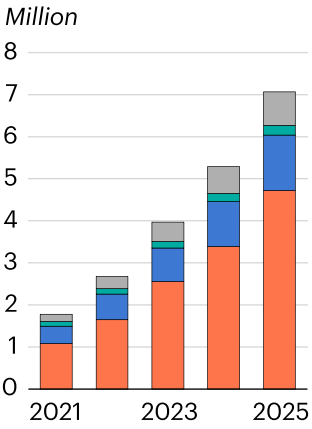
Road transport

State of the sector

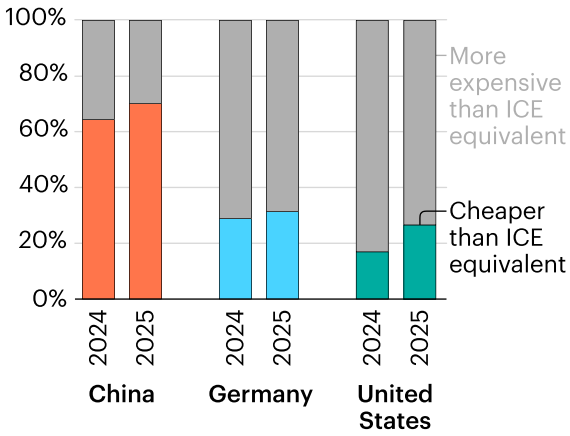
Electric car sales shares



Public charging points

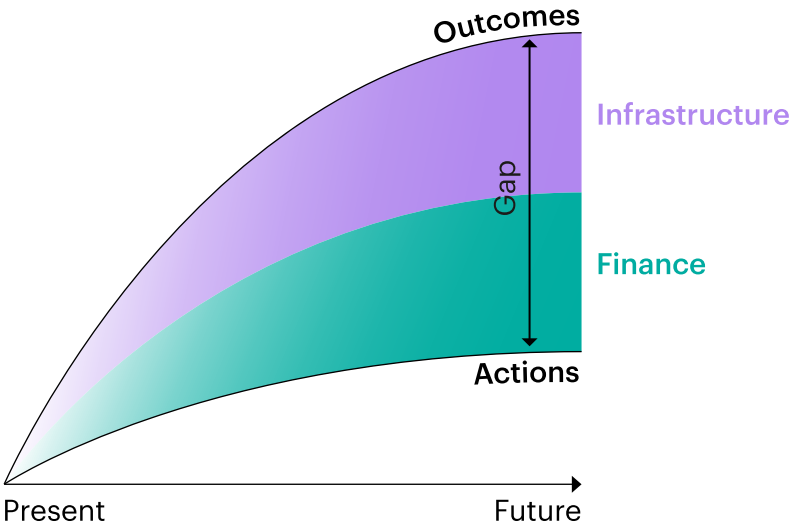


Battery electric car affordability



Design of plans to accelerate solutions

Closing the outcome-action gap



Learning from good design

- ✓ **Collaboration levers** are aligned to the sector's needs
- ✓ Outcomes for corridor development are matched with specific **delivery pathways** and **responsible actors**
- ✓ Effective use of **timelines** and action **sequencing**

Near-term sector priorities

Governments and energy providers support **knowledge-sharing** to encourage the publication of hosting capacity maps to guide the development of charging infrastructure.

Governments, multilateral development banks and development finance institutions establish a **funding assistance programme** at an institution qualified to allocate capital to zero-emission commercial vehicle purchases.

Governments agree on **minimum quality and performance standards** for used vehicle imports to further strengthen demand for used or new electric vehicles.

STATE OF THE SECTOR

Road transport remains dominated by internal combustion engine vehicles, but electrification is advancing rapidly, particularly in passenger cars. Sales of electric cars (which include battery electric vehicles and plug-in hybrid electric vehicles) increased by more than 20% in 2025 to around 21 million, and are expected to rise again in 2026 and account for 28% of all cars sold worldwide. Europe saw the strongest growth among major electric vehicle (EV) markets in 2025, with electric car sales reaching 28% of total sales, following an increase in regulatory stringency. China's growth in electric car sales slowed slightly, in part due to a temporary halt to its trade-in scheme, but EVs still accounted for nearly 55% of all car sales. Meanwhile, some emerging markets saw steep increases in electric car sales: annual sales more than doubled in Southeast Asia and grew by 75% in Latin America. More than 100 countries recorded electric car sales growth in 2025.

Progress in medium- and heavy-duty vehicles is more uneven. Sales of electric trucks and buses expanded in 2025, led by China, but they still represent a small share of total vehicle stocks in most other regions. High upfront vehicle costs, limited charging infrastructure for freight applications, and uncertainty around vehicle performance and resale values continue to slow adoption. Near-term bottlenecks relate to infrastructure, finance and quality and performance standards, but recent developments point to strong momentum.

IMPROVING PAS DESIGN

The Road Transport PAS portfolio is relatively mature compared with those in many other sectors. However, the PAS assessment identifies several design features that limit its ability to scale implementation more broadly.

A key issue is **stakeholder–action mismatch**. While the PASs involve a wide range of international initiatives, NGOs and technical organisations, actors with direct implementation authority are not consistently positioned to lead the actions most closely linked to delivery. Actions relating to charging infrastructure planning, standards adoption and investment mobilisation are mostly led by initiatives with central, state and city-level authorities supporting such initiatives. The PAS does not explicitly reflect direct involvement from transport ministries, public transport authorities, grid operators, development banks or major fleet operators. This results in many actions focused on analysis and guidance, rather than actions that enable implementation.

There is also a recurring **outcome-action mismatch**. Outcomes point towards deployment of zero-emission vehicles and freight corridors, yet most supporting actions remain foundational. Beyond a limited number of green corridor pilots and EMDE programmes, finance activities are largely concentrated on studies, tools and voluntary frameworks rather than mechanisms that directly unlock vehicle purchases or infrastructure investment. As a result, the PAS portfolio has limited capacity to generate bankable project pipelines at scale.

Finally, while the portfolio appropriately prioritises international collaboration levers such as infrastructure co-ordination and demand aggregation, coverage across vehicle segments is fragmented. Medium- and heavy-duty vehicles and freight corridors receive greater attention, reflecting a higher sectoral priority, but more could also be placed on public transport systems, informal mobility and used vehicle markets, which are critical for affordability and deployment in many EMDEs.

In some cases, identified gaps reflect areas where activity is underway but not clearly articulated or consolidated within PAS documentation. This is particularly relevant for segments such as two- and three-wheelers, public transport systems and certain EMDE-focused finance initiatives, where action exists across parallel platforms but is unevenly reflected in the PAS portfolio.

PRIORITIES

PRIORITY 1 – INFRASTRUCTURE

Governments and energy providers support knowledge-sharing to encourage the publication of hosting capacity maps to guide the development of charging infrastructure.

Grid capacity constraints and connection queues are already delaying the deployment of charging infrastructure in several markets, particularly as higher-power chargers are deployed for freight vehicles. Planning and permitting for grid upgrades can be slow and capital intensive, creating a risk that infrastructure becomes a binding constraint on vehicle uptake even where demand is strong. Developing publicly available hosting capacity maps, and using them actively in infrastructure planning, can help ensure that new charging assets are sited where spare capacity exists today, reducing costs and avoiding additional grid buildout in the near term. Countries can work together through existing initiatives to support knowledge-sharing on methodologies, data standards and best practice, helping governments and system operators to accelerate deployment while managing system impacts. This priority builds on existing analytical work and infrastructure co-ordination efforts under the Road Transport PAS and related green corridor initiatives, by shifting focus towards operational practices that can accelerate deployment in the near term.

PRIORITY 2 – FINANCE AND INVESTMENT

Governments, multilateral development banks and development finance institutions establish a funding assistance programme at an institution qualified to allocate capital to zero-emission commercial vehicle purchases.

High upfront vehicle prices remain a key barrier to the adoption of zero-emission trucks and buses, particularly for small- and medium-sized operators with limited access to capital. Electric trucks remain two to three times more expensive to purchase than diesel trucks. While total cost of ownership can be favourable over time, the combination of upfront vehicle costs, charging equipment and depot upgrades presents a significant hurdle. Targeted financing assistance programmes that are implemented through development banks, export credit agencies or other qualified institutions can help bridge this gap by reducing risk, lowering the cost of capital, aggregating demand and mobilising private capital. This priority builds on the work by CALSTART, the Zero-Emission Vehicle Transition Council, the World Business Council for Sustainable Development and the Partnership on Sustainable, Low Carbon Transport by leveraging the existing total cost of ownership tools and mobilising identified financing mechanisms to support deployment of zero-emission commercial vehicles.

PRIORITY 3 – TRADE CONDITIONS

Governments agree on minimum quality and performance standards for used vehicle imports to further strengthen demand for used or new electric vehicles.

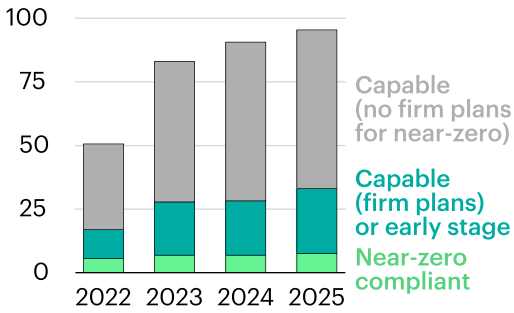
Approximately one-quarter of the world's population lives in countries where at least half of the cars are imported used cars. Second-hand imports are particularly prominent in EMDEs, especially African countries. Without common standards, this can result in the inflow of inefficient, high-emitting vehicles that impose long-term costs on energy systems and public health. Establishing minimum quality, safety and performance criteria for used vehicle imports, including specific provisions for zero-emission vehicles, can help strengthen demand for cleaner options while supporting more orderly fleet renewal. This priority builds on existing discussions around vehicle standards and deployment at the United Nations Economic Commission for Europe, the United Nations Environment Programme, and under the Road Transport PAS by extending them to the used vehicle market, an area where international co-ordination between exporting and importing countries can add clear value.

Steel

State of the sector

Deployment

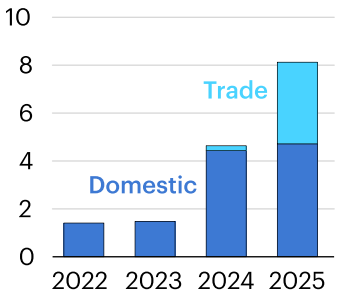
Million tonnes iron



Note: Estimates based on project announcements.

Demand

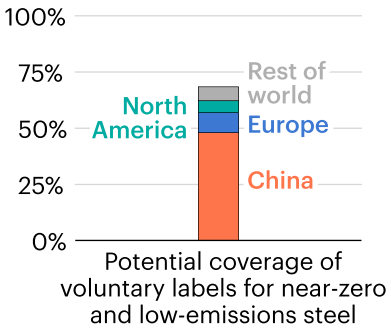
Million tonnes crude steel



Note: Includes announced and committed demand based on announcements from companies and private sector demand aggregation initiatives.

Standards coverage

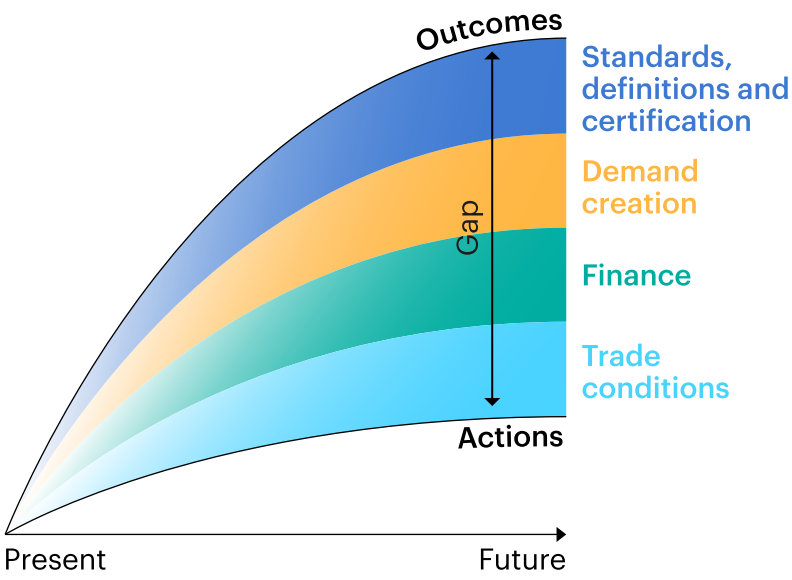
Share of global production



Note: Includes labels already released and under development.

Design of plans to accelerate solutions

Closing the outcome-action gap



Learning from **good design**

- ✓ **Stakeholder alignment** between standards bodies
- ✓ Linkage between high-level **commitments** and operational **delivery** platforms
- ✓ **Institutional architecture** reflects understanding of market dynamics

Near-term sector priorities

Governments advance and aggregate ambitious **demand creation policies** to enable firm offtake commitments for near-zero and low-emissions steel from both public and private sector actors.

Governments, multilateral development banks and development finance institutions target existing **international financial and technical assistance delivery programmes** specifically to the enabling conditions needed to mobilise private sector investment in the first commercial near-zero emissions steel projects across regions.

Governments establish a **strategic dialogue** among a small group to agree on **bilateral or plurilateral trade partnerships** for near-zero and low-emissions iron and/or steel, underpinned by agreement on enabling conditions such as standards interoperability and competitiveness safeguards.

STATE OF THE SECTOR

Steel production remains overwhelmingly based on the blast furnace-basic oxygen furnace route, with near-zero and low-emissions production[2] accounting for a relatively small share of global output. Commercial-scale technologies for primary near-zero emissions steel, such as hydrogen-based direct reduced iron and CCUS-equipped production are beginning to emerge, while earlier-stage options such as iron ore electrolysis continue to advance through pilot and demonstration projects. Despite this progress, deployment remains limited. Efforts are increasing to release the full decarbonisation potential of scrap-based production, including using low-emissions energy inputs and maximising scrap use, although this route is ultimately limited by global scrap availability. At the end of 2025, the global project pipeline for near-zero emissions and near-zero emissions capable steel reached around 115 Mt of planned capacity, roughly 5% of today's production. Much of this capacity is still at an early development stage, and a significant share is designed to begin operation using natural gas, without firm commitments or infrastructure in place to transition to low-emissions hydrogen. Fewer than 10% of announced projects are expected to be fully aligned with near-zero-emissions production from the outset. Geographic concentration remains pronounced, with most projects located in advanced economies, while future demand growth is expected to be strongest in EMDEs.

Recent market conditions underline the importance of early delivery. Weakened global steel demand, volatile energy prices, thin margins due to global competition, global excess capacity, and tight capital markets have slowed investment decisions, while cost premiums for cleaner production remain substantial. At the same time, early demand signals for near-zero and low-emissions steel are beginning to emerge through public procurement initiatives and private buyer coalitions, helping clarify market expectations, although these still remain at relatively small scale. These developments point to growing momentum, but also highlight the need to strengthen enabling conditions (particularly demand certainty, finance mobilisation and trade frameworks) to move from project pipelines to operating capacity.

IMPROVING PAS DESIGN

The Steel PAS reflects a strong understanding of the sector's core transition challenges and covers a broad set of international collaboration levers. However, the PAS assessment highlights several design features that limit its effectiveness in supporting near-term delivery.

A key issue that arises is **outcome-action mismatch** for different levers of collaboration. For instance, for **standards, definitions and certification**, while there is growing momentum in the standards landscape – for example, driven by industry-led initiatives such as the Low Emissions Steel Standard and efforts by ResponsibleSteel to advance interoperability – this progress has not yet translated into formalised approaches within international agreements, such as trade frameworks, nor been taken up through use of internationally interoperable approaches in domestic policy measures. As a result, while companies, industry associations and standards organisations are moving ahead in

[2] "Near-zero emissions" is defined in the IEA report Achieving Net Zero Heavy Industry Sectors in G7 Members and includes both iron-based and scrap-based steel production routes.

establishing common approaches, there remains a need for governments to formalise and embed these emerging standards within policies and regulatory frameworks.

For **demand creation**, the PAS outcome points towards firm offtake agreements and advance purchase commitments, yet most associated actions remain focused on pledges, dialogues and toolkits. These efforts help build momentum but fall short of enabling commitments at a scale sufficient to underpin final investment decisions for projects, especially for near-zero emissions steel.

While public finance and technical assistance are addressed with reasonable depth, **private capital mobilisation** remains underdeveloped. Actions related to finance are largely foundational, centred on studies, mappings and co-ordination platforms, rather than delivery mechanisms capable of shifting investment at scale. Similarly, outcomes related to **technology demonstration and commercialisation** are not consistently matched with enabling actions and policies that directly mitigate risk or accelerate deployment. Another gap is the lack of clear plans to take forward international dialogue on **trade conditions**, a priority lever identified in previous Breakthrough Agenda analysis. Given the global nature of steel markets and competitiveness concerns during the transition, this represents a notable gap.

An underlying problem is the lack of sufficient government engagement in the relevant initiatives – both in terms of the number of governments actively involved, and in terms of ownership in taking forward dialogue and activities into concrete agreements and eventual policy implementation. International organisations and others can play a facilitating role, but without strong government support for the objectives of the PAS and its initiatives, there is a limit to what can be achieved.

PRIORITIES

PRIORITY 1 – DEMAND CREATION

Governments advance and aggregate ambitious demand creation policies to enable firm offtake commitments for near-zero and low-emissions steel from both public and private sector actors.

Demand is consistently raised as a missing ingredient for projects to move forward from announcement to financing to construction. There are now multiple international initiatives pushing for demand creation. Some early buyers, including those participating in the First Movers Coalition, have expressed a willingness to pay a higher price. However, voluntary action can only get so far. This priority builds on existing initiatives under the Steel PAS, including public procurement and market creation pledges, private buyer coalitions and supporting analytical work, but shifts the focus to government-led engagement and policy efforts that aggregate demand and increase effectiveness. This could include specific mandates, quotas or minimum threshold emission requirements, for both public and private procurement. Co-ordinated demand signals across public procurement, that are not restricted to national producers and policies, and that set enabling conditions for private offtake play an important role in providing the market certainty needed for producers to invest in first-of-a-kind and early commercial projects.

PRIORITY 2 – FINANCE AND INVESTMENT AND RD&D

Governments, multilateral development banks and development finance institutions target existing international financial and technical assistance delivery programmes specifically to the enabling conditions needed to mobilise private sector investment in the first commercial near-zero emissions steel projects across regions.

Finance mobilisation is key to get the first projects off the ground. In EMDEs, high costs of capital, limited fiscal space and underdeveloped financial markets continue to limit access to affordable finance, reinforcing the importance of international public finance and blended structures to catalyse private investment.

Current actions are not yet shifting investment at scale. While multiple delivery programmes already exist, their impact remains fragmented. This priority builds on PAS-related project support platforms and international financial initiatives by focusing them explicitly on the policy stability, risk-sharing and infrastructure conditions that private investors require. Greater engagement from both advanced economies and EMDE governments can help ensure that early commercial projects proceed across regions, supporting learning, cost reduction and broader market confidence.

PRIORITY 3 – TRADE CONDITIONS AND STANDARDS

Governments establish a strategic dialogue among a small group to agree on bilateral or plurilateral trade partnerships for near-zero and low-emissions iron and/or steel, underpinned by agreement on enabling conditions such as standards interoperability and competitiveness safeguards.

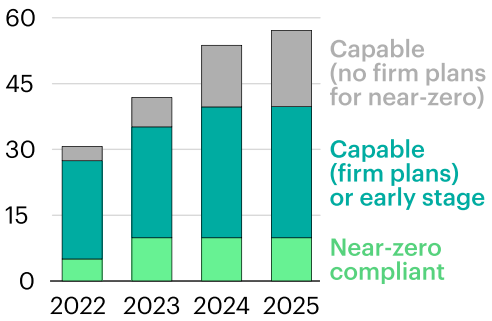
Trade openness and competitiveness concerns remain central to steel decarbonisation, yet the current PAS portfolio is relatively weak on outlining clear next steps. This priority builds on existing work on standards harmonisation and interoperability by anchoring it in tangible trade arrangements, where interoperability and policy treatment can be tested in practice. Early trade partnerships can help turn standards from technical exercises into effective market enablers, while reducing the risk that divergent national approaches slow adoption or fragment markets. Additionally, this priority could help test and develop other enabling conditions for trade agreements, facilitating development of new opportunities presented by the steel sector transition that can bring mutual benefits. This could help further open and broaden dialogue on trade through focusing on positive enablers, rather than only focusing discussions on competitiveness challenges.

Cement and concrete

State of the sector

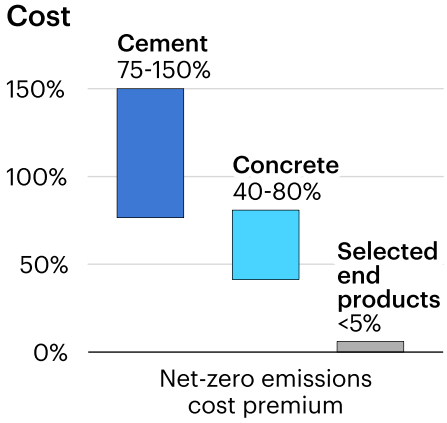
Deployment

Million tonnes cement



Note: Estimates based on project announcements.

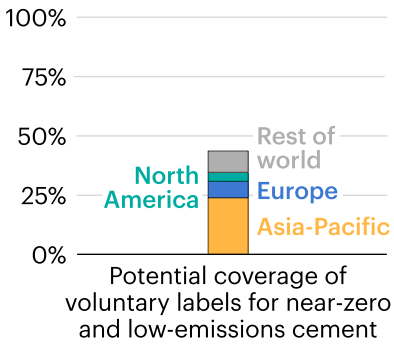
Cost



Note: Selected end products include houses, roads and railways.

Standards coverage

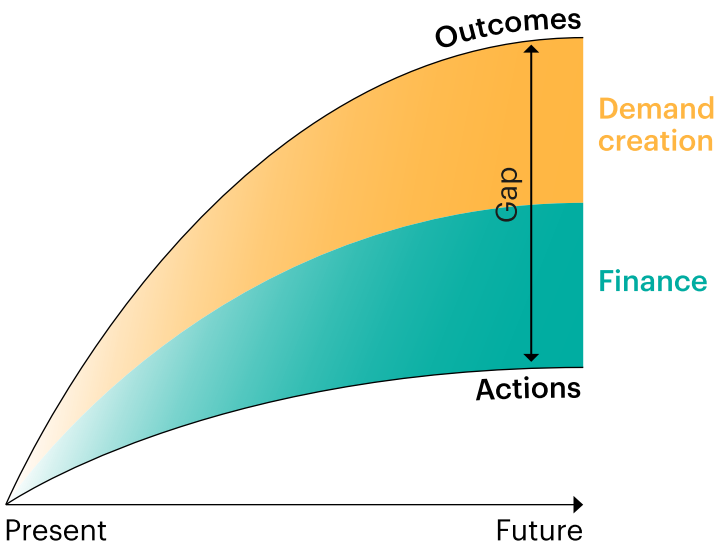
Share of global production



Note: Includes labels already released and under development.

Design of plans to accelerate solutions

Closing the outcome-action gap



Learning from good design

- ✓ **Collaboration levers** are aligned to the sector's needs
- ✓ **Complementary instruments** for demand creation across public and private markets
- ✓ **Institutional architecture** reflects understanding of market dynamics

Near-term sector priorities

Governments advance and aggregate ambitious **demand creation policies** to enable firm offtake commitments for near-zero and low-emissions cement and concrete.

Governments, multilateral development banks and development finance institutions, within existing **international financial and technical assistance delivery programmes**, include support specifically targeting the enabling conditions needed to mobilise private sector investment in the first commercial near-zero emissions cement projects across regions.

Governments support the adoption of **interoperable standards and definitions** for near-zero and low-emissions cement and concrete in firm policy, procurement and implementation applications.

STATE OF THE SECTOR

Cement and concrete production is highly emissions intensive, with the vast majority of output based on conventional clinker production using limestone. A range of technologies to reduce emissions are technically available. This includes low-emissions solutions, such as clinker substitution, fuel switching and efficiency improvements, and near-zero emissions[3] options such as carbon capture on cement kilns and novel cement chemistries using alternative raw materials that eliminate process emissions. While deployment of low-emissions solutions is advancing in some regions and can lead to near-term emissions reductions, deployment of near-zero emissions solutions remains limited – posing a challenge for achieving net zero by mid-century, given substantial project and infrastructure lead times and typical rates of technology learning and diffusion.

By the end of 2025, announced capacity for near-zero-emissions cement stood at around 55 Mt, with only about 20 Mt having reached relatively advanced development stages, equivalent to roughly 1% of global capacity. Most projects rely on carbon capture, which is currently the most technologically mature pathway for achieving near-zero emissions in cement production, though deployment remains limited. Alternative approaches, such as cements produced entirely without limestone, remain at earlier stages of development for broad application. While deployment of low-emissions solutions has an increasingly global reach, near-zero emissions deployment is geographically concentrated in advanced economies, creating a growing mismatch between where new technologies are being deployed and where demand for them will materialise.

High capital costs, limited operating experience at scale, and the absence of strong demand and other policy signals continue to slow investment decisions in near-zero emissions technologies. While markets for low-emissions cement and concrete are developing through opportunities for clinker substitution and fuel switching at increasingly competitive prices, markets for near-zero emissions materials remain nascent, with cost premiums that cannot yet be absorbed without supportive procurement or regulatory frameworks. At the same time, demand initiatives, particularly in public construction, are beginning to signal early interest in lower-emissions materials. These developments indicate initial progress and underline the need to strengthen policies and collaboration that can translate early momentum into scalable and ambitious deployment.

IMPROVING PAS DESIGN

The Cement and Concrete PAS is well structured and reflects a coherent market transformation logic, with outputs covering standards and definitions, demand creation, innovation and finance. This collection of levers provides a strong conceptual foundation. However, the PAS assessment highlights several design issues that weaken its ability to support near-term delivery.

Like steel, a central gap is **outcome-action mismatch** across levers. For **demand creation**, the PAS appropriately emphasises procurement as a key lever, supported by initiatives such as government pledges and private buyer coalitions. However, most associated actions remain structural and voluntary in nature, relying on follow-through by national governments and private sector actors that is not explicitly operationalised in the PAS. As a result, there is a gap between the ambition of creating demand at scale and the

[3] "Near-zero emissions" is defined in the IEA report Achieving Net Zero Heavy Industry Sectors in G7 Members.

actions currently supporting it. Demand creation policies beyond public procurement, in particular those that mobilise private sector procurement, receive limited attention. A similar mismatch appears in **finance and investment**. While the PAS frames targeted outcomes at an implementation level, most supporting actions focus on analytical studies, mapping exercises, toolkits and frameworks. These are important precursors, but they do not yet constitute mechanisms capable of mobilising capital for capital-intensive first-of-a-kind projects, particularly in EMDEs, where financing constraints are most acute.

Several hosts of the PAS are also experimenting with improved transparency and co-ordination tools, such as clearer documentation of completed deliverables to support onboarding and reduce duplication, though these measures do not substitute for delivery-oriented actions that can unlock investment.

PRIORITIES

PRIORITY 1 – DEMAND CREATION

Governments advance and aggregate ambitious demand creation policies to enable firm offtake commitments for near-zero and low-emissions cement and concrete.

Demand is consistently raised as a missing ingredient for projects to move forward. There are now multiple international initiatives pushing for demand creation. However, voluntary action can only get so far – governments need to develop policies that effectively support private sector implementation, including using public procurement to create demand and enable firm private sector offtake commitments for near-zero and low-emissions cement and concrete. This needs to be targeted towards providing sufficient market certainty for transformational projects. As in the steel sector, if countries co-ordinate public procurement policies in their timing and their targeting of near-zero emissions technologies, and do not restrict them to only domestic producers, this will send a stronger demand signal to incentivise industry investment. The priority builds on existing enabling pledges, dialogues and resources from the Cement and Concrete PAS, and identifies governments as the key actor needing to take this action to the next level – rather than only participating in dialogues and being recipients of additional analysis – and to take leadership in moving forward on adopting and pooling ambitious policies.

PRIORITY 2 – FINANCE AND RD&D

Governments, multilateral development banks and development finance institutions, within existing international financial and technical assistance delivery programmes, include support specifically targeting the enabling conditions needed to mobilise private sector investment in the first commercial near-zero emissions cement projects across regions.

Finance mobilisation is key to get the first projects off the ground. As the assessment points out, actions predominantly constitute foundational or structural steps, and not yet tangible investment mobilisation mechanisms. Targeting existing delivery programmes to the enabling conditions and policies required for private sector investment and having the first cases in all regions is important to kick-start progress and for inclusivity of EMDEs, followed by further scaling of these programmes. Greater engagement and stronger supporting policies by governments from both advanced economies and EMDEs can help ensure early projects proceed across regions.

PRIORITY 3 – STANDARDS, DEFINITIONS AND CERTIFICATION

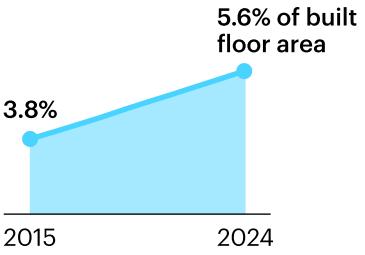
Governments support the adoption of interoperable standards and definitions for near-zero and low-emissions cement and concrete in firm policy, procurement and implementation applications.

Standards and definitions can provide distinct recognition of emissions performance, and international interoperability reduces reporting burden on firms and provides clarity to markets. Substantial groundwork already exists under the PAS. This priority builds on that technical foundation by focusing on adoption, particularly by governments, in policies that can provide the necessary clarity and signal to markets. Anchoring next steps on standards in real policy use cases can strengthen market clarity, reduce fragmentation, support decision-making and accelerate uptake, while providing tangible cases to for countries to collaborate towards international interoperability.

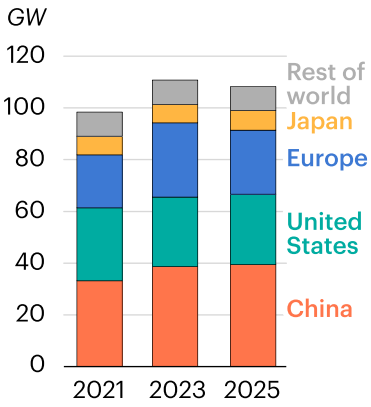
Buildings

State of the sector

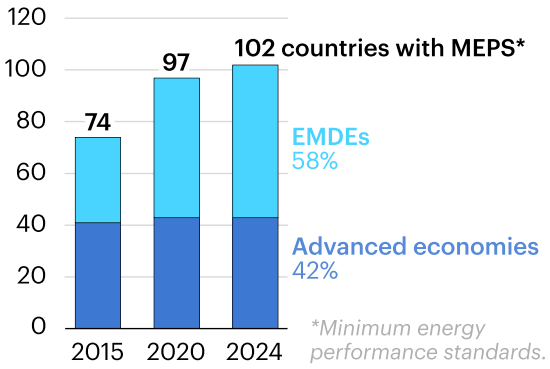
Zero-carbon-ready floor space



Heat pump sales

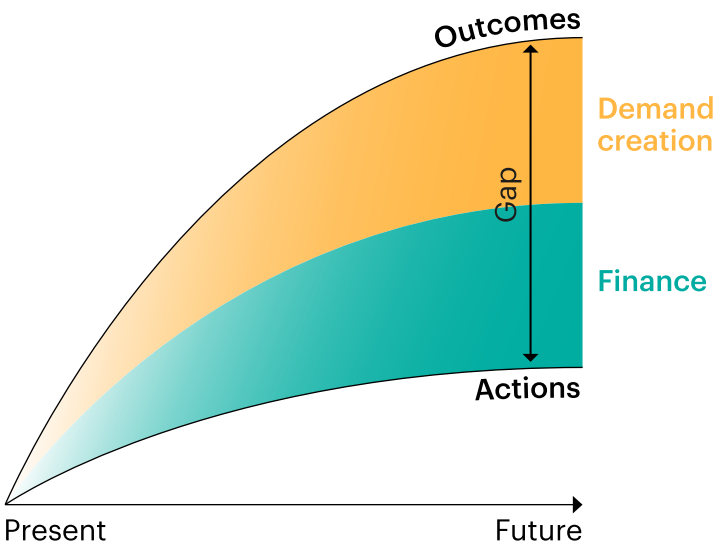


Performance standards for AC systems



Design of plans to accelerate solutions

Closing the outcome-action gap



Learning from good design

- ✓ **Resource gaps** are transparently identified in some actions
- ✓ Cross-sector **interdependencies** are leveraged to enable progress in other sectors
- ✓ **Stakeholder coverage** reflects a mature and comprehensive ecosystem

Near-term sector priorities

National governments and building coalitions should work together to develop time-bound **roadmaps** for **adopting energy performance requirements and regulations** for renewable energy and energy efficiency in buildings and for NZERBs, recognising differing levels of readiness for electrification across markets.

Governments and multilateral development banks strengthen **engagement** and **exchange** with financial institutions to integrate NZERB and BEERI criteria into lending and investment practices.

Governments and public authorities should strengthen **public procurement practices** for NZERB-aligned buildings and efficient buildings technologies, sharing knowledge and best practices, and building institutional capacity for implementation.

STATE OF THE SECTOR

Buildings account for around 30% of global energy demand, with space heating, cooling and appliances driving growth. Progress towards more efficient and electrified buildings remains uneven across regions. In 2025, global heat pump sales fell by around 2%, reflecting slower sales in the United States and flat demand in China and Japan, while Europe recorded a recovery after declines in previous years. Air-conditioning markets continue to expand rapidly, particularly in EMDEs, with minimum energy performance standards now covering around 90% of global cooling demand.

Policy progress on building performance is mixed. Several advanced economies and regions, including the European Union, the United Kingdom, Canada and parts of the United States, have strengthened building codes and renovation strategies aligned with zero-carbon-ready building concepts. However, fewer than 10% of the global building stock currently meets these standards, and around 100 countries still lack mandatory building energy codes altogether. Investment in building retrofits and electrification has increased over the past decade, but remains highly concentrated in advanced economies, while growth in floorspace and cooling demand is fastest in EMDEs. These trends point to gradual improvement in new buildings and technologies, alongside a large and persistent implementation gap in the existing building stock.

IMPROVING PAS DESIGN

The Buildings PAS portfolio, primarily the Near-Zero Emission and Resilient Buildings (NZERB) and the Building Efficiency, Electrification and Renewable Integration (BEERI) PASs, addresses many of the sector's structural challenges. However, targeted changes could improve the PAS design by reducing gaps between intended outcomes and planned actions.

The Buildings PAS portfolio primarily address formally constructed, professionally engineered buildings, reflecting the applicability of existing codes, standards and certification systems. Informal, self-built structures, which represent a significant share of building activity in many EMDEs, largely sit outside the current PAS scope. While consistent with the PAS mandate, this boundary highlights a broader structural gap in addressing the full spectrum of building practices and may limit applicability in contexts where informal construction dominates.

A central issue is an **outcome-action mismatch** across levers. For **demand creation**, both PASs articulate outcomes that imply mandates, regulatory reform and significant capital flows. In practice, most associated actions in the NZERB PAS include capacity building activities, framework development and knowledge-sharing. These actions help build shared understanding, but they do not directly support governments in implementing the policy decisions implied by the outcomes. The BEERI PAS also includes a broader set of demand activities, including support for Decarbonisation and Resilience Roadmaps, promotion of high-impact policy bundles (such as minimum energy performance requirements, electrification mandates and renewable integration), and use of the NDC Scorecard for Sustainable Buildings to drive more ambitious national targets. While these actions are intended to support policy design and implementation, the PAS does not explain how these tools lead to the policy mandates implied by the outcomes.

For **finance mobilisation**, while both PASs identify finance as a critical constraint, neither includes implementation-level actions capable of shifting investment at scale. NZERB's finance actions focus on reports, databases and frameworks, including Global Property Linked Finance Initiative capital market vehicle design, the Partnership for Energy Efficiency in Buildings (PEEB)'s bank network, the GlobalABC finance roadmap template, and International Finance Corporation (IFC)/World Bank's data initiatives. BEERI's finance gap is more substantial: there is one finance-related output in the PAS, which is focused on a taxonomy mapping exercise. While further engagement may be occurring outside of the actions outlined in the PAS, the narrative commitments to mobilising blended finance and engaging financial institutions are not fully reflected in the actions. These activities are important precursors, and in some cases form a necessary part of the policy design and implementation process. However, existing mechanisms could be further strengthened, such as such as outlining actions related to risk-sharing instruments or co-ordinated engagement with financial institutions, as implied by the stated outcomes.

PRIORITIES

PRIORITY 1 – STANDARDS, DEFINITIONS AND CERTIFICATION

National governments and building coalitions should work together to develop time-bound roadmaps for adopting energy performance requirements and regulations for renewable energy and energy efficiency in buildings and for NZERBs, recognising differing levels of readiness for electrification across markets.

Stable and predictable energy performance requirements are critical for investment and market development in the buildings sector. This priority builds on existing roadmap work under BEERI and the definitions developed through NZERB by shifting the focus from indicative targets to concrete regulatory pathways. Knowledge exchange can support sharing of best practices, sequencing and alignment.

PRIORITY 2 – FINANCE AND INVESTMENT

Governments and multilateral development banks strengthen engagement and exchange with financial institutions to integrate NZERB and BEERI criteria into lending and investment practices.

Private finance is essential to scaling retrofits and electrification, particularly for the existing building stock. Multilateral development banks and international climate finance can help de-risk investments, support project preparation and scale up concessional finance for building retrofit programmes. In parallel, countries can facilitate the sharing of best practices and policy frameworks, helping to accelerate implementation and improve the effectiveness of domestic financing mechanisms. This priority builds on existing PAS activities related to finance roadmaps and data frameworks by focusing more explicitly on financial institutions as delivery actors.

PRIORITY 3 – DEMAND CREATION AND MANAGEMENT

Governments and public authorities should strengthen public procurement practices for NZERB-aligned buildings and efficient buildings technologies, sharing knowledge and best practices, and building institutional capacity for implementation.

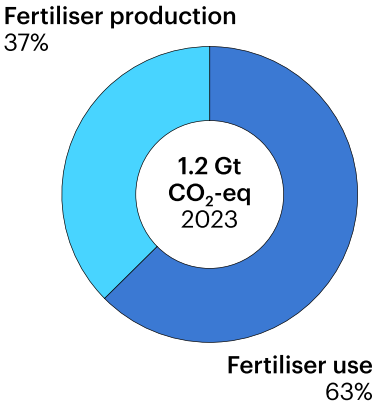
Public procurement represents a significant share of construction demand and can help create early markets and advance energy performance requirements and technologies.

However, for it to be effective, significant sectoral knowledge, experience and support is needed on the side of the buyer. This priority builds on NZERB procurement frameworks and pledges by focusing on practical implementation support, such as guidance, templates and capacity building for procuring authorities. Strengthening this lever can help translate existing commitments into concrete demand without creating new institutional structures.

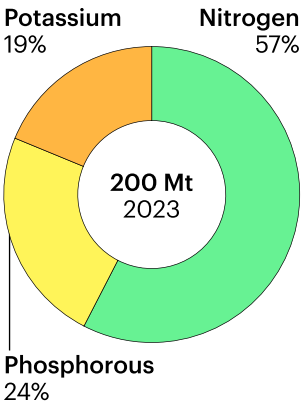
Fertilisers

State of the sector

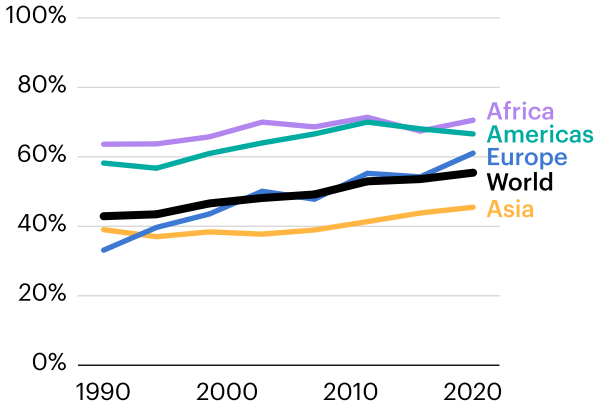
Emissions



Mineral fertiliser demand

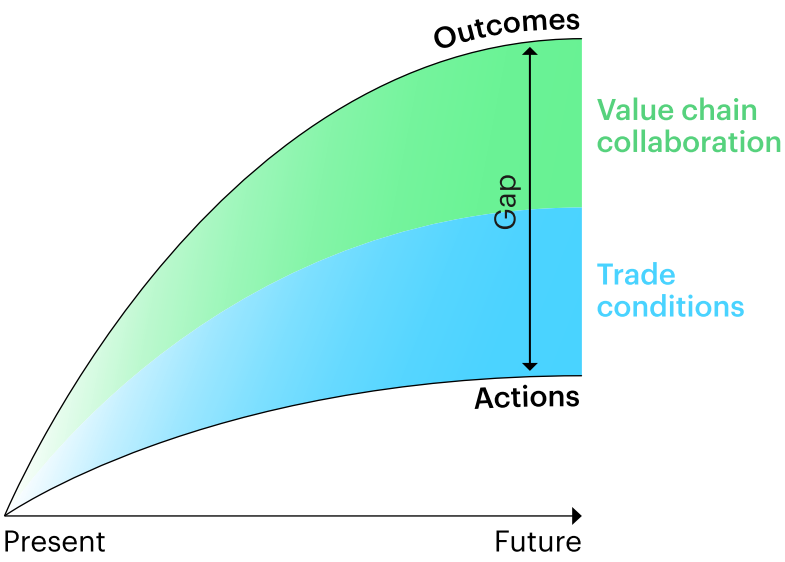


Nutrient use efficiency



Design of plans to accelerate solutions

Closing the outcome-action gap



Learning from good design

✓ **Collaboration levers** are aligned to the sector's needs

✓ **Clear scope** of actions involving multiple stakeholders

✓ **Equity** and **inclusion** considerations are integrated into actions

Near-term sector priorities

Governments intensify and **align efforts to create demand** for near-zero and low-emissions fertilisers in a way that enables deployment in a context of competitive trade.

Governments and initiatives develop internationally consistent **standards and certification schemes** for near-zero and low-emissions fertilisers and for soil health and protection.

Governments, multilateral development banks and development finance institutions target **international financial and technical assistance delivery programmes** to the enabling conditions required to mobilise private investment in low-emissions fertiliser production and use across regions.

STATE OF THE SECTOR

The fertiliser sector is extremely heterogeneous, with distinct sub-sectors characterised by different production processes, emissions sources and mitigation pathways. Nitrogen-based fertilisers, primarily derived from ammonia, are the most energy- and emissions intensive, with production linked to fossil-based hydrogen and accounting for a significant share of industrial emissions. By contrast, phosphate-based fertilisers are less energy intensive but generate emissions primarily from chemical processes and mining-related activities, with different decarbonisation challenges.

Recent disruptions to the trade flows through Strait of Hormuz have highlighted the exposure of fertiliser supply to global supply chains. More than 30% of global trade of urea moves through the Strait, along with about 20% of trade of ammonia and phosphate. This creates risks for food prices and security. Moreover, disruptions in this sector could have indirect effects on energy markets, since some countries use imported LNG to run domestic fertiliser plants.

Global GHG emissions from fertilisers have remained broadly stable over the past decade, but this masks a growing challenge. Fertiliser demand is expected to increase alongside population growth and rising food demand, meaning that in the absence of a shift in how fertilisers are produced and used, emissions will rise. Fertilisers account for around 1.2 Gt of CO_2-equivalent emissions annually, about 2.4% of global GHG emissions, with approximately 60–70% of emissions occurring during fertiliser use through nitrous oxide emissions in soils, and the remainder arising from production processes.

Low-emissions fertiliser production remains at a very early stage. In 2024, low-emissions ammonia, the key input to nitrogen fertilisers, accounted for less than 2% of global ammonia production. While around 19 Mt of low-emissions ammonia capacity has been announced or has reached advanced development stages, this represents less than 10% of current production and only a subset is linked to fertiliser applications. Costs remain a major constraint: ammonia produced using carbon capture is estimated to be around 30% more expensive than conventional production, while electrolytic routes can cost up to three times more, depending on regional energy prices. For a sector that is so critical for global food supply and security, this is a major challenge.

On the use side, improving nutrient use efficiency (NUE) is critical. Global NUE averages around 55% today, meaning nearly half of applied nitrogen is lost to the environment. According to the International Fertilizer Association, fertiliser use emissions would need to fall by around 70% by mid-century to align with net-zero pathways, requiring the global average NUE to increase to around 70%. There are existing principles guiding appropriate use of fertilisers, such as the “4R” Nutrient Stewardship approach: applying the right source of nutrients, at the right rate, at the right time, and in the right place, which offers a strategic opportunity to enhance NUE. Achieving this will require changes in fertiliser formulations, farming practices and soil management, alongside improved monitoring and data. Together, these trends indicate that while technical pathways exist, the fertilisers transition is still nascent and constrained by weak demand signals, high costs and limited co-ordination across the full value chain.

IMPROVING PAS DESIGN

The Fertilisers PAS portfolio benefits from a strong analytical foundation, covering the full value chain across production and use within the broader transformation of global food

systems. The PAS portfolio provides complementary coverage of the fertilisers transition, with the Fertilisers Solutions PAS anchoring supply-side transformation and market development, and the Regenerative Agriculture PAS strengthening demand-side practices and system-level outcomes through soil health and regenerative production approaches.

Overall, the PAS portfolio design is strong, but could benefit from a number of improvements.

A foundational challenge is not a lack of stakeholder engagement, but rather the need to more clearly translate the broad network of stakeholders into defined roles for delivery. The PAS portfolio already reflects strong participation across international organisations, initiatives and development partners with mandates across technical assistance, standards and analysis. However, they could be further strengthened by more explicitly identifying the actors responsible for large-scale implementation – including governments, major fertiliser producers, large buyers and institutional investors – and clarifying how their actions can drive progress in specific areas. This would help sharpen accountability and accelerate the transition from co-ordination to delivery.

Generally, there is good alignment between the stated outcomes and actions, with only a few cases of **outcome-action mismatches**. This is most evident in the action on cross sectoral value chain collaboration, where the outcome explicitly spans both fertiliser production and use emissions. However, the corresponding action remains relatively generic – framed around value chain collaboration and the use of artificial intelligence – without clearly specifying the implementation mechanisms, delivery pathways or how emissions reductions would be achieved and measured. In this case, artificial intelligence appears more as an enabling tool than a defined mechanism for delivery. Strengthening this area would involve specifying concrete interventions across the value chain – such as targeted practices, decision points or policy and market levers – and linking these directly to measurable emissions outcomes.

Additionally, **trade conditions** are not adequately covered, despite fertilisers being globally traded commodities with complex price formation and cross-border competitiveness dynamics.

PRIORITIES

PRIORITY 1 – DEMAND CREATION

Governments intensify and align efforts to create demand for near-zero and low-emissions fertilisers in a way that enables deployment in a context of competitive trade.

Without clear market signals, producers face uncertainty and are unlikely to invest at scale, while farmers have limited incentives to adopt higher-cost or higher-risk products. This priority builds on existing initiatives under the Breakthrough Agenda and the PAS portfolio, as well as private sector efforts in lead markets, by focusing on co-ordinated demand signals with sufficient certainty and ambition to enable firm offtake agreements and advance purchase commitments. Connecting fertiliser producers with downstream actors, including food companies, retailers and public procurement bodies, is essential to create demand at a scale that can underpin transformational projects while safeguarding food affordability. A co-ordinated approach to policies such as low-emissions ammonia mandates in fertiliser production, involving major fertiliser-producing countries, could be important to create demand without putting first movers at a competitive disadvantage.

PRIORITY 2 – STANDARDS, DEFINITIONS AND CERTIFICATION

Governments and initiatives develop internationally consistent standards and certification schemes for near-zero and low-emissions fertilisers and for soil health and protection.

Fragmented and policy-dependent methodologies are limiting market creation and investment. Building on the Fertilisers PAS portfolio, which prioritises the development of internationally applicable definitions, lifecycle emissions accounting methodologies and certification systems for low-emissions fertilisers, this priority reinforces the need for globally aligned standards and monitoring frameworks. This priority also builds on existing work on hydrogen and ammonia standards and emerging soil health initiatives by extending them across the full fertiliser value chain. Interoperable standards can support demand creation, enable fair competition, and mobilise finance by providing clarity for policy instruments, procurement and trade, while ensuring environmental integrity and credibility.

PRIORITY 3 – FINANCE AND INVESTMENT

Governments, multilateral development banks and development finance institutions target international financial and technical assistance delivery programmes to the enabling conditions required to mobilise private investment in low-emissions fertiliser production and use across regions.

Actions to date have not yet shifted investment at scale. This priority builds on both the Fertilisers PAS portfolio and the cross-cutting financing PAS, which emphasise the need to mobilise public and private capital, particularly in EMDEs. Co-ordinated engagement by governments from both advanced economies and EMDEs is critical to create stable policy environments, reduce financing costs and ensure early projects proceed across regions, supporting learning, cost reduction and inclusive transition pathways.

In parallel, financing efforts should also focus on the deployment of fertiliser use decarbonisation levers, including the adoption of 4R nutrient stewardship practices. These approaches can significantly improve nutrient efficiency, reduce nitrous oxide (N_2O) emissions, enhance soil health, and strengthen carbon sequestration, but their deployment remains constrained by insufficient financial incentives, limited affordable monitoring, reporting and verification infrastructure, and weak support mechanisms for farmers across the value chain.

This priority further builds on existing delivery platforms (including multilateral development banks, concessional finance facilities and pilot support programmes) by focusing them explicitly on de-risking first-of-a-kind and early commercial fertiliser projects.

GENERAL ANNEX

ANNEX A – LEVERS OF INTERNATIONAL COLLABORATION

Figure 1 Levers of international collaboration

Lever	Explanation
Long-term Vision	Developing a shared vision and policy support through a co-ordinated approach that sets the speed of the transition and provides clear investment signals.
Standards, Definitions and Certification	Establishing a shared technical language and interoperable standards to avoid market fragmentation and distinguish clean products in global markets.
Demand Creation and Management	Aggregating demand through measures such as public procurement and offtake agreements to create lead markets and de-risk early technology deployments.
Research and Innovation	Collaborating on the development, testing and demonstration of new solutions to accelerate cost reduction through economies of scale and shared technology learning.
Finance and Investment	Scaling up international financial and technical assistance, including the use of blended finance, to mobilise private investment and accelerate project delivery.
Infrastructure	Co-ordinating the development of shared infrastructure, such as cross-border power grids, regional interconnections, and zero-emission road freight corridors.
Trade Conditions	Ensuring that international trade rules and policies facilitate, rather than obstruct, the transition to sustainable industrial systems and clean technologies.
Supply Chains	Co-operating on mapping vulnerabilities, diversifying sources of materials, and strengthening energy security through stable, long-term supply partnerships.
Capacity and Skills	Expanding international co-operation on skills transfers, knowledge-sharing, and building the institutional capability required for designing and building clean systems.
Social Engagement	Ensuring active citizen participation and the equitable distribution of costs and benefits to build social licence and support for the transition.

International Energy Agency (IEA).

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