

Scaling Up Transition Finance

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Successful transitions need finance that goes where the emissions are

Actions by the world's most emissions-intensive sectors, companies, and countries are crucial to placing the world on a sustainable pathway. Yet, investments that could deliver meaningful reductions in their environmental footprint often do not receive sufficient financial support. Currently, finance is drawn heavily to certain “green” assets and activities—most prominently renewable power. While vital, these investments alone cannot deliver all the changes needed to cut global emissions, especially in areas where clean technologies are not yet commercially available or cost competitive. This is where *transition finance* comes in: it can help emissions-intensive countries, companies, and sectors shift over time towards sustainable practices aligned with long-term climate and development goals.

Transition finance faces complex definitional challenges, which have slowed its adoption. Nonetheless, it could play an essential role in global energy investments. Today, transition finance flows remain modest, but scenarios consistent with national or global emissions reduction targets suggest that USD 400-500 billion per year in transition finance could be mobilised over the next decade—equivalent to USD 4-5 trillion cumulatively. This is comparable in scale to the current global green bond market.

With its focus on sectors where emissions are hard-to-abate and on emerging market and developing economies (EMDE), transition finance can play a vital, complementary role to green finance. The central challenge is to ensure that it drives ambitious and credible change, while reflecting diverse national and regional circumstances. This IEA report does not attempt to resolve every complexity but instead maps the landscape for transition finance, explains why it matters, and highlights approaches that could move the debate forward.

The foundations of transition finance

Transition finance channels capital into hard-to-abate areas, grounded in strategies and ongoing monitoring. It rests on a practical partnership between corporates, financiers, and governments. This partnership can unlock investment in projects that fall outside the “green finance” label but are nonetheless essential for a sustainable transition.

- **Corporates** set out asset- or entity-level transition strategies and commitments, demonstrating their direction of travel to maintain access to finance and other benefits.
- **Governments** provide credibility and investor confidence by publishing national decarbonisation strategies, underpinned by regulations and incentives to support transition activities.
- **Financial institutions** act both as financiers and as quality controllers, engaging with and monitoring clients to ensure that financing remains aligned with climate goals.

Attempts to define these activities more precisely—including how transition finance relates to green finance and to long-term climate goals—are difficult to harmonise globally. National circumstances differ widely, and what is unnecessary in one country may be essential in another. At its core, transition finance requires:

- credible transition strategies,
- transparent and sector-specific Key Performance Indicators (KPIs) to track progress, and
- robust mechanisms for follow-up.

Because transitions unfold over many years, strategies need to be regularly reviewed and adapted as technologies, markets, and policies evolve. National and regional roadmaps are critical for anchoring this process. Guidance such as Japan’s transition finance follow-up framework—emphasising disclosure checkpoints, strengthened targets, and regular revisions—illustrates how finance can remain credible over time.

Sectoral applications

The scope of transition finance is broad, but this report dives into three sectors where it can be applicable: steel and cement, critical minerals, and natural gas.

- **Cement and steel.** Together these sectors account for about 14% of direct energy and process CO₂ emissions. A large part of steel and cement capacity will face re-investment decisions by 2035, making this decade crucial for accelerating emissions cuts. Public support for scaling up near-zero emissions technologies is vital, but scarce, and transition finance can support interim steps such as gas-based direct reduction iron, energy efficiency investments, waste heat recovery, and biofuel blending.
- **Critical minerals.** Mining and refining underpin energy supply chains for electric vehicles, batteries, renewables, and grids. Scaling production is vital, but extraction and processing can have major impacts beyond emissions, including water use, biodiversity loss, and land degradation. Transition finance can unlock high-impact projects that both reduce emissions and mitigate these broader risks, guided by sector-specific KPIs.
- **Natural gas.** Gas is set remain in the global energy mix for decades, and gas-fired generation capacity plays an important role in transition pathways to ensure security of supply, especially in countries with large seasonal swings in demand. The role of transition finance varies by country and sector, and changes over time. Priorities include cutting methane emissions, lowering the carbon footprint of LNG liquefaction, providing infrastructure for low-emissions gases, and helping, alongside other technology options, to ensure system flexibility and electricity security. All should be pursued under transparent, time-bound plans aligned with national decarbonisation strategies.

Keeping the doors open

For transition finance to deliver meaningful results, financial flows from advanced economies to EMDE need to expand and currently excluded groups need to be brought on board. An IEA survey of 23 financial institutions found that differences in taxonomies and frameworks complicate cross-border financing for activities that could benefit from transition finance. EMDE face disproportionate investment needs but often have underdeveloped capital markets making external finance essential. Clear requirements for transition strategies are appropriate for large corporations but can become barriers for SMEs and capacity-constrained actors. Expanding participation therefore requires supportive frameworks for actors that are currently “left-out” (e.g. EMDE and SMEs) and those that “opt-out” because they have limited incentive to participate.

Failure to tackle these constraints raises the risk that financial institutions cut their emissions on paper, by reducing their exposure to emissions-intensive sectors and countries, rather than reducing real-economy emissions. This “financial carbon leakage” — as financial institutions simply shift emissions off their balance sheets—is no solution, as it avoids the hard questions that need to be answered if the world is to tackle the rise in global average temperatures.

A complementary source of finance for transitions

With the right supporting structures in place, transition finance can move from being seen as a “second tier” of green finance to stand as a “second pillar” of global financing for emissions reductions—especially in sectors where emissions are hard-to-abate and EMDE. Achieving this requires public and private actors to design supportive frameworks, with safeguards to ensure credibility and inclusion. Governments play a central role, not only in setting national roadmaps but also in enabling participation by actors without the capacity for detailed strategy planning. Simplified, roadmap-based frameworks can provide a path forward. At the same time, recognising equivalence across taxonomies and broadening the focus beyond short-term financed emissions will be essential to mobilising capital. With these steps, transition finance can evolve into a disciplined yet flexible tool: one that supports the global scale-up of energy investment, strengthens energy security, and delivers meaningful emissions reductions.

What is transition finance?

Developments and current status

S U M M A R Y

- Many energy investments defy a simple binary classification between “clean” and “dirty”: there are also the “in-between” investments that can deliver material emissions reductions but that do not bring emissions to zero. These investments have historically been difficult to categorise due to differences in energy pathways and timeframes across regions and have been the subject of debate, including over whether and how they should be supported.
- Transition finance refers to financial activities that can contribute to emissions reductions, particularly in hard-to-abate sectors as well as in emerging market and developing economies (EMDE) where finance needs are high but the support from green finance is limited. It is subject to an important process requirement, in that investments need to be grounded in transition plans, strategies or equivalents with mechanisms in place to enable tracking and follow-up.
- Transition finance complements the role of green finance, which has grown rapidly in recent years, but which cannot deliver all aspects of energy system transformation, especially in hard-to-abate sectors and in EMDE.
- For the moment, the volume of finance that can be labelled as transition finance is low, but International Energy Agency (IEA) scenarios provide some indicative guidance of the potential volume of investments that could be covered. Over the next decade, the amount of investment that can be supported by transition finance is approximately USD 5 trillion of cumulative investment in the Announced Policies Scenario (APS) and approximately USD 4 trillion in the Net Zero Emissions by 2050 (NZE) Scenario, or USD 400-500 billion per year. Over half of those investments would be in EMDE, spanning energy efficiency, selected low-emissions technology across different end-use sectors, and some investments in natural gas infrastructure, gas-fired power, critical minerals, and other areas.
- The core of transition finance lies in its dynamic nature, shaped by the diversity of national energy pathways, the fact that types of investments needed evolve over time and the necessity of taking a view on the likely length of the transformation. However, this nature makes it difficult to define a uniform global framework, since investments essential in one region may be unnecessary in another.
- These complexities have historically made transition finance less prominent than green finance in global discussions. However, transition finance remains an important way to scale up energy finance and emissions reductions over the next decade. With this in mind, this report discusses the current landscape and approaches to scale up the use of transition finance.

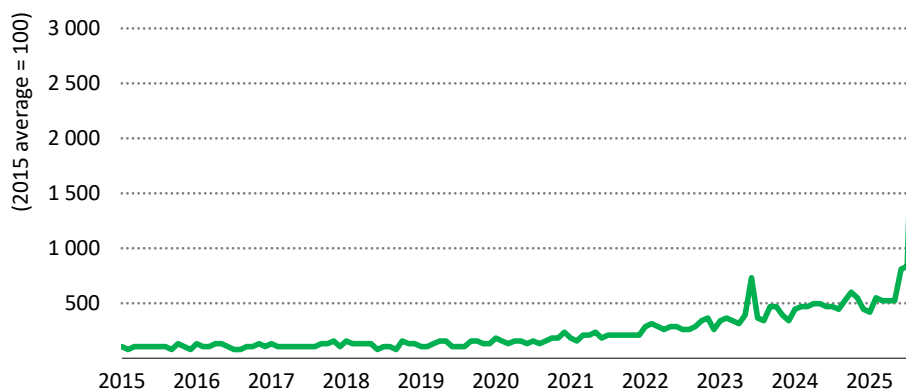
1.1 Current landscape of transition finance

1.1.1 Introduction

Assessing the implications of different energy sector investments for future emissions is complex. Some investments unequivocally help to reduce emissions while others are sure to increase them. However, the idea that all energy sector investments can be divided neatly into “clean” and “dirty” investments does not survive contact with the realities of the energy sector. There are, in practice, many investments whose environmental implications depend on changes elsewhere in the system; there are many investments that can help improve environmental performance but which do not bring emissions to zero. These types of investment are tricky to categorise and classify, and there are legitimate differences of view about where the lines should be drawn. At the same time, these kinds of “in-between” investments are essential to reduce global emissions. A key challenge for policy makers is to ensure that adequate channels are in place to support investments and financial flows that help countries, corporates or relevant sectors shift toward lower-emission, more sustainable practices aligned with long-term climate and sustainability goals, even if they do not immediately deliver zero emissions energy.

The term “transition finance” used in this report aims to capture this concept of financing “in-between” energy investments. It has gained prominence amid rising uncertainty and the growing importance of energy security and emissions reductions. Interest in transition finance, as measured by Google Trends, has grown since 2019 and shows substantial acceleration in 2025 (Figure 1.1).

Figure 1.1 ▶ Search interest in “transition finance”, Google Trends, 2015-2025



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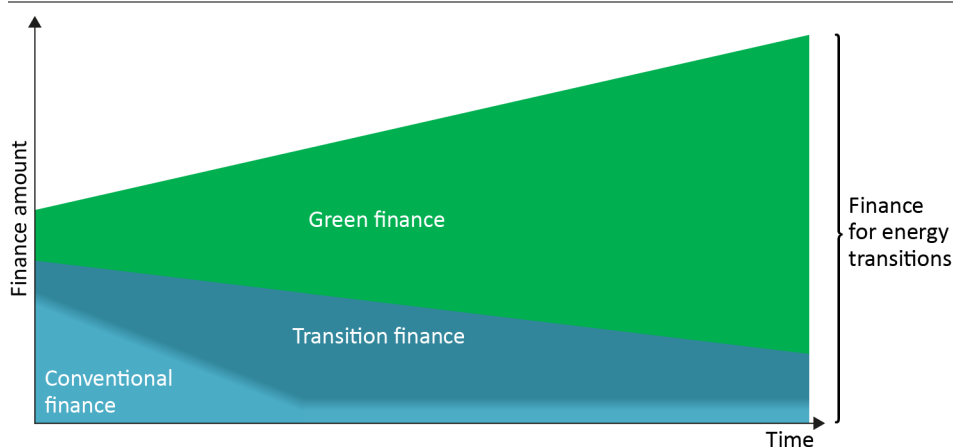
The term “transition finance” has attracted increasing interest online.

Source: Google Trends (2025), search results for “transition finance”, <https://trends.google.com/trends/explore?date=all&q=Transition%20finance&hl=en> (15th September 2025).

There is broad recognition that transition finance refers to financial activities that can contribute to emissions reductions, particularly in hard-to-abate sectors as well as in emerging market and developing economies (EMDE) where finance needs are high but the support from green finance is limited. However, there remains no universally agreed global definition.

In the energy context, transition finance is sometimes used interchangeably with overall finance for energy transitions; however, in this report, it is treated as a distinct category of finance with a specific purpose, framework or both (Figure 1.2). Transition finance refers to financing for governments, corporates or relevant sectors that can support investments in technologies, assets or other activities not supported by green finance but which can lower emissions and shift towards more sustainable practices, aligned with long-term climate and sustainability goals. At the same time, there are important process requirements that future actions must be delivered through transition plans, strategies or equivalents, with mechanisms to enable periodic follow-up and track progress over time.

Figure 1.2 ► Finance for energy transitions and transition finance



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Transition finance is a subset of finance for energy transitions and has distinct characteristics that set it apart from green finance.

Transition finance can be positioned alongside green finance and other financial instruments as one of the key pillars of financing for driving down global emissions. Guidance on transition finance is lacking whereas extensive guidance on green finance has already been developed and is supplemented by taxonomies or guidelines for use of proceeds, including detailed sector guidance aligned with 1.5°C scenarios. Green finance has gained recognition from financiers and markets while supporting considerable finance. Transition finance is inherently dynamic, making it difficult to provide a unified use-of-proceeds level criterion. It is designed to bridge the gap between long-term climate goals and current, region-specific

realities. Whether it is an appropriate option varies over time and across regions, shaped by differing starting points, evolving national circumstances and diverse transition pathways. This variability presents a central challenge for harmonisation since activities considered unnecessary or unsuitable in one region might be essential and ambitious in another. A definition set from a single regional perspective may unintentionally exclude others, leading to fragmentation rather than collaboration in global decarbonisation efforts.

Sometimes, concerns are raised that establishing criteria that cannot be considered “green” could risk slowing the emissions reductions. However, these concerns do not always hold, as the assumption that actors can simply choose between fully green activities and transition activities does not reflect the realities of ongoing energy investment situation in some regions or sectors. In practice, many entities face structural barriers that make it difficult to adopt fully green activities or they do not meet the requirements to access green finance. One such case is supporting state-owned energy companies in EMDE, which are entities that might not readily qualify for green finance to undertake emissions-reducing investments. In these cases, transition finance plays a crucial role by enabling such actors to go beyond business as usual and move incrementally towards decarbonisation. It provides a pathway for actors who might otherwise be locked into existing high-emission activities that are not aligned with the transition pathway, helping to direct them towards lower-emission trajectories when access to green finance is not feasible, and thereby accelerating the decarbonisation of the system as a whole.

Expanding energy-related investment in a way that contributes to emissions reductions while also meeting growing demand requires action from the entire system, not only from leading actors. Transition finance can support such system-wide progress and this is what makes it a fundamentally important concept in today’s energy and climate discussions.

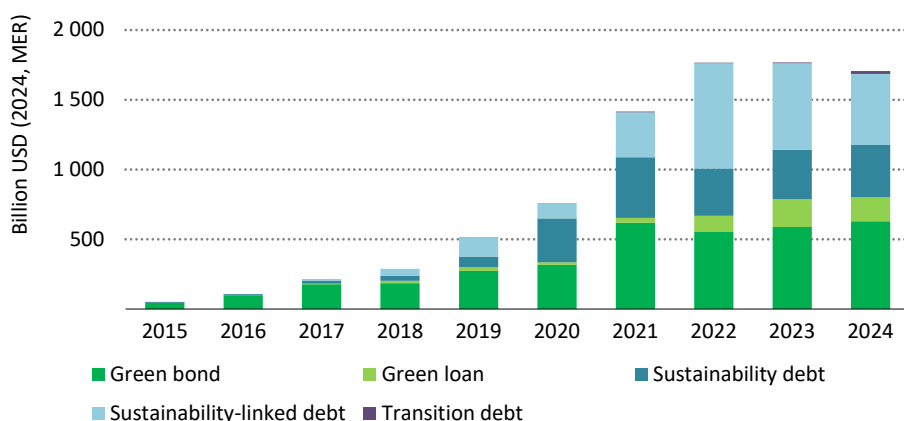
In the context of energy-related investment, transition finance is essential during the period of transition towards a net zero emissions energy system — particularly in the short to medium term, and most critically over the coming decade — when investments that are not fully green but nonetheless contribute to emissions reductions will be required. As innovation makes fully green technologies more accessible over time, the role of transition finance is expected to gradually diminish, serving as a bridge to green finance in the longer term.

The scope of transition finance is not limited to loans or capital market products; it can encompass all forms of financial products, so long as they meet transition criteria. That said, comprehensive data covering this full spectrum is currently unavailable. Accordingly, this report uses a set of proxy indicators and frameworks to illustrate emerging trends. This report aims to clarify the role that transition finance can play in emissions reductions and support its effective application, acknowledging that discussions on transition finance span a wide range of financial topics, some of which extend beyond the IEA’s core areas of expertise. This report does not seek to introduce new definitions or claim authority over the existing ones. Instead, the IEA’s approach in this report is to provide focused analysis on energy investment and on the key issues of transition finance.

1.1.2 Transition finance: a missing piece of the puzzle

Expectations for transition finance have grown alongside the development of the green finance market. Since the mid-2010s, the green debt market has expanded remarkably from approximately USD 45 billion in 2015 to over USD 800 billion in 2024, playing a central role in creating momentum for sustainable finance within global capital markets (Figure 1.3). Among the types of debt other than green debt included in Figure 1.3, sustainability debt is shown in this table as a use-of-proceeds instrument, referring to financing intended to support broader social and environmental improvements beyond the energy sector. Sustainability-linked debt does not earmark the use of proceeds but instead requires issuers to define key performance indicators and sustainability performance targets, with financing evaluated based on whether those targets are achieved. This non-use-of-proceeds structure is sometimes described as sharing characteristics with transition finance. However, important differences such as the distinction between sustainability performance targets and comprehensive transition plans or strategies remain, and therefore the two are not entirely equivalent. Notably, setting a boundary and deciding which sustainability-linked finance should be considered part of transition finance remains challenging at the moment. At present, the only portion of transition debt that can be quantitatively observed consists of instruments explicitly carrying a transition label.

Figure 1.3 ▶ Sustainable finance market by type, 2015-2024



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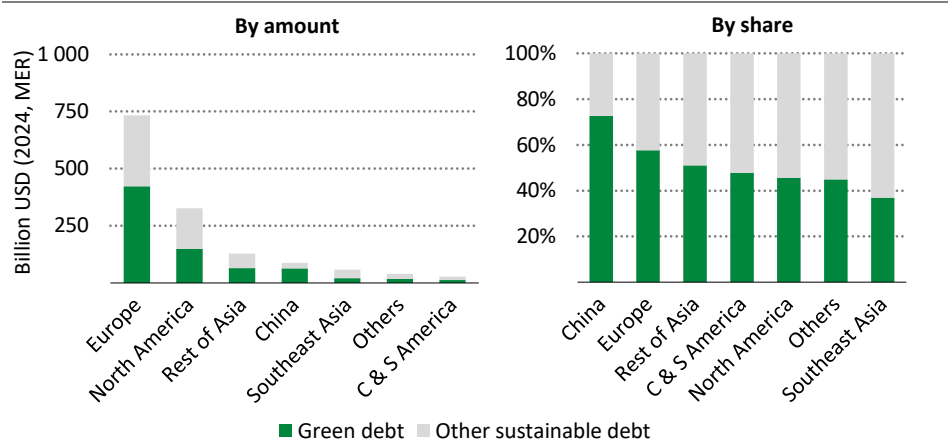
The green finance market has expanded substantially, playing a central role in creating momentum for sustainable finance within global capital markets.

Note: The term “sustainable finance market” refers to the combined total of bonds and loans. For categories other than green, only the aggregate amount of bonds and loans is shown as they tend to have smaller volumes.

Source: IEA analysis based on data from Environmental Finance (2025).

Regionally, Europe accounted for just over half of global green debt issuance in 2024 (Figure 1.4), demonstrating not only the strength of European capital markets but also how the definition of green finance aligns closely with the region’s energy and climate policy objectives. The total volume of sustainable debt of the People’s Republic of China (hereafter, “China”) is smaller than that of Europe or the United States, but the share of green bonds exceeds 70%, significantly higher than in other regions, making it another notable case. This reflects both a developed capital market and an abundance of projects, such as renewable energy projects, that are well suited to green finance. The growth of the global green market over the past decade along with the success achieved in two key regions clearly demonstrates its meaningful contribution to energy investments and emissions reductions. In contrast, other areas such as Southeast Asia continue to show relatively low volumes of green finance and a lower share of green finance within the regional total issuance of sustainable finance. While this can partially be attributed to the level of capital market development and EMDE country and project risk perspective, the lower share of green finance suggests some structural factors, such as a mismatch between regional transition needs and the scope of activities supported by green finance.

Figure 1.4 ▶ Sustainable finance market by region, 2024



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Green finance has been led by Europe and China. Looking ahead, finance should be directed towards regions that remain underserved.

Notes: The term “sustainable finance market” refers to the combined total of bonds and loans. Other sustainable debt is the aggregated amount of transition debt, sustainability-linked debt, and sustainability debt. C & S America = Central and South America.

Source: IEA analysis based on data from Environmental Finance (2025).

The limited uptake of green finance in some EMDE mentioned above underscores the need to accelerate the development of additional green projects, yet progress in this area has so far been relatively modest when compared with leading markets such as Europe and China. In this context, there is a growing call for complementary financing mechanisms that can channel finance in alternative ways. Transition finance is increasingly recognised as a critical tool in this regard, providing a means to fill the gaps left by green finance and expand financing for decarbonisation. For example, the Association of Southeast Asian Nations (ASEAN) Transition Finance Guidance outlines three broad categories of financing needed for the energy transition of the ASEAN economy (see Box 1.1), providing practical and inclusive direction to the region. Similarly, efforts to establish guidelines for transition loans across Asia demonstrate a proactive regional stance.

Box 1.1 ► ASEAN Transition Finance Guidance

The ASEAN Transition Finance Guidance outlines three applications of finance required to support the energy transition of the ASEAN economy:

- **Green finance:** financing for low- to zero-emissions activities or assets that are in line with the goals of the Paris Agreement.
- **Asset-level transition finance:** financing for specific assets or activities that help reduce carbon emissions in the near term, even though they are not yet fully green nor provide long-term climate solutions.
- **Entity-level transition finance:** general-purpose financing for entities undertaking ambitious and credible transitions in line with the goals of the Paris Agreement.

By distinguishing between these applications, the guidance helps direct capital to the full spectrum of transition needs in the ASEAN region – from supporting already green activities to enabling an ambitious decarbonisation of entire organisations – regardless of the financing instrument used.

Source: ASEAN Capital Markets Forum (2024), ASEAN Transition Finance Guidance Version 2.

From a sectoral perspective, the role of transition finance is most pronounced in industries where green finance support is either limited or unavailable. In 2024, the International Capital Market Association (ICMA) reported observations segmenting the recognition of transition into three categories, namely economy-wide transition, climate transition and hard-to-abate transition, and noted the continued difficulty of financing in reaching hard-to-abate sectors (ICMA, 2024).

Green finance, particularly for renewable energy, has a clear and vital role in tackling climate change and remains one of the cornerstones of the financing decarbonisation investment. However, achieving a full-scale transformation of the energy system cannot rely on green finance alone, and this is where transition finance proves essential, enabling investment flows into the sectors, technologies and regions that are central to a realistic, inclusive and resilient path of decarbonisation.

1.1.3 *Analysing transition finance guidelines and frameworks*

With growing attention to transition finance, a wide range of guidelines and frameworks have been published in recent years. While these materials vary in scope and level of detail, this section focuses on two analytical dimensions. First, how transition finance is defined or how its intended purpose is described; and second, what specific criteria or requirements are applied to determine what qualifies as transition finance.

Table 1.1 provides a non-exhaustive overview of major transition finance frameworks and guidance documents, highlighting how each characterises transition finance. Most definitions converge on the concept that transition finance is intended to support emissions reduction activities aligned with long-term climate goals, and some frameworks distinguish between different types of transition activities.

Conversely, to better understand the differences, it is useful to focus on what is explicitly or implicitly excluded from the scope of transition finance. One key difference among guidelines and frameworks relates to the relationship between green finance and transition finance. Depending on the framework, transition finance may be considered as a subset of green finance, green finance may be seen as a subset of transition finance, the two may overlap but remain distinct, or they may even be treated as mutually exclusive. These differences reflect the varying histories of policy development across regions and differences in political and economic priorities and in national decarbonisation pathways. Given today's circumstances and the urgent need to advance the energy investment by contributing emissions reductions, it is essential that transition finance be understood as a complementary instrument to green finance, with process requirements such as those mentioned above, enabling the flow of finance into areas that green finance alone cannot easily reach.

Another major point of distinction lies in the framing of long-term climate goals. Some frameworks use a 1.5°C scenario as the benchmark, others refer to the Paris Agreement's "well below 2°C (WB2°C)" objective, while others align with nationally determined contributions (NDCs) or allow for credible aligning efforts even if full alignment with a long-term target has not yet been achieved. Many government-led transition finance frameworks reflect the status of the energy system and the country's objectives for its decarbonisation, often linking eligibility criteria to national policy goals. While this is a natural outcome, it also points to a fundamental challenge: some investments along a transition pathway that may be unnecessary or inapplicable in one country could be essential in another. Consequently, definitional decisions, particularly around what is or is not included as transition finance, have direct implications for whether the global financial system supports or constrains the diversity of national transition strategies.

Table 1.1 ► Definitions of transition finance and reference scenarios

Guideline or framework	Definition or description of transition finance (non-exhaustive)	Key reference scenarios		
		1.5°C	WB2°C	NDCs
ASEAN Capital Markets Forum, ASEAN Transition Finance Guidance Version 2 (2024)	Asset-level transition finance: finance provided to specific transitional assets or activities that contribute towards decarbonisation in the short-term but are not fully green nor long-term climate solutions. Entity-level transition finance: general-use finance provided to entities undergoing ambitious and credible transitions that are aligned with the Paris Agreement.	✓	✓	✓*
Asia Transition Finance Study Group, Asia Transition Finance Guidelines 1st Edition (2022)	Finance for activities that support a just and orderly transition to low-carbon economies by lowering rather than eliminating emissions (transition activities).	✓	✓	✓
City of London, Scaling Transition Finance: Findings of the Transition Finance Market Review (2024)	Transition finance, in the broadest sense, incorporates the financial flows, products and services that facilitate an economy-wide transition to net zero consistent with the Paris Agreement.	✓	✓	✓
Climate Bonds Initiative, Transition Finance for Transforming Companies (2021); 101 Sustainable Policies for 1.5°C (2023)	Finance that supports an entity or activity's transition to net zero alignment and climate resilience.	✓	✓	
European Commission, Recommendations on Facilitating Finance for the Transition to a Sustainable Economy (2023)	Transition finance should be understood as the financing of improvements in terms of climate and environmental performance to transition towards a sustainable economy, at a pace that is compatible with the climate and environmental objectives of the EU.**	✓		
Glasgow Financial Alliance for Net Zero (GFANZ), Scaling Transition Finance and Real-economy Decarbonization (2023)	The four strategies finance or enable: - Climate solutions: entities and activities that develop and scale climate solutions. - Aligned entities: entities that are already aligned to a 1.5 °C pathway. - Aligning: entities committed to transitioning in line with 1.5 °C -aligned pathways. - Managed phase-out: the accelerated managed phase-out of high-emitting physical assets.	TBD	TBD	TBD

Guideline or framework	Definition or description of transition finance (non-exhaustive)	Key reference scenarios		
		1.5°C	WB2°C	NDCs
G20 Sustainable Finance Working Group (SFWG), 2024 G20 Transition Finance Framework (2024)	Transition finance refers to financial services supporting whole-of-economy transitions towards lower and net zero emissions and climate resilience in a way that is aligned with the goals of the Paris Agreement and the 2030 Agenda for sustainable development, and that considers national circumstances.	✓	✓	
ICMA, Climate Transition Finance Handbook (2023)	N/A	✓	✓	
International Platform on Sustainable Finance (IPSF), Transition Finance Report November 2022 (2022)	Transition finance can be encouraged at different levels of the economy: 1) at the economic activity level (including capital and other investment in individual measures that will drive the decarbonisation of the activity, as well as investment in the activity as a whole), 2) at the entity (company) level, and 3) at the financial portfolio level.	✓		
Ministry of Economy, Trade, and Industry of Japan (METI), Basic Guidelines on Climate Transition Finance (2025)	Financing means to promote long-term, strategic GHG emissions reduction initiatives that are taken by a company considering to tackle climate change for the achievement of a decarbonised society. In particular, Japan, with its aim to achieve carbon neutral status in 2050, defines transition finance as a finance for supporting the fundraiser who have set their target consistent with the Paris Agreement and satisfied the elements set forth in these guidelines.	✓	✓	
Network for Greening the Financial System (NGFS), Enhancing Market Transparency in Green and Transition Finance (2022)	Economic activities that facilitate the transition to sustainable energy sources, without resulting in a lock-in of assets that are incompatible with net zero based on their operating life.	✓	✓	
Organisation for Economic Co-operation and Development (OECD), OECD Transition Finance Guidance (2022)	Finance deployed or raised by corporates to implement their net zero transition, in line with the temperature goal of the Paris Agreement and based on credible corporate climate transition plans.	✓	✓	✓

*Reference to NDCs is only allowed in the “progressing” tier, which requires a commitment to address any material omissions in the next two years. **Document contains a precise formal definition. In this table, a high-level illustration of characteristics is cited for comparison.

Notes: WB2°C = well below 2°C. NDCs = nationally determined contributions.

Source: IEA analysis of the guidelines and frameworks mentioned in the table.

Table 1.2 provides an overview of process requirements and shows a greater degree of convergence than the discussion on definitions. Although the depth of guidance and the stringency with which it is applied vary, major frameworks share three core elements: the establishment of targets; the preparation of a plan or strategy to meet those targets; and transparent reporting on implementation and progress.

Table 1.2 ▶ Process requirements for transition finance to ensure credibility

Guideline or framework	Procedure or requirement
ASEAN Capital Markets Forum, ASEAN Transition Finance Guidance Version 2 (2024)	Element 1. Climate ambition • Current state assessment; transition pathway; and transition targets Element 2. Robustness of ability to deliver • Implementation strategy; disclosure; independent verification; and just transition considerations
Climate Bonds Initiative, Transition Finance for Transforming Companies (2022)	The five hallmarks of a credible company climate mitigation transition: 1. Paris-aligned targets 2. Robust plans 3. Implementation action 4. Internal monitoring 5. External reporting
European Commission, Recommendations on Facilitating Finance for The Transition to a Sustainable Economy (2023)	• Organisation can consider their transition finance needs based on their sustainability impacts, risks and opportunities. These can be identified through a materiality assessment. • To determine their transition finance needs, undertakings could start by setting transition targets and defining individual transition pathways based on science-based scenarios and pathways. • Sustainable finance tools, in particular the taxonomy or the EU climate benchmarks, as well as credible transition plans, can be used to support the definition of transition targets and articulate specific transition finance needs at the level of the undertaking and at the level of economic activities. • By clearly integrating transition targets and related transition finance needs in a credible transition plan, financial intermediaries and investors can more easily understand, compare and benchmark transition finance opportunities. • Transition finance needs can be specified as planned capital expenditure and, when appropriate, operating expenditure relating to achieving climate and environmental targets as well as current or targeted revenue related to the transition. • Where relevant, undertakings could discuss with financial intermediaries and investors their specific transition finance needs and the most suitable financing solutions.
G20 SFWG, 2024 G20 Transition Finance Framework (2024)	The Framework puts forward transition finance principles grouped into five high-level pillars: Pillar 1. Identification of transition finance activities Pillar 2. Reporting of information on transition activities and investments Pillar 3. Transition related financial instruments Pillar 4. Design of policy measures Pillar 5. Assessing and mitigating negative social and economic impacts.

Guideline or framework	Procedure or requirement
GFANZ, Scaling Transition Finance and Real-economy Decarbonization (2023)	The attributes for the identification of the four key transition financing strategies are, for the climate solutions, (a) real-economy emissions reduction and (b) expectations of net zero alignment. For the aligned and aligning, and the managed phase-out strategies, the attributes are: a) established net zero commitment/ambition; b) established net zero targets; c) net zero transition plan* (or phase-out plan); d) additional key performance indicators (where applicable); and e) performance.
ICMA, Climate Transition Finance Handbook (2023)	There are four key elements to these recommendations: 1. Issuer's climate transition strategy and governance 2. Business model environmental materiality 3. Climate transition strategy and targets to be "science-based" 4. Implementation transparency
IPSF, Transition Finance Report November 2022 (2022)	Target setting principles – guiding robust transition targets • 1.5 degrees, Ambitious, All-encompassing, and Compatible. Delivery principles – demonstrating the ability to deliver on targets. • Comprehensive transition plan, Internal governance, External engagement, External reporting, and Standardised assessment.
METI, Basic Guidelines on Climate Transition Finance (2021)	Element 1. Issuer's climate transition strategy and governance Element 2. Business model environmental materiality Element 3. Climate transition strategy to be science-based and include targets and pathways Element 4. Implementation transparency
METI, Fundamental Review of Transition Finance (2025)	1. Strategy 2. Use of proceeds 3. Safeguards 4. Follow-up
OECD, OECD Transition Finance Guidance (2022)	Ten elements to ensure credibility: - Element 1. Setting temperature goals, net zero, and interim targets - Element 2. Using sectoral pathways, technology roadmaps, and taxonomies - Element 3. Measuring performance and progress through metrics and key performance indicators - Element 4. Providing clarity on use of carbon credits and offsets - Element 5. Setting out a strategy, actions, and implementation steps, including on preventing carbon-intensive lock-in - Element 6. Addressing adverse impacts through the do-no-significant-harm Principle and responsible business conduct due diligence - Element 7. Supporting a just transition - Element 8. Integration with financial plans and internal coherence - Element 9. Ensuring sound governance and accountability - Element 10. Transparency and verification, labelling and certification

*The attribute for aligning entities does not require a transition plan to be established, it is sufficient if the entity is developing a plan.

Source: IEA analysis of the guidelines and frameworks mentioned in the table.

Notably, two distinct discussions are ongoing regarding the requirement for transition strategies, especially transition plans. In several jurisdictions, transition plans are strongly recommended to establish to show entities' capability and commitment of transition, with increasingly sophisticated criteria and requirements. Conversely, particularly in EMDE and among small and medium-sized enterprises, transition plans are viewed more as an aspiration than a formal pre-requisite, reflecting limited technical and institutional capacity. There is also ongoing discussion on how to provide appropriate alternatives for such actors. The former approach seeks to raise the bar for frontrunners, while the latter is driven by an inclusion agenda that aims to avoid excluding actors who lack the resources to produce highly detailed plans at this stage of their transition journey.

Other documents frequently referenced in discussions on transition finance are taxonomies. Currently, there are around 50 taxonomies, approximately 35 of which were published by official national and regional bodies (Table 1.3). A taxonomy provides criteria for determining whether specific economic activities qualify as sustainable, based on thresholds defined by national or regional authorities. While the intended uses – such as for regulatory reporting – of these taxonomies vary, one of the common applications are their linkage to sustainable finance instruments. It is important to clarify that the existence of a formal taxonomy is not a pre-requisite for conducting green or transition finance. Japan, for instance, has achieved results by expanding transition finance rather than relying on a static classification system but developing a sector-specific roadmap approach that reflects evolving technological progress. Taxonomies and roadmaps each have distinct advantages, and effective guidance may rely on one or the other, or a combination of both.

Recent developments in taxonomy design reveal an emerging trend towards linking transition finance. Among the 33 sustainable and green finance taxonomies and one roadmap presented in Table 1.3, 14 explicitly include a dedicated transition category. These categories are variously labelled as “transition” or “amber”, or their equivalent, and identify activities that, while not meeting the strict thresholds for “green” classification, still contribute to national or regional climate goals and are thus deemed worthy of support. This is particularly evident in Asia, where a few taxonomies adopt this inclusive approach. This underscores that a transition pathway or investment option that may not be necessary in one region can be essential in another, depending on the status of each jurisdiction. Recognising this diversity and adopting a demand-side perspective that reflects the legitimate and context-specific needs of regions are fundamental to ensuring that transition finance frameworks remain inclusive of the varied decarbonisation pathways required across regions.

Table 1.3 ► List of country and regional sustainable finance taxonomies and their transition classifications

Year	Region or country	Name	Green	Transition
2019	Mongolia	Mongolian Green Taxonomy	✓	
2020	European Union	EU Taxonomy for Sustainable Activities	✓	(✓)*
2020	Bangladesh	Sustainable Finance Policy for Banks and Financial Institutions – Sustainable Taxonomy	✓	
2021	China	Green Bond Endorsed Project Catalogue	✓	
2021	Malaysia	Climate Change and Principle-based Taxonomy	✓	✓
2021	Japan**	Roadmap for Promoting Transition Finance	✓	✓
2021	ASEAN	ASEAN Taxonomy for Sustainable Finance	✓	✓
2021	Kazakhstan	Classification (Taxonomy) of Green Projects Eligible for Financing Through Green Bonds and Green Loans	✓	
2022	Colombia	Green Taxonomy of Colombia, Implementation Guidelines	✓	
2022	South Africa	South African Green Finance Taxonomy	✓	
2022	Georgia	Sustainable Finance Taxonomy for Georgia	✓	
2022	Sri Lanka	Sri Lanka Green Finance Taxonomy	✓	
2022	Korea	K-Taxonomy on Green Industries	✓	✓
2023	Mexico	Sustainable Taxonomy of Mexico	✓	
2023	Russian Federation	Green Finance Methodology	✓	✓
2023	Thailand	Thailand Taxonomy – A Reference Tool for Sustainable Economy	✓	✓
2023	Singapore	Singapore-Asia Taxonomy for Sustainable Finance	✓	✓
2024	China	2024 Edition of the Catalogue of Industries for Green and Low-carbon Transition	✓	✓
2024	Indonesia	Indonesia Taxonomy for Sustainable Finance	✓	✓
2024	Philippines	Philippine Sustainable Finance Taxonomy Guidelines	✓	✓
2024	Rwanda	Rwanda Green Taxonomy	✓	
2024	Dominican Republic	Dominican Republic Green Taxonomy	✓	

Year	Region or country	Name	Green	Transition
2024	Panama	Sustainable Financing Framework	✓	
2024	Costa Rica	Sustainable Finance Taxonomy of Costa Rica	✓	
2024	Azerbaijan	The Green Taxonomy	✓	
2024	Nepal	Nepal Green Finance Taxonomy	✓	✓
2024	Hong Kong, China	Hong Kong Taxonomy for Sustainable Finance	✓	
2024	Israel***	Israeli Taxonomy for Classifying Financial Sustainable Activities, Mitigation (Reducing the Emissions of Greenhouse Gases)	✓	✓
2024	West African Economic and Monetary Union (EUMOA)	Taxonomie des projets verts, sociaux et durables au sein de l'EUMOA	✓	
2025	Australia	Australian Sustainable Finance Taxonomy	✓	✓
2025	Chile	Sistema de Clasificación o Taxonomía de Actividades Económicas Medioambientalmente Sostenibles de Chile (T-MAS)	✓	
2025	Guatemala	Taxonomía Voluntaria de Finanzas Sociales de Guatemala	✓	
2025	Kenya	Kenya Green Finance Taxonomy	✓	
2025	Viet Nam	National Green Taxonomy	✓	

*In the European Union, the term “transitional” is used to refer to economic activities for which there is no technologically and economically feasible low-carbon alternative. **Japan has adopted a roadmap-based approach rather than a taxonomy framework. ***The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

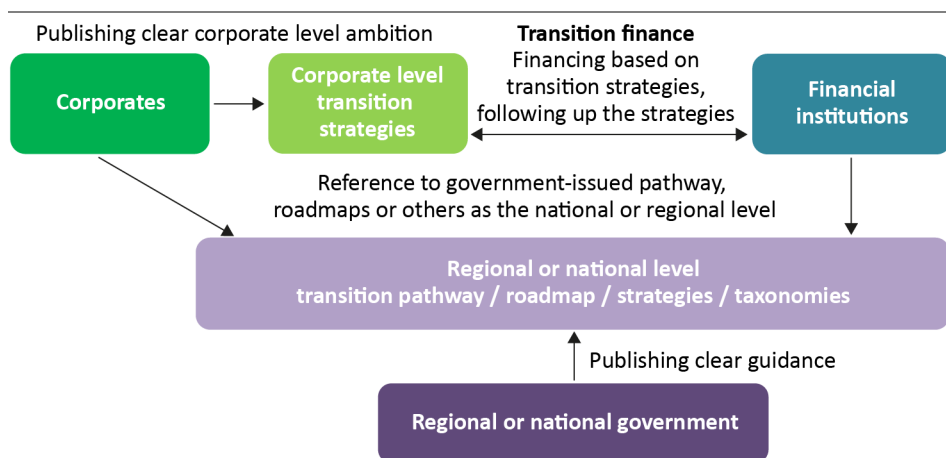
Note: For taxonomies that have multiple revisions, the year of initial issuance is noted. The “transition” category includes classifications such as “transitional”, “transition,” “amber,” or other equivalent terminology.

Source: IEA analysis of the taxonomies in the table.

1.1.4 State of play of transition finance

While transition finance can take a wide variety of financial products and cannot be fully standardised across all instruments, Figure 1.5 provides a general overview of the roles and expectations of key stakeholders in commonly used structures such as bonds and loans.

Figure 1.5 ► Roles and expectations of stakeholders in transition finance



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Transition finance is driven by the combined efforts of governments, corporates and financial institutions, each playing a vital role in enabling credible transition pathways.

Corporates seek continuity of funding under transition finance frameworks, the reputational benefit of positive signalling, additional liquidity and potentially more favourable financing terms. Corporates are encouraged to explain their direction, progress and long-term commitment of transition either at asset level or entity level, and in this context, transition strategies have proven to be an effective tool for articulating credibility, especially for leading corporate actors.

Governments and regional authorities play a crucial enabling role. National decarbonisation strategies, supporting regulations, fiscal incentives, credible pathways and integrated information systems help underpin corporate transition plans or strategies and enhance investor confidence. Moreover, countries and regions' transition strategies also involve contributions to energy security, industrial competitiveness and broader national interests, benefitting when aligned investments are developed. Additionally, particularly in EMDE, attracting international capital flows provides an additional significant incentive for governments to actively engage.

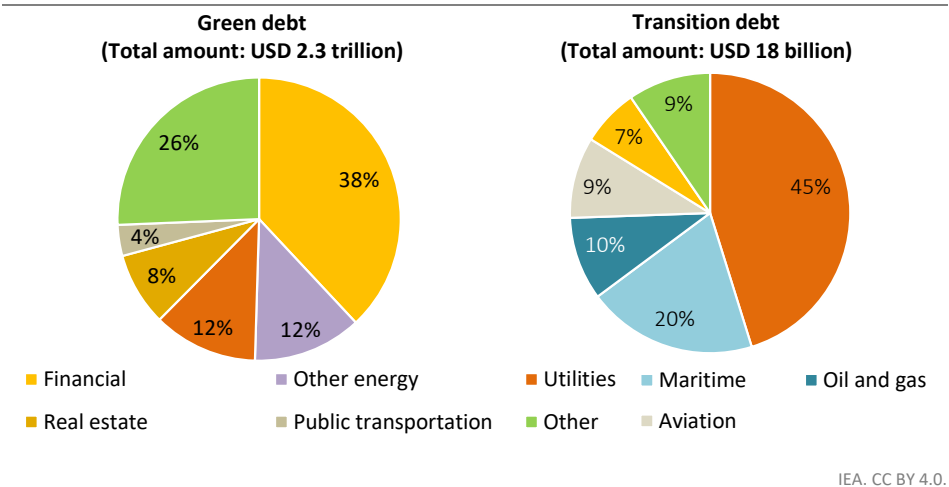
Financial institutions are not only providers of finance but also serve as quality controllers. In addition to conventional risk analysis, they assess whether corporates can credibly use transition finance in line with stated goals and process requirements. Active engagement and monitoring with client corporates and the provisions of transition finance generate a synergistic effect, supporting broader decarbonisation outcomes. While transition finance may not generate excess returns at present, financial institutions benefit from gaining a sustainable finance business. Furthermore, institutions concerned about losing key clients due to regulatory tightening, particularly in hard-to-abate sectors, may find that transition finance allows them to retain relationships while remaining compliant with transition pathways. In this way, transition finance can create shared value for both financial institutions and corporates, aligning business continuity with emissions reduction objectives. Some global financial institutions, particularly those facing regulatory or public scrutiny, have also raised concerns about financial carbon leakage. This occurs when restrictions placed on them shift financing to less regulated or unlisted financial actors, undermining the transition effort. Transition finance is seen as a critical tool to avoid such unintended consequences, support energy investments while preserving financial system integrity and preventing competitive disadvantages for more ambitious institutions.

Beyond the stakeholders included in Figure 1.5, sustainability assessment providers, second-party opinion providers and bond framework verifiers often play an important role in assessing the alignment of the guideline or principles. Also, when financing is conducted through capital markets, financial institutions typically act as financial intermediaries and engagement activities are frequently undertaken by investors.

Transition finance can generally be categorised into the use-of-proceeds type and the non-use-of-proceeds type such as sustainability-linked finance. However, as mentioned above, setting a boundary and deciding which sustainability-linked finance should be considered part of transition finance remains challenging so it is difficult to quantify transition finance. Additionally, for instance, there are some cases including financing activities that could be considered transition finance, such as finance for energy efficiency, but which do not use the term (Climate Smart Venture, 2024).

Given these circumstances, there are limitations to the comprehensiveness of available data. However, based on the current data for financial instruments explicitly labelled “transition”, the total issuance between 2021 and 2024 amounts to USD 35 billion, with corporate issuance accounting for nearly USD 18 billion, or roughly half of the total. In 2024, the volume increased compared with the previous year, largely driven by the issuance of the world’s first sovereign transition bond by the Government of Japan (Box 1.2). While the overall market size remains limited and there are notable regional concentrations, a comparison of issuer characteristics between green and transition markets suggests that transition finance tends to be more commonly used by corporates in hard-to-abate sectors (Figure 1.6).

Figure 1.6 ▶ Share of corporate green and transition debt issuance by industry, 2021-2024



Compared with green debt, transition debt is more frequently used by hard-to-abate sectors such as shipping, logistics, and oil and gas, in addition to utilities.

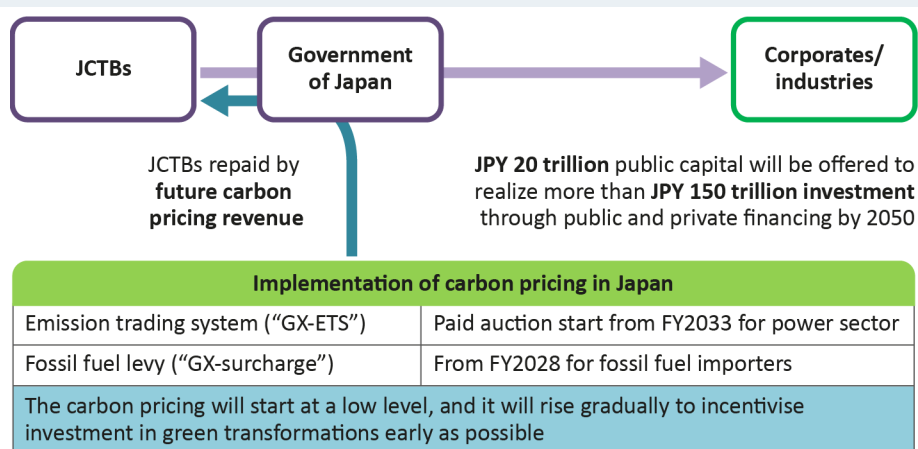
Source: IEA analysis based on data from Environmental Finance (2025).

Box 1.2 ▶ The transition sovereign bond: its use in Japan and the possibility of its use in EMDE

In February 2024, Japan issued the world’s first sovereign transition bonds, Japan Climate Transition Bonds. To date, a total of seven issuances have been conducted across five-year and ten-year maturities, amounting to approximately JPY 3.3 trillion (around USD 22.0 billion) in cumulative issuance. It is notable that the inaugural issuance in February 2024 was carried out under the certification of the Climate Bonds Initiative. At recent offering in July 2025, the bids were about four times the amount of issuance offered, indicating strong investor demand. How these bonds use proceeds is based on Japan’s national transition strategy. Japan’s Basic Policy for the Realization of Green Transformation, published in February 2023, includes a detailed investment strategy for 22 industrial sectors to reach carbon neutrality by 2050, as well as a commitment to introduce carbon pricing. Under the investment strategy, the government envisages JPY 20 trillion (USD 133 billion) of public capital to realise more than JPY 150 trillion (USD 1 trillion) in investment through public and private financing by 2050. The strategy is accompanied by transition roadmaps for each sector, which were developed by expert committees composed of public and private stakeholders. These roadmaps allow investors to identify transition activities and can also be used by companies for internal transition strategy planning. The investment strategy emphasises nascent technologies, which will receive over half of the proceeds of Japan Climate Transition Bonds. The bonds also include a novel approach to carbon pricing. Normally, revenue from carbon pricing

can only fund future decarbonisation activity, i.e. activity after the carbon has been paid. This delays the impact of carbon pricing. Japan's approach was to build the future pricing revenue into the issuance, by assuming this is the capital that the government will use to make repayments on the bonds. This allows for the government to immediately take advantage of the assumed future revenue of carbon taxes (Figure 1.7). The bonds approach can potentially be repurposed for EMDE. With the government playing the role of credit intermediary, this could enhance corporates' creditworthiness and eliminate the complexity of financing for small-scale projects. Countries with sub-investment grade credit ratings may need additional credit enhancements – such as guarantees from DFIs – to help facilitate access to international capital markets.

Figure 1.7 ▶ Structure of Japan Climate Transition Bonds (JCTBs)



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The bond approach offers the potential to mobilise future revenues from carbon pricing as a source of finance for today's investments and activities in EMDE.

1.2 Transition finance support for energy investment

1.2.1 How much investment can be supported by transition finance?

Financing for energy transitions encompasses a variety of activities and classifications. Some will clearly qualify as green finance; others will fall under transition finance or may lie outside these categories within conventional commercial activities. The IEA does not attempt a rigid classification of all finance as strictly "green", "transition" or "other". Instead, the IEA adopts a practical and analytical approach, identifying and aggregating investments in key sectors where transition finance can have meaningful impacts based on the IEA's sectoral expertise.

The investment figures presented in the following analysis represent a non-exhaustive aggregation of investment amounts into areas that can be supported by transition finance. For the purposes of this analysis, the figures cover financial activities that support projects and entities, especially in hard-to-abate sectors, and that contribute to emissions reductions from current production processes or energy systems, even though they have not yet achieved net zero and are not supported by green finance, while aligning with long-term national or regional climate goals such as NDCs and the Paris Agreement. In the IEA analysis, we use the range of the Announced Pledges Scenario (APS) and the NZE Scenario in 2024.

It is essential to emphasise that inclusion within this set does not imply that those investments are automatically considered transition finance. As previously highlighted, the feature of transition finance is not the sector or activity alone, but the presence of transition plans, strategies or equivalents. Without such transition alignment, investments, even if they fall within the identified sectors, would not qualify as transition finance. Conversely, exclusion from this dataset does not imply that a given investment cannot be considered transition finance. In many regions, particularly in EMDE, starting points differ significantly, and while some countries may be relatively further from net zero, they nonetheless face urgent needs for investment in emissions-reducing investment over the next decade. Such investments may be highly impactful, even if they do not yet align with long-term Paris-compatible goals. Moreover, in certain jurisdictions, efforts are underway to enhance inclusion, supporting corporates that have not yet aligned fully with the Paris Agreement targets, lack formalised transition strategies or face capacity constraints, such as small and medium-sized enterprises. While such cases fall outside the scope of this quantitative analysis, they should not be interpreted as ineligible. Like transition finance itself, the estimates presented here are inherently dynamic and should be viewed as directional rather than definitive.

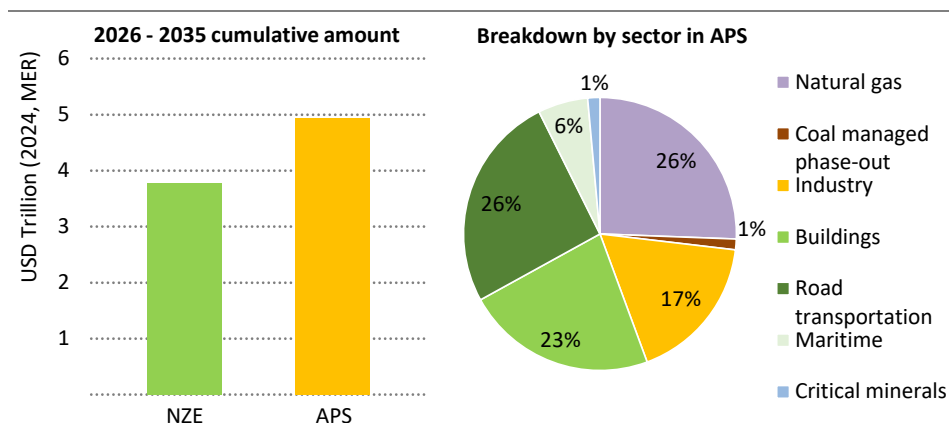
1.2.2 Investments which can be supported by transition finance

The cumulative amount that could be supported by transition finance over the next decade is approximately USD 5 trillion under the APS, and USD 4 trillion under the NZE Scenario (Figure 1.8). On an annual average basis, these amounts range from USD 400 billion to 500 billion, covering a broad spectrum from end-use sectors such as buildings, transport and industry to energy supply and power generation processes.

In the end-use sectors, those investments include a range of energy efficiency and low-carbon technology upgrades. In buildings, this includes fuel-switching measures such as replacing inefficient boilers with gas alternatives, particularly in EMDE. In transport, energy efficiency improvements directed at internal combustion engine vehicles and international maritime transportation are included, and in industries such as steel and cement production, investments cover both energy efficiency and the deployment of technologies that can contribute to substantial emissions reductions in operation processes. In the natural gas sector, relevant investments could include infrastructure such as distribution networks and liquefied natural gas (LNG) transport and gas-fired power generation capacity aligned with

climate scenarios. In the context of managed coal phase-out, the figure includes the unrecovered capital from the existing global coal-fired power plant fleet, as identified in previous IEA analyses (IEA, 2024). In the area of critical minerals, investment in the extraction and refining of nickel is included due to its impact on emissions from a transition perspective. It is important to note that these investments are eligible for support through transition finance only when they are carried out under credible decarbonisation strategies and meet the necessary process requirements. Without such alignment, they do not qualify as transition finance.

Figure 1.8 ▶ Investments that can be supported by transition finance, by scenario and sector



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The ten-year cumulative amount that could be supported by transition finance is approximately USD 4-5 trillion, covering a broad spectrum of investments.

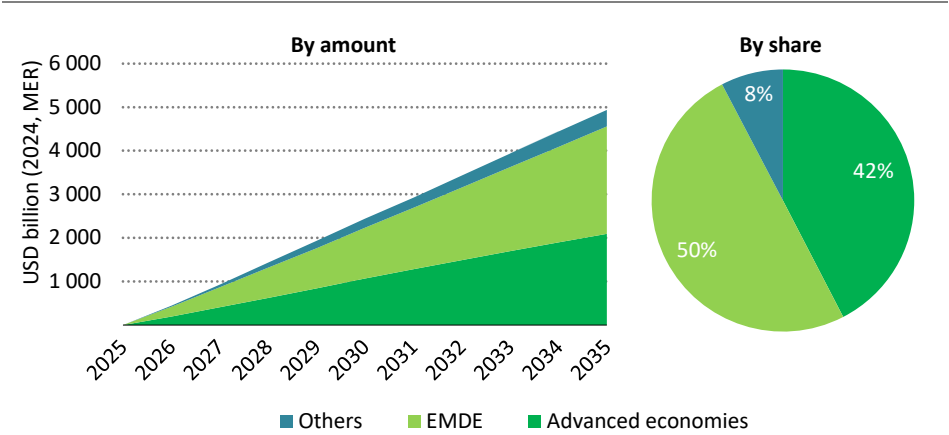
Note: The investment amounts represent a non-exhaustive aggregation of investment amounts into areas that can be supported by transition finance. In this report, transition finance refers to financing that supports governments, corporates or sectors in shifting towards lower-emissions and more sustainable practices aligned with long-term climate and sustainability goals even if they are not fully “green”, and hence technologies eligible for more stringent green finance are excluded. At the same time, there are important process requirements that future actions must be represented through transition strategy plans or equivalents, with mechanisms in place to enable follow-up and track progress over time.

Annual investments of USD 400-500 billion are expected to be weighted heavily towards EMDE, with a cumulative share of half in the next decade (Figure 1.9). This reflects the critical role of transition finance in supporting regions that are not easily reached by existing green capital flows, as highlighted earlier in this report. It also underscores the importance of expanding cross-border financial flows from advanced economies to EMDE.

While a direct comparison with financial market volumes should be made with caution, it is worth noting that the global green bond market reached an annual issuance volume of

around USD 600 billion in 2024. Reproducing the success of the last decade in the green finance market within the transition finance market over the next ten years will support energy investments that contribute meaningfully to both energy security and emissions reductions.

Figure 1.9 ▶ **Additional investments that can be supported by transition finance by cumulative amount and share under APS, 2025-2035**



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The countries most in need of support from transition finance are EMDE, accounting for half of the estimated investment amount identified in the IEA analysis.

Notes: “Others” includes content that cannot be broken down by region or country, such as international maritime.

Sectoral insights

Where can transition finance be applied?

SUMMARY

- This chapter provides an analysis of investments that can be supported by transition finance in three important areas – heavy industry, critical minerals and natural gas – building on the preceding assessment of investments and providing illustrative cases and non-exhaustive key performance indicator (KPI) examples to underpin transition strategies.
- As with the investment amounts highlighted in Chapter 1 that can be supported by transition finance, inclusion here does not automatically render an activity eligible for transition finance, since such eligibility depends on meeting the relevant process requirements. Equally, the absence of an activity from this chapter does not imply that it is ineligible for transition finance.
- Heavy industry: The cement and steel sectors are a foundation of economic development and are major emitters, accounting for about 14% of direct energy and process CO₂ emissions. Near-zero emissions technologies are essential to achieve net zero pathways, these technologies are still in the preliminary stages of commercial deployment. In the near-term, transition finance can support interim steps towards reaching near-zero emissions solutions.
- Critical minerals: As these are the material backbone of energy supply chains, scaling mining and refining is crucial to meeting increasing demand driven by energy applications such as electric vehicles, battery storage, renewables and grid networks. At the same time, the extraction and processing of minerals may have adverse impacts that require safeguards addressing not only greenhouse gas (GHG) emissions but also, among others, high water use, land degradation and biodiversity loss. Transition finance can unlock high-impact projects that lower emissions and avoid or mitigate other impacts, guided by practical KPIs.
- Natural gas: Natural gas is set to remain a part of the global energy mix for many decades but the applicability of transition finance to gas varies by country and sector and over time. Priority should be placed on front-loading methane abatement, reducing emissions from liquefied natural gas (LNG) liquefaction providing infrastructure for low-emissions gases and helping, alongside other technology options, plants to provide flexibility for electricity systems, under transparent, time-bound plans that align with national energy and climate strategies.

2.1 Key sectors for transition finance

This chapter builds on the analysis of the investments that can be supported by transition finance described in the previous section and focuses on several key sectors that are particularly important for this discussion.

Drawing on the International Energy Agency (IEA)'s sectoral expertise, the analysis examines how investments in heavy industries, critical minerals and natural gas can be understood within a transition finance context, highlights illustrative examples and key considerations, and sets out a non-exhaustive set of key performance indicators (KPIs) that might be useful in developing credible transition strategies. The discussion of KPIs largely focuses on GHG emissions; however, since the upstream extractives sector, particularly mining, has historically been closely linked to a broader range of environmental impacts alongside GHG emissions, we have incorporated wider environmental dimensions, including water use, land use and other sustainability considerations. While the thresholds for such KPIs are expected to be defined in line with the specific context of national and regional energy pathways, what is most important is that clear action plans are articulated. By combining multiple indicators and aligning them with credible strategies, transition finance can be deployed in a way that both contributes to emissions reductions and ensures the effective mobilisation of finance in support of essential investments.

As with the estimate for transition finance needs highlighted in Chapter 1, the sectoral studies presented in this chapter are non-exhaustive. It is important to reiterate that inclusion here does not automatically render an activity eligible to be considered for transition finance; such eligibility depends on meeting the appropriate process requirements. Equally, the absence of an activity from this chapter does not imply that it is ineligible for transition finance nor does it reflect any judgement on its relative importance.

As noted in Chapter 1, end-use investments such as energy efficiency improvements in fossil-fuel-based transport categories, such as road and shipping, and efficiency upgrades in the buildings sector, remain critical areas for the progress of decarbonisation. In addition, grid investment, which is closely linked to the power sector examples discussed in this chapter, serves as an essential enabler of both green and transition activities and should be recognised as a foundational element of the energy investment.

2.2 Heavy industries: Industry decarbonisation

The cement and steel sectors combined account for 14% of total emissions from energy combustion and process emissions on a direct basis (IEA, 2025a). These two sectors are also important contributors to countries' economic and infrastructure development. Achieving country targets and aligning with the Paris Agreement will require these two sectors to achieve sharp reductions in emissions by mid-century. The near-zero emissions technologies necessary to fully decarbonise steel and cement are under development, but they are not yet commercially available on the market and are estimated to come with production costs

ranging from 10% to 125% more than that of traditional production routes, depending on the technology and regional circumstances (IEA, 2025a).

Over the next five to ten years, the accelerated development of regionally diverse large-scale demonstration projects, followed by early commercial deployment, is needed to enable wide scale commercial deployment of near-zero technologies by the mid-2030s. In parallel, a variety of technologies and measures that can reduce the energy and emissions intensity of steel and cement production in the near-term are required. Many financial institutions have committed to align their portfolios with the Paris Agreement. In addition to green finance that can support near-zero technologies, there is a need for transition finance for investments that can achieve significant emissions reductions over the next decade as plants transition to near-zero emissions production.

Transition finance considerations will also need to incorporate retrofit-ready requirements in permitting or financing applications, for example, requiring plants to demonstrate that they have the space and technical capacity to incorporate near-zero emission technologies in the future. Such considerations would help avoid risks of investing in assets with unrecoverable capital in the future.

This section builds on past analysis published by the IEA, including in particular *Achieving Net Zero Heavy Industry Sectors in G7 Members* (IEA, 2022), which established a toolbox of policies and financing mechanisms for the decarbonisation of the cement and steel sector and proposed definitions for near-zero and low-emissions steel and cement production. These definitions can aid countries in using indicators to set suitable targets for transition finance in the steel and cement sectors.

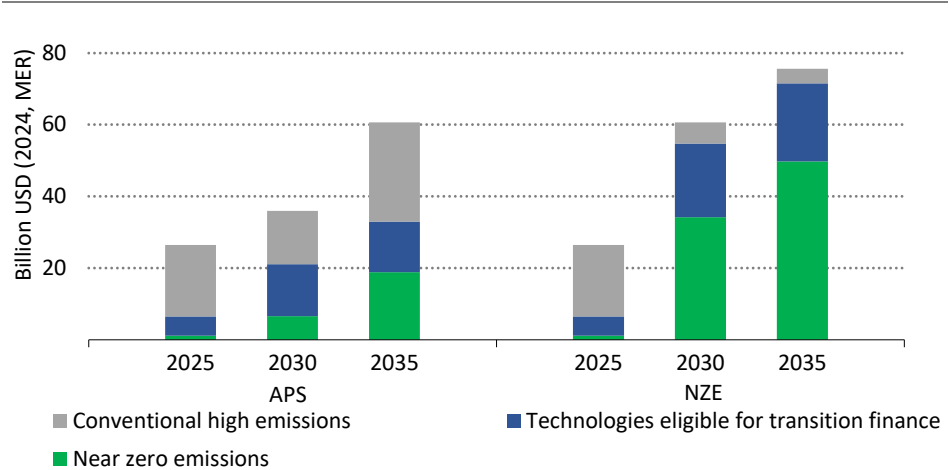
2.2.1 Sizing transition finance needs in cement and steel

Current investments in the cement sector are dominated by conventional carbon-intensive production routes, with investments in energy efficiency and electrification accounting for only 20% of all investments.¹ Investments in near-zero emission technologies remain small, focused primarily on pilot and demonstration projects. The next decade will be important for the cement sector, as the global fleet is ageing and nearly 70% of cement capacity is set to face a re-investment decision by 2035. Given the long lifetimes of industrial plants, re-investment in or replacement of such plants can consider the use of efficient technologies and well-planned configurations. This can reduce emissions in the short-term and prepare plants to incorporate near-zero emissions technologies in the medium-term, if such technologies are not already incorporated from the start. In the Announced Pledges Scenario (APS), efficiency investments grow rapidly in the sector in the coming years. Achieving Net Zero Emissions by 2050 (NZE) Scenario outcomes in the cement sector would mean more than a doubling in investments, reaching USD 60 billion by 2030 and further rising to USD 75 billion by 2035.

¹ The figures for investments given in this chapter, as with the full report, are based on IEA's 2024 scenarios.

Transition finance needs in the cement sector are made up of spending on energy efficiency measures such as waste heat recovery and low-emissions measures such as use of bioenergy-based fuels. Such fuels help reduce fuel-related emissions but do not address process emissions from heating limestone to produce clinker. These finance needs exceed USD 14 billion per year in the APS and USD 20 billion in the NZE Scenario by 2035 (Figure 2.1). Over the next decade, the sector’s cumulative transition finance requirements could reach nearly USD 140 billion in the APS and nearly USD 200 billion in the NZE Scenario. Near-zero emission investments that qualify for green finance reach nearly USD 20 billion per year in the APS and USD 50 billion in the NZE Scenario by 2035, or a cumulative total of about USD 100 billion and USD 300 billion, respectively. Qualifying investments include kilns equipped with carbon capture, utilisation and storage (CCUS) and production using novel cement chemistries that eliminate process emissions. Transition finance needs over the next decade may equal about 60% to 140% of those of green finance. The amount of public support required to mobilise these levels of finance may vary depending on the type of technology and regional circumstances.

Figure 2.1 ▶ Annual investments in the cement sector by category



IEA. CC BY 4.0.

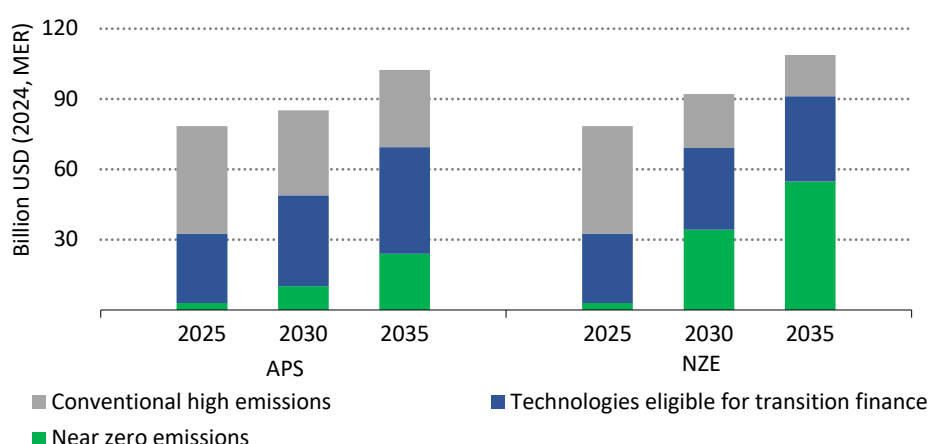
Transition finance needs will peak in 2030 as green finance grows with spending on near-zero emission technologies by 2035.

Notes: Near-zero emissions meets the emissions intensity threshold outlined in IEA (2022), *Achieving Net Zero Heavy Industry Sectors in G7 Members*; this includes primarily CCUS with high capture rates, bioenergy-based fuels and electric kilns with CCUS on process emissions, and cements from alternative decarbonised raw materials (e.g. silicates). Technologies eligible for transition finance include energy efficiency, bioenergy-based fuels and electric kilns without CCUS on process emissions, and CCUS with partial capture rates.

Like spending in the cement sector, investments in the iron and steel sector today are dominated by conventional carbon-intensive production routes, mainly blast furnaces.

Spending on production routes with inherently lower emissions, such as scrap-based electric arc furnaces (electrification), on energy efficiency equipment and on gas-based direct reduction iron production can help to lower energy and emissions intensity. It can also help prepare the sector while near-zero emission technologies such as low-emissions hydrogen and CCUS reach commercial viability. Investments in gas-based direct reduction iron can transition over time to take increasing shares of low-emissions hydrogen to reach near-zero emission production. Transition finance provision should take into account the robustness of planning, economic feasibility assessments and other preparations towards such a transition in a reasonable timeframe.

Figure 2.2 ▶ Annual investments in the iron and steel sector by category



IEA. CC BY 4.0.

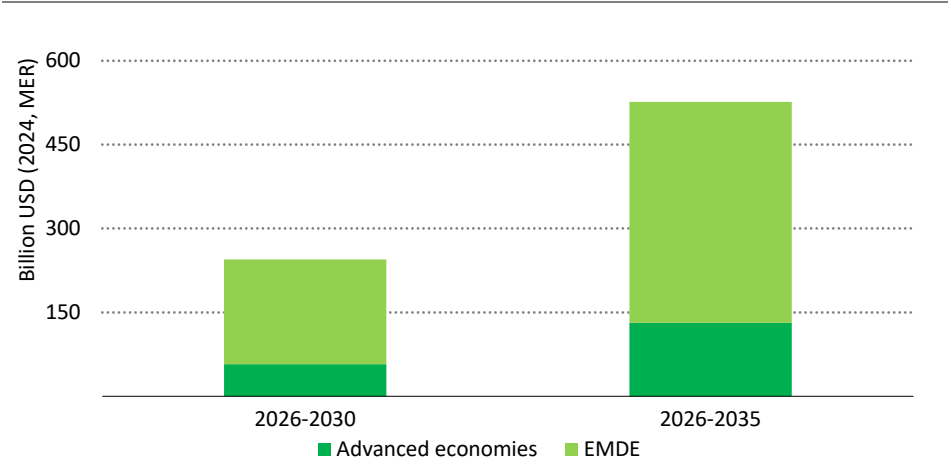
Transition finance needs are largest in the APS while green finance requirements in the NZE Scenario start to exceed that of transition finance after 2030.

Notes: Near-zero emissions meet the emissions intensity threshold outlined in IEA (2022), *Achieving Net Zero Heavy Industry Sectors in G7 Members*; this includes primarily hydrogen, CCUS, iron ore electrolysis and scrap-based production with sufficient emissions reductions. Technologies eligible for transition finance include energy efficiency, gas-based direct reduced iron, partial electrification, charcoal and scrap-based production with partial emissions reductions.

Total investments in the iron and steel sector under the APS are only slightly lower (6% in 2035) than in the NZE Scenario, but the composition of these investments are substantially different (Figure 2.2). Spending on conventional carbon-intensive production routes fall sharply in both scenarios but make up only 16% in the NZE scenario by 2035, compared with nearly a third in the APS. Transition finance needs are larger in the APS, reaching USD 45 billion per year in 2035 with cumulative needs over the next decade at USD 390 billion or nearly 45% of the total. This falls slightly to just over USD 315 billion in the NZE Scenario, or 37% of the total. Investments in near-zero technologies account for more than half of all spending in 2035 under the NZE Scenario, with cumulative spending over the

next decade estimated at USD 370 billion. Cumulative transition finance needs range from about 95% to 250% of green finance requirements over the next decade. Again, the amount of public support required to mobilise these levels of finance may vary depending on the type of technology and regional circumstances.

Figure 2.3 ▶ Cumulative transition finance needs in the cement and steel sectors, APS



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The majority of transition finance needs are in emerging market and developing economies (EMDE).

Note: EMDE = emerging market and developing economies.

Cumulative transition finance needs for the cement and steel sectors over the next decade are estimated to exceed USD 500 billion in the APS (Figure 2.3). Rapid economic development over the next decade in emerging market and developing economies (EMDE) is set to drive demand for construction materials, including growing steel and cement consumption, particularly in EMDE other than the People’s Republic of China (hereafter “China”). In contrast, materials demand in advanced economies remains relatively flat and in some cases is starting to decline, with investment in the manufacturing of steel and cement focused on replacing ageing and outdated production capacity. With global demand growth for materials dominated by EMDE, the vast majority (75%) of transition finance support technologies and measures in EMDE.

Total investment spending in the cement and steel sector for new capacity additions, replacement of outdated equipment, refurbishments and upgrades for low-emissions technologies and for near-zero emission technologies are estimated to reach nearly USD 1.3 trillion in the APS in the next decade. Transition finance needs are the second largest source of capital requirements in the cement and steel sectors, accounting for over a third

of the total financing requirements in the two sectors – about 20% less than for conventional investments and nearly double those for near-zero emission technologies.

Box 2.1 ▶ Transition for the ammonia sector

Ammonia today is mainly used for fertiliser production and for various industrial applications including plastics and synthetic fibres. It can also be used as a future low-emissions energy carrier to help decarbonise shipping and to be co-fired in coal power plants, as well as for seasonal power storage; other uses such as 100% ammonia-firing in gas turbines are also being piloted. Today, ammonia accounts for around 2% of global energy use and just over 1% of CO₂ emissions in the energy sector. Overall, ammonia production is the third largest industrial source of emissions after steel and cement and represents about a third of all CO₂ emissions from the chemical and petrochemical subsector.

The transition for the ammonia sector implies the accelerated adoption of low-emissions ammonia production (including through the adoption of best available technologies and fuel shifting from coal to gas) and near-zero emissions production routes, including fossil-based routes with CCUS, electrolysis and methane pyrolysis. Demand side measures are also required – more efficient use of fertilisers and other end-uses could reduce overall ammonia production for conventional uses by about 10% in 2050.

Ammonia sector investment needs for transition finance and near-zero emissions technologies combined reach USD 17-26 billion per year by 2035 in different decarbonisation pathways.² Significant investments will be needed in the coming years for near-zero emissions technologies, as commercial deployment ramps up increasingly over the next decade in these scenarios. In parallel to this ramp up, capital will also need to flow to low-emissions projects that are Paris-aligned to achieve greater near-term emissions reductions than would come from near-zero emissions projects alone.

The development of low-emissions and near-zero emission ammonia production is well underway with a total of 516 announced projects (as of May 2025) included in the latest edition of the Ammonia Energy Association (AEA) project database.³ Low-emissions and near-zero emissions ammonia production from low-cost renewables could be a strategic investment opportunity for countries that currently rely heavily on imports, both from economic and food security perspectives.

² IEA estimates.

³ AEA definitions for transitional and low emission ammonia production have some differences from IEA's considerations for low-emissions and near-zero emissions production.

2.2.2 Recent developments in finance or other relevant activities

A number of government, industry association, company and financial market initiatives and frameworks exist to support the decarbonisation of the steel and cement sectors. These initiatives provide guidance on decarbonisation and net zero pathways, target setting, progress reporting and the use of KPIs to evaluate alignment and support the development of green, sustainability-linked or transition finance instruments. While targets vary across jurisdictions to reflect national circumstances, convergence on the KPIs is emerging and efforts to strengthen alignment would help to enhance interoperability internationally. This facilitates the raising of capital internationally and provides the market with strong policy signals towards investments in decarbonisation technologies. The following section provides an illustrative overview of several of these initiatives and sustainable finance frameworks.⁴

Government initiatives

The EU Taxonomy (European Commission, 2021) is a key pillar of the EU's sustainable finance framework, providing market transparency through the provision of a classification system to define activities across different economic sectors that align with a net zero by 2050 commitment. The taxonomy includes emission intensity targets covering ten manufacturing sectors including cement and steel. The 2030 intensity targets for the cement sector cover GHG emissions intensity for clinker and for cement production. The targets for the steel sector cover hot metal, sintered ore, coke, iron casting, electric arc furnace high alloy steel and electric arc furnace carbon steel. These emissions reductions targets are defined for sustainable or green finance thresholds and can be used to inform transition finance targets.

The Association of Southeast Asian Nations (ASEAN) Transition Finance Guidance version 2 (ASEAN Capital Markets Forum, 2024) prepared under the ASEAN Capital Markets Forum (a group of capital market regulators from 10 ASEAN economies) provides a framework for transition finance in Southeast Asia. Recognising that not everyone in the region is able to commit to a 1.5°C target, the framework introduced a tiered approach to enable companies to be categorised as aligned and aligning to 1.5°C, aligned and aligning to well below 2°C, or progressing. The Guidance provides entities with a framework to evaluate and demonstrate a credible transition in the region and facilitate access to financing. It is intended to enable financial institutions to direct capital to companies that are implementing credible transitions and also to enable companies (including cement and steel companies) to develop credible transition plans. Version 2 of the guidance augments global reference pathways for real economy companies to use in the absence of a suitable regional or country pathway.

Other countries and regions have released taxonomy definitions with technical screening criteria for the cement and steel sector. These include Australia (Australian Sustainable Finance Institute, 2025), Mexico (SHCP, 2023),⁴ Singapore (Green Finance Industry Taskforce, 2023), South Africa (National Treasury, South Africa, 2022), Sri Lanka (Central Bank of Sri

⁴ The IEA has not undertaken analysis on whether these frameworks are net zero aligned – inclusion here is simply intended to highlight a variety of initiatives aiming to enable transition finance.

Lanka, 2022) and Thailand (Thailand Taxonomy Board, 2025). India and Canada are also in the process of developing taxonomies, including definitions for the cement and steel sector.

Hebei province, the largest steel producing province in China, published its *Guidelines for Transition Finance in the Iron and Steel Industry* in December 2023. The Guidelines include a list of 176 eligible transition technologies and encourage companies to develop detailed transition plans with short (2025), medium (2030) and long-term (2060) targets. In 2024, the total transition credits in Hebei's steel sector totalled CNY 20 billion (USD 2.8 billion) and Chinese issuers launched 12 steel bonds with a total value of USD 3 billion (Climate Bonds Initiative, Transition Asia, 2025).

Industry association initiatives and company sustainable finance frameworks

Both the World Steel Association (WSA) and the Global Cement and Concrete Association (GCCA), which represent a large portion of the world's leading steel and cement companies, have published guidelines and net zero roadmaps and have set up reporting protocols to support the sector's net zero transition. While these efforts do not explicitly cover transition finance frameworks, they provide key tools for corporates and financial institutions to identify and set net zero targets, pathways and interim targets to evaluate alignment with the Paris Agreement and hence their suitability for transition finance.

The *GCCA 2050 Cement and Concrete Industry Roadmap for Net Zero Concrete* (GCCA, 2021) sets out a pathway for the sector to achieve net zero across the whole life cycle, while the *GCCA Sustainability Framework Guidelines* (GCCA, 2022) covers a package of guidelines to support implementation of the GCCA Sustainability Charter covering five key pillars. The *GGCA in Numbers* (GCCA, 2025) is a key tool for monitoring sector and member progress.

The World Steel Association has produced a climate change policy brief (WSA, 2021) that sets out three components to mitigate its CO₂ emissions and has a long established accounting methodology for GHG emissions from the steel sector (WSA, 2025). At COP 28, World Steel was among the endorsers launching the *Steel Standards Principles* (WTO, 2025) to highlight the need for common GHG measurement standards to accelerate the sector's transition.

Cement and steel companies have been actively engaging in the development of different technology solutions and measures to reduce the sectors' energy and emissions intensity for decades through global, national and company technology roadmaps aimed at achieving near net zero emissions by 2050. Decarbonising steel and cement will require an investment of billions of US dollars in investments in capacity using nascent technologies. Moreover, the market for low and near-zero emissions steel and cement will need to grow to enable market adoption. Access to affordable capital is required to enable the financing of these projects.

Major cement and steel companies have been active in sustainable finance markets issuing green, sustainable, sustainability-linked and transition finance instruments. To support issuances to capital markets, companies have published sustainable and green finance frameworks to outline their transition targets and have set metrics to align capital investments with their transition plans (see Table 2.1). These frameworks are useful tools for

financial institutions to evaluate the suitability and alignment of issuances with their own transition plans and sustainable finance frameworks. Issuances can cover entity financing needs or be specific on the use of proceeds for low-emissions or near-zero emission projects.

Table 2.1 ► Summary of select sustainable finance frameworks and issuances in the cement and steel sector

Sector / Company	KPI	Target	Instrument
Cement			
Heidelberg Materials	KPI 1: scope 1 GHG emissions	2026: < 500 kg CO ₂ -eq per tonne of cement 2030 target: < 400 kg net CO ₂ per tonne cement	EUR 750 million sustainability-linked bond
	KPI 2: tonnes CO ₂ captured	> 10 Mt CO ₂ captured by 2030	
Taiheiyo Cement Corp	KPI 1: CO ₂ emissions intensity in the supply chain	CO ₂ emissions intensity in the supply chain: 20% reduction (compared with the year 2000)	JPY 10 billion (USD 100 million) Transition-linked loan
	KPI 2: Domestic CO ₂ emissions	Domestic CO ₂ emissions: 40% reduction (compared with 2000)	
UltraTech	KPI 1: scope 1 CO ₂ emissions per tonne of cement	Reduction of Scope 1 emissions, (kg CO ₂ /t cement), by 27% by 31 March 2032, vs 2017	USD 500 million sustainability-linked loan
	KPI 2: % green electricity consumption	85% green electricity (waste heat recovery system, solar and wind) by 2030, 100% by 2050	
Cemex	KPI 1: Net carbon dioxide emissions per tonne of cement; KPI 2: Clean electricity (%) KPI 3: Alternative fuels (%)	Scope 1 CO ₂ emission reduction by 47% (from a 1990 baseline) by 2030; net zero CO ₂ by 2050	USD 3.25 billion sustainability-linked loan
Limak	KPI 1 Scope 1 and 2 GHG intensity	2030 GHG intensity target of 570 kg CO ₂ -eq per tonne of cement GHG intensity (24.8% reduction)	
Holcim	KPI 1 Scope 1 and 2 GHG emissions intensity reduction	Scope 1 2030 intensity target – 420 kg CO ₂ -eq per tonne of cement (22.4% reduction vs 2018) Scope 2 reduction of 65% by 2030 compared with 46 kg CO ₂ /t cement 2018 baseline	Sustainable finance instruments account for 40% of all financing
TCC Group Holdings	KPI 1 Scope 1 and 2 GHG emissions reduction based on Science Based Targets initiative targets	26.8% reduction of GHG emissions for plants in Chinese Tapei and China by 2030 vs 2016 base year 22% reduction of Scope 1 and 2 by 2030 vs 2022 base year in Cimpor Portugal 23% reduction of Scope 1 and 2 vs 2021 base year Oyak cement in Türkiye	Sustainability-linked convertible bonds TWD 8 billion (USD 265 million); Sustainable and green finance lines TWD 151 billion (USD 5 billion)

Sector / Company	KPI	Target	Instrument
Steel			
Arcelor-Mittal	KPI 1 – Scope 1 and 2 CO ₂ -eq intensity of global and European activities KPI 2 – Number of facilities certified by ResponsibleSteel	Carbon neutrality by 2050 25% global (steel and mining) CO ₂ -eq intensity reduction and 35% in Europe (steel only)	Sustainable-linked loan (USD 5.5 billion revolving credit facility) adopted April 2021 to December 2024
JFE Holdings	KPI – CO ₂ intensity reduction	30% intensity reduction by 2030 Carbon neutral by 2050	Transition bond (use of proceeds) – JPY 30 billion (USD 260 million)
U.S. Steel	KPI 1 – Carbon reduction KPI 2 – number of facilities certified by ResponsibleSteel	Net zero carbon emissions by 2050	Sustainability-linked credit facility USD 1.75 billion
SSAB	KPI 1 – Scope 1, 2 and 3 CO ₂ -eq emissions intensity reduction/t hot rolled steel KPI 2 – Scope 1 and 2 reduction for other CO ₂ -eq emissions KPI 3 – Scope 3 reduction for other purchases CO ₂ -eq	58.6% by 2033 (vs 2018) 63% by 2033 37.5% by 2033	Sustainability-linked bonds SEK 2.1 bn (USD 220 m)
POSCO	KPI 1 – Absolute emissions reduction KPI 2 - Electric arc furnace KPI 4a and b – direct reduction iron gas and direct reduction iron coal	30% reduction by 2035; 50% by 2050 and net zero by 2050 All electric arc furnaces are eligible 20% reduction if facility > 2 t CO ₂ /t steel and 15% reduction and 15% if < 2 t CO ₂ /t steel 20% (gas) and 40% (coal) intensity reduction by 2030	

Financial market and other initiatives

Established in 2021, the Net Zero Banking Alliance (NZBA) was a member-led initiative comprising 127 banks with total assets of USD 44 trillion across 44 countries. It was set up to support banks leading on climate mitigation in line with the Paris Agreement. Members contributed to the development of the NZBA Guidance for Climate Target Setting for Banks – Version 3 (UNEP, 2025), which contains a set of principles to help banks set credible, robust and ambitious targets that align with achieving net zero targets by mid-century to support the bank's clients in transitioning their businesses. The NZBA covers cement, steel and aluminium, among other carbon-intensive industry sectors.

The initiative released a summary of emerging practices for climate target setting for steel-sector financing (UNEP, 2024a) and also publishes an annual progress report (UNEP, 2024b) summarising targets set by its members. In the latest report, 66 banks disclosed financed

emissions and 52 members set decarbonisation targets for the iron and steel sector based on production intensity, with 13% setting an absolute emissions reduction target. Just over half required reductions in the range of 0-25% by 2030, while 40% required reductions of 26-50%. In the cement sector, 52 members disclosed financed emissions, of which 41 had set decarbonisation targets ($\text{tCO}_2\text{-eq/t cement}$ and 21% $\text{tCO}_2/\text{t cement}$) and another 22 reported no exposure to the sector. Almost all targets set were intensity based and aligned with a 1.5°C pathway.

The Science Based Targets initiative (SBTi) provides standards, tools and guidance for companies to set GHG emissions reductions targets (SBTi, 2025). It has developed 11 sector guidance documents to provide businesses with frameworks to help guide companies in setting their net zero targets, including for cement (SBTi, 2022) and steel (SBTi, 2023) companies. Most recently, SBTi has launched the Financial Institutions Net-Zero Standard to enable financial institutions to align capital flows with pathways to achieve net zero emissions by 2050. The Climate Bonds Initiative has prepared science-based guidance for the cement and steel sectors to help stakeholders identify companies, assets and projects that are aligned with a 1.5°C pathway consistent with the SBTi and Transition Pathway Initiative approaches.

2.2.3 *How transition finance can support future developments with KPIs*

Transition finance enables capital to flow towards investments that are important stepping stones to near-zero emissions technologies, which have not yet reached widespread commercial deployment in the steel and cement sectors. The long lifetime of steel plants and cement kilns (typically around 40 years) and investment cycles of around 25 years mean that investments made in the near-term need to consider future pathways and the integration of near-zero production routes when they become commercially available. Otherwise, investments in technologies or measures providing only incremental improvements could result in unrecovered capital in future assets.

As the transition progresses, near-zero emissions technologies become more widely available and costs decline, transition finance eligibility requirements should become more stringent – thus, transition finance will be most critical over the next decade. Ideally, targets would lay out trajectories for which investments will be eligible for finance, so that companies can prepare their future plans accordingly. Examples of transition investments include gas-based direct reduction iron with detailed plans for their transition to hydrogen and new cement kilns based on best available technology designed to ensure adequate space and technical capacity to be integrated with CCUS technology in the future.

In the APS, the global average emissions intensity in the steel sector falls by nearly 30% in 2035 relative to today, with total sectoral emissions falling close to 25%. This rises to a decline of over 40% in both intensity and absolute emissions under the NZE Scenario. For the cement sector, the intensity falls by 20% in 2035 in APS but it falls by more than 40% in the NZE Scenario, with absolute emissions falling by similar levels. While countries need to set

their own targets based on their own national circumstances, and each company's path differs depending on its existing asset portfolio and the conditions in which it operates, the global values provided by the IEA scenarios may serve as useful guideposts to put in context and compare the ambition of different transition plans.

Table 2.2 proposes a set of KPIs that can be used by the cement and steel sectors, financial institutions and governments to define suitable targets to determine whether certain investments align with pathways to meet the Paris goal and hence whether they are suitable for transition finance. As the pathways towards near-zero emission technologies in these two sectors depend on different country and company circumstances, the actual values could be set by each government or tailored by the company. Meanwhile, the use of similar indicators could enable interoperability and comparability between different sets of transition finance guidelines.

Table 2.2 ► KPIs for iron and steel and cement sectors

Sector	KPI
Iron and steel	- Emissions intensity: Scope 1 and 2 CO₂ emissions per tonne of crude steel (t CO₂/tCS) by production routes (Scope 3). - Absolute emissions: total emissions in Scope 1 and Scope 2 emissions (Scope 3 possibly) by company, plants and products. - Detailed reduction plans in Scope 1, 2 and 3 emissions due to technology changes at asset, production route and corporate levels (t CO₂-eq and t CO₂-eq/tCS); at the asset-level, future emissions should be assessed for duration of the period to recoup the investment, to avoid the lock-in of emissions and investments that would not be compatible with future milestones in transition plans. - Near-zero emissions capability, i.e. adequate space and technical considerations for future conversion to near-zero emissions production. - Investment in near-zero emissions technology research & development (R&D) and demonstration, on a clear path to bring needed technologies to market in the required timeframe. - Near-zero emissions capacity added.
Cement	- Emissions intensity: Scope 1 and 2 CO₂ emissions per tonne of cement and/or clinker (t CO₂/t) (Scope 3 where possible). - Absolute emissions: total emission in Scope 1 and Scope 2 emissions (Scope 3) by company, plant level and product level. - Detailed reduction plans in Scope 1, 2 and 3 emissions due to technology changes at asset, production route and corporate levels (tCO₂-eq and tCO₂-eq/t); at the asset-level, future emissions should be assessed for the duration of the period to recoup the investment, to avoid lock-in of emissions and investments that would not be compatible with future milestones in transition plans. - Near-zero emissions "capability", i.e. adequate space and technical considerations for future conversion to near-zero emissions production. - Investment in near-zero emissions technology R&D and demonstration, on a clear path to bring needed technologies to market in the required timeframe. - Near-zero emissions capacity added.

2.3 Critical minerals

Demand for key energy minerals – copper, lithium, nickel, cobalt, graphite and rare earth elements – is set to grow rapidly across all scenarios, increasing 2.5-fold in the APS by 2040. Lithium demand sees the most dramatic rise, growing sixfold by 2040, while graphite demand increases by threefold and nickel, cobalt and rare earth elements demand grow by 75% over the same period. Copper sees a 40% demand growth by 2040 and it also sees the largest absolute volume growth as it is the material with the largest established market.

This surge in demand is driven mainly by the deployment of energy technologies, as these minerals are all essential components of batteries for electric vehicles and energy storage systems, as well as renewable energy and related infrastructure. In the APS, energy technologies account for 70% of total demand growth for these minerals, with their share of total demand rising from 30% to over 80% by 2040. The increasing reliance on these minerals for energy systems underscores their importance as key enablers of clean energy investments.

At the same time, the extraction and processing of minerals has adverse environmental impacts that require mitigation. These include not only GHG emissions but also high water use, land use and degradation, and biodiversity loss from mining and processing operations, among others. Social issues are also pervasive, ranging from human rights violations such as forced and child labour, particularly in artisanal and small-scale mining, to failure to engage local communities and Indigenous Peoples in decision-making and benefits sharing. Governance challenges, including weak regulatory environments and corruption in some jurisdictions, exacerbate these risks. While similar challenges that are not emissions-related can also arise in other sectors, extractive industries and especially the mining industry have historically been associated with these additional adverse impacts, making it crucial to include them in transition finance discussions. Given that new and existing mineral projects will be necessary to meeting rising demands from energy technologies, prevention and mitigation of these impacts is not only essential for sustainable and responsible mineral development; but it is also a key way to ensure reliability and resilience.

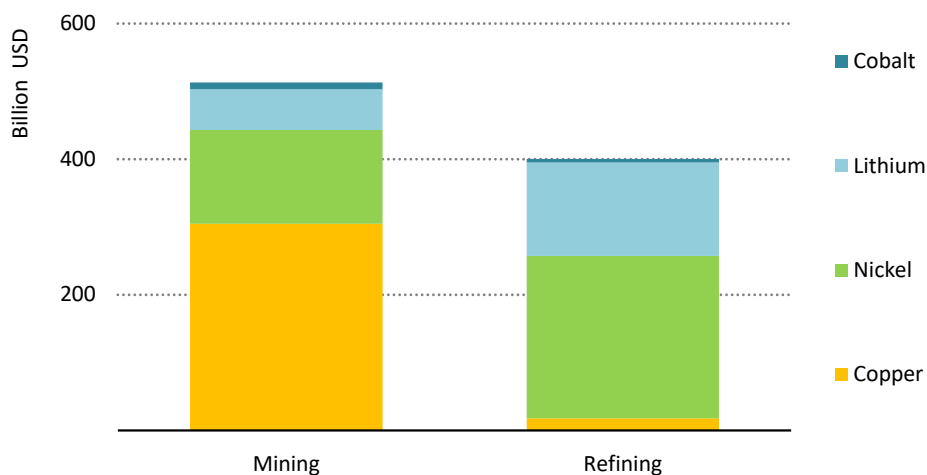
The environmental and social challenges associated with critical minerals vary across different segments of the value chain and between minerals. For example, land use and biodiversity loss are particularly acute in the mining stage and are more significant for minerals such as nickel than for lithium. In contrast, refining, which relies on energy-intensive industrial processes, typically has a much higher GHG emission intensity than mining. On average for copper, nickel and lithium, refining exhibits a CO₂ intensity that is more than two times greater than mining. This difference also varies substantially between minerals; nickel, the most emissions-intensive mineral, has a CO₂ intensity that is four times higher than the second most emissions-intensive mineral (i.e. cobalt for mining and lithium for refining). However, the CO₂ intensity varies widely depending on the deposit type and the processing route, with laterite high-pressure acid leaching processing having significantly lower emissions than rotary kiln electric furnace processes.

2.3.1 Finance needs for mining and refining

Existing and announced supply projects highlight varying degrees of supply gaps by 2040 under the APS, highlighting the need for significant investment in new mines and refineries to expand the supply of materials. Under the APS, approximately USD 915 billion in new capital investment is required for mining and refining between now and 2035 (Figure 2.4). For mining, copper accounts for the largest share of these requirements, at around USD 305 billion, but across both mining and refining, nickel faces the most substantial investment needs at almost USD 380 billion. These requirements span multiple regions and encompass both brownfield expansions and greenfield developments. This reflects not only the scale of demand growth but also rising capital intensity for new projects, driven in part by declining ore grades, particularly in more mature markets such as copper.

Additional capital will be needed to implement practices and technologies that mitigate the environmental and social impacts associated with mining and refining. While a range of financing approaches may be considered, transition finance can play an important role by supporting the projects that already mitigate such impacts or that plan to implement mitigation measures to ensure sustainable and resilient critical mineral supply chains.

Figure 2.4 ▶ Cumulative investment for critical mineral production in the APS, 2026-2035



IEA. CC BY 4.0.

In the APS, around USD 915 billion in mining and refining investment is required by 2035.

Nickel refining offers a useful illustration of how much investment could qualify for transition finance. Approximately 78% of global nickel refining takes place in Indonesia, which relies heavily on both fossil-fuel-heavy power mixes and energy-intensive processes such as rotary

kiln electric furnaces. This results in an average CO₂-eq intensity of almost 80 tCO₂-eq per tonne of nickel for refining, highlighting the importance of shifting towards low-emissions alternatives. Applying an indicative threshold of 4 t CO₂-eq per tonne of nickel (Scope 1 and 2), as used by the Australian Sustainable Finance Taxonomy (see below), shows that approximately 7% of current nickel production meets this threshold. An additional 4% qualifies by demonstrating potential for at least a 10% reduction in emissions intensity between now and 2030. Together, this suggests that around USD 40 billion in nickel refining investment, or roughly 20% of total projected investment needs, could be eligible for transition finance.

2.3.2 Recent developments in finance or other relevant activities

Given the historical adverse impacts of mining and refining, these activities have largely been excluded from green and transition finance frameworks that direct funding towards decarbonisation goals, whether in taxonomies, financial standards or multilateral development bank (MDB) policies. Recently, however, there has been growing recognition that funding is needed both to scale up mining and refining to meet rising material demands and to mitigate the adverse impacts that are associated with these activities.

Taxonomies and standards

Australia's Sustainable Finance Taxonomy (Australian Sustainable Finance Institute, 2025), launched in June 2025, is the first sustainable finance taxonomy to explicitly include mining and refining within its framework. Its aim is to facilitate green financing, including green bonds, for mining companies and related activities. Under this taxonomy, economic activities and entities are classified as "green" if they are already aligned with net zero targets or as "transition" if they are on a credible pathway towards net zero. The taxonomy covers mining activities for key critical minerals, including lithium, nickel and copper and their refining. The green criteria are primarily based on an absolute or percentage reduction in emissions intensities that aligns with a credible net zero pathway, among other requirements, with thresholds tailored to the specific characteristics and challenges of each mineral. Transition finance criteria are primarily based on a defined set of decarbonisation measures, focusing on significant levers for emissions reduction and directly eligible capital investments that support decarbonisation.

Although mining and refining activities are not currently covered under the EU Sustainable Finance Taxonomy, growing recognition of the critical role of minerals in energy technologies has prompted the Platform on Sustainable Finance, an advisory body to the European Commission, to recommend their inclusion. In its independent report on advancing sustainable finance, the Platform reviewed and proposed amendments to the technical screening criteria under the Climate Delegated Act adopted in 2021 (Platform on Sustainable Finance, 2025). The draft criteria, if adopted, would allow certain mining and refining activities to qualify as sustainable, provided that the end-use supports energy transitions. To be considered to make a substantial contribution to climate change mitigation, activities

must meet requirements such as reducing lifecycle emissions and waste, protecting and restoring biodiversity, increasing the use of renewable energy and adhering to high social and environmental standards. These standards vary by mineral and by stage of the value chain.

Multilateral development bank policies

MDBs also see a parallel trend of reassessing whether mining and refining industries fit within climate finance frameworks, particularly in cases where the product directly enables clean energy investment. The *Common Principles for Climate Finance Tracking* (EIB, 2023), released in December 2023 by 11 MDBs, consist of a set of definitions and guidelines and list eligible activities to be used by MDBs in their tracking and reporting of climate change mitigation finance. Under the Principles, mining and refining activities are conditionally eligible for climate finance when they support the production of minerals that are critical for clean energy technologies. Eligibility depends on the end-use of outputs, and projects must commit to long-term decarbonisation strategies, including renewable energy integration, energy and resource efficiency improvements and, where feasible, recycling of waste and process residues. Recycling activities are additionally eligible if they deliver substantial emissions reductions.

The European Bank for Reconstruction and Development (EBRD) is one of the few multilateral development banks with a dedicated framework for mining and refining. Its *Mining Sector Strategy (2024-2028)* provides clear guidelines for supporting projects that align with transition objectives, with a strong focus on renewable energy integration, energy and resource efficiency, and improved environmental and social performance (EBRD, 2024). Other multilateral development banks offer guidance, technical assistance and climate finance support for mining activities that are aligned with climate goals, such as the Asian Development Bank (ADB) and the World Bank Group through its Climate-Smart Mining Initiative and through the International Finance Corporation's (IFC) project financing, but do not have standalone frameworks that explicitly define how these activities qualify.

2.3.3 How transition finance can support future developments with KPIs

Transition finance for critical minerals mining and refining refers to capital directed towards projects that either already mitigate their impacts or require financing to implement such measures. This approach is essential to ensure the rapid scale-up of mineral supply for energy technologies does not come at the expense of environmental integrity or social well-being.

KPIs can help identify and track the alignment of mining and refining activities with transition objectives. While KPIs should vary by mineral and supply-chain stage, they could broadly cover emissions intensity (absolute thresholds and percentage reduction), renewable energy use, energy efficiency, water and waste management, biodiversity protection and social performance. Social aspects, such as adherence to human rights and labour laws, are more challenging to assess, but adherence to or alignment with existing voluntary standards could be leveraged.

In the mining sector, a range of voluntary standards have emerged in response to investor and market pressures to address operational and reputation risks that could provide a starting point for identifying KPIs relevant to transition finance. Standards such as the Copper Mark, the Initiative for Responsible Mining Assurance and the International Council on Mining and Metals and Towards Sustainable Mining offer robust methodologies for evaluating environmental and social practices. However, variations in scope, methodology, stringency, assurance mechanisms and uptake make it difficult to use these standards as a consistent basis for transition finance. Many of them also lack quantitative thresholds (e.g. specific emissions limits or safety benchmarks) or apply differing approaches to similar indicators, complicating their use in KPI development. For refining, the landscape is even less mature. Standards such as the Responsible Minerals Assurance Process, the Copper Mark's extension to smelters and the London Metal Exchange's Responsible Sourcing requirements focus mainly on due diligence and traceability rather than on specific criteria for assessing performance. A combination of leveraging existing voluntary standards and insights from frameworks such as Australia's Sustainable Finance Framework or the EU Platform on Sustainable Finance could help inform transition finance KPIs for both mining and refining.

Transition finance can help cover the upfront and ongoing costs of impact mitigation. In mines, this could include transitioning vehicle fleets to battery-electric models, installing conveyors or trolley assists to reduce haulage emissions, deploying more efficient equipment (e.g. best-in-class electric motors) and expanding the use of renewable energy such as wind and solar photovoltaic. Other investments may involve carbon removal offsets, energy storage solutions and process optimisation (e.g. ore sorting, AI-driven operations, mine-to-mill). For refining, improvements could include switching to renewable electricity where feasible, enhancing energy efficiency and adopting to non-fossil-fuel reductants and reagents. Addressing broader environmental and social impacts, such as implementing practices to adhere to and address human rights concerns, worker safety processes and improvements in gender equality, also requires significant capital investment.

However, even with access to capital, constraints may limit the implementation of mitigation measures. These include grid connectivity challenges, particularly for off-grid operations in remote locations without access to low-emissions energy sources, and the substantial land requirements of mining and refining activities. For refiners, the long lifespans of industrial plants can slow transitions away from inefficient processes, and physical constraints such as ore grade may limit energy efficiency gains. A combination of absolute and relative (reduction-based) KPIs may offer the most pragmatic approach to accommodate these hurdles; see Table 2.3.

Table 2.3 ► KPIs for the critical minerals sector

Part of supply chain	Type of indicator	KPI
Mining	<i>Emissions</i>	- Emissions intensity: Scope 1 and 2 CO₂ emissions per tonne of crude steel (t CO₂-eq/tCS) by production routes (Scope 3). - Scope 1 and 2 GHG emissions per tonne of mined material (and including Scope 3 if possible) (t CO₂-eq/t of mined material) - Thresholds will differ depending on mineral as they differ in their average intensities, e.g. cobalt mining has an average Scope 1 and 2 intensity of 18 t CO₂-eq /t of cobalt, while lithium brine mining has an intensity of 2.7 t CO₂-eq/t of lithium - Absolute Scope 1 and 2 GHG emissions (and including Scope 3 if possible) (t CO₂-eq) - Projected reduction in emissions - Energy efficiency in mining operations (kWh/t of output)
	<i>Other environmental</i>	- Land use impact, e.g. land area rehabilitated (annual and cumulative, m²) - Biodiversity impact, e.g. hectares successfully restored or rehabilitated (annual and cumulative) - Tailings (kt) - Mine waste, e.g. total mine waste (kt) or hazardous waste generation (kt) - Water use, e.g. total water withdrawals (GL), total water consumption (GL) or water efficiency (reuse/recycle) (%)
	<i>SDG-related indicators</i>	- Adheres to human rights laws, including but not limited to prohibiting child labour - Worker safety - Adherence to standards, e.g. Initiative for Responsible Mining Assurance, the Copper Mark or others.
Refining	<i>Emissions</i>	- Scope 1 and 2 GHG emissions per tonne of refined material (and including Scope 3 where material) by production route (t CO₂-eq/t of refined material) - Thresholds will differ depending on mineral as they differ in their average intensities, e.g. nickel refining has an average Scope 1 and 2 intensity of 49 t CO₂-eq/t of nickel, while lithium refining has an intensity of 9 t CO₂-eq /t of lithium - Thresholds will differ depending on production route, e.g. nickel processing through rotary kiln electric furnace has an average 60 t CO₂-eq /t vs 19 t CO₂-eq /t for laterite high-pressure acid leaching - Absolute Scope 1 and 2 GHG emissions (and including Scope 3 where material) (t CO₂-eq) - Projected reduction in emissions - Energy efficiency in refining operations (kWh/t of output)
	<i>SDG-related indicators</i>	- Adheres to human rights laws, including but not limited to prohibiting child labour - Worker safety

2.4 Natural gas

Some elements of the global energy system are evolving rapidly, but natural gas is set to remain an important part of the global energy mix for many decades. In the APS, gas demand rises in several regions that currently rely heavily on coal and face rapid growth in energy demand, before plateauing or declining as cleaner alternatives expand. This trend is most evident in EMDE including India and countries in Southeast Asia and Africa. In other countries, natural gas demand falls in the APS but it continues to support a diversified energy mix and energy security. In both cases, maintaining and upgrading gas equipment and infrastructure is important to strengthen supply resilience and diversify import routes while helping to reduce emissions in line with announced pledges.

Natural gas is a fossil fuel responsible for more than 20% of energy-related CO₂ and methane emissions today, and investment in natural gas needs to be carefully calibrated within the context of broader transition strategies. Natural gas can deliver low-emissions energy – for example, if supply-chain emissions (such as methane emissions) are kept at very low levels and if CCUS is used with it – in which case it may qualify for green financing. Where it delivers partial emissions reductions, the question shifts to whether it should instead be considered under transition financing initiatives. Any such role must be consistent with a system looking to achieve net zero emissions by a certain date, but the applicability of transition finance for gas equipment and infrastructure will still vary by country, sector and over time.

The treatment of natural gas in sustainable finance frameworks – such as those in the European Union and Canada – is a subject of much debate. In cases where clean energy cannot yet be deployed at the scale needed, natural gas can play a role in the transition away from coal and oil. In power systems, investment in gas-fired generation can also support electricity security by offering dispatchable capacity that can ensure the reliable operation of power systems with rising shares of variable renewables, especially to counter the seasonal variability in their output. However, this is a complex landscape and defining the hurdles that gas-related investment must clear to fit with longer-term emissions reduction goals requires a detailed assessment of the availability and cost-effectiveness of alternative fuel and technology options.

2.4.1 *Investment to reduce emissions from the natural gas supply chain*

One essential element for gas to play a role in transition strategies is to minimise emissions from production, processing and transport of natural gas. These emissions come from various sources along gas supply chains. Extracting gas from the subsurface requires large amounts of energy to power drilling rigs, pumps, other process equipment and provide heat. Gas undergoes processing to separate natural gas liquids and remove impurities such as CO₂, hydrogen sulphide and sulphur dioxide. It is then transported, often over long distances, by both pipeline and by ship, and these processes are also a significant source of GHG emissions.

There are also multiple potential sources of fugitive and vented methane emissions along the gas supply chain. We estimate that upstream natural gas operations caused around

21 Mt of methane emissions in 2024 while natural gas transport caused just under 8 Mt. This is equivalent to 0.86 Gt CO₂-eq in total. Solutions to reduce methane emissions include upgrading equipment that emits by design, such as replacing wet compressor seals with dry seals, using vapour recovery units to recover low-pressure methane flows and deploying regular or continuous leak detection and repair programmes. Methane abatement in the oil and gas industry is one of the cheapest options to reduce GHG emissions because abatement measures generate revenues from the sale of captured methane. Around USD 2.4 billion in annual investment spending is required to cut methane emissions by 75% by 2050 in the APS.

Oil and gas companies carry primary responsibility for deploying abatement measures. However, additional sources of finance can help catalyse private investments where companies may not be willing or able to invest at the levels needed. This includes, for example, investment in low- and middle-income countries (especially those without strong methane reduction policies and regulations), investment at facilities owned and operated by national oil companies and smaller independent companies, and funding for measures that do not generate meaningful return over their lifetimes.

Another important area requiring investment to reduce emissions from the gas supply chain relates to liquefied natural gas (LNG). Around 550 bcm of natural gas was transported as LNG in 2024 (just under 15% of global gas consumption) and LNG export capacity is set to grow by nearly 300 bcm in the coming years. There is a wide variation in the emissions intensity of different sources of LNG, but the global average GHG emissions intensity of delivering LNG is around 20g CO₂-eq/MJ (not including emissions from the combustion of the natural gas at the point of use), compared with an average of 12g CO₂-eq/MJ for natural gas supply overall.

In addition to reducing methane emissions, electrification of the liquefaction process using low-emissions electricity, implementation of efficiency improvements and CCUS, and elimination of routine flaring would reduce emissions from LNG. Recent IEA analysis has flagged that the upfront capital investment needed to implement electrification, methane reduction and CCUS at all viable facilities along the existing LNG supply chain is just over USD 100 billion (IEA, 2025b). Implementing these measures would avoid around 60% of total emissions of the LNG supply chain at a weighted average CO₂ cost of USD 40/t CO₂. Integrating such measures into new greenfield LNG projects as part in front-end engineering and design phase would likely cost less than retrofitting existing terminals.

GHG emissions from storage and pipeline transport are smaller than upstream and LNG, but targeted capital allocation remains important. It can fund upgrades to pipeline insulation and improve flow assurance (e.g. through pigging and drag-reducing agents). Storage facilities may also benefit from electrification, improved monitoring and pressure control systems that prevent venting during maintenance.

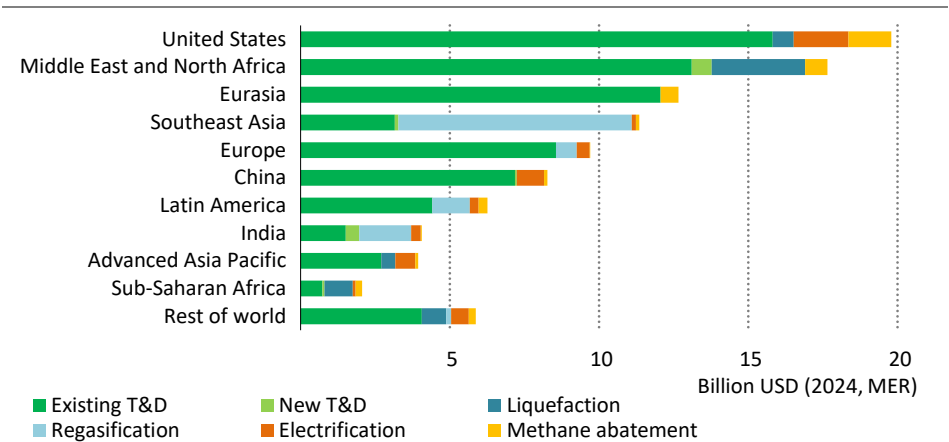
2.4.2 Investment in infrastructure and power generation

Storage, transmission and distribution

Natural gas demand declines globally in the APS but targeted investment in gas networks remains important for energy security and the integration of a greater share of low-emissions energy sources. Gas demand could become more volatile in some regions as the share of variable renewables rises, with periods of lower gas-fired capacity use followed by other periods when these plants are essential to electricity security. Investment in transport and storage infrastructure is needed to accommodate the changing roles of natural gas and avoid local spikes in demand disrupting energy security in other countries.

Global investment in natural gas infrastructure averages around USD 90 billion per year between 2026 and 2035 in the APS (Figure 2.5). Transmission and distribution gas networks make up the largest share, around USD 75 billion annually, mostly for maintaining and upgrading existing infrastructure. Careful co-ordination is required as these costs could fall on a shrinking customer base as users shift away from natural gas, driving up bills for those left behind, while vulnerable consumers face disproportionate affordability risks.

Figure 2.5 ▶ Average annual investment in natural gas infrastructure in the APS, 2026-2035



IEA. CC BY 4.0.

Gas network upgrades dominate global infrastructure needs, highlighting their continued role in energy security and to support increasing low-emissions energy sources to 2035.

Notes: Advanced Asia Pacific includes Australia, New Zealand, Japan and Korea. T&D = Transmission and distribution gas network. Figure 2.5 does not include investment in hydrogen infrastructure.

Well-designed investment in new and repurposed gas grids can also provide a platform for the deployment of low-emissions gases such as biomethane and, potentially, low-emissions hydrogen and hydrogen-based fuels. This would extend asset lifetimes and enhance

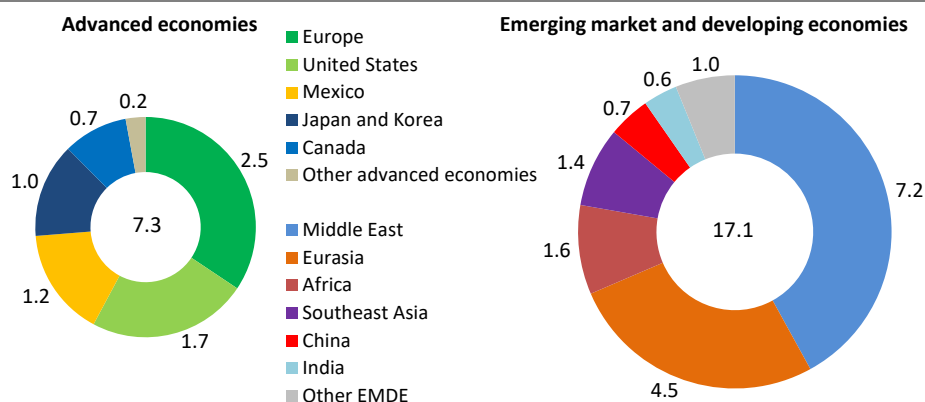
flexibility, but it also raises the risk of long-term carbon lock-in or higher network costs for consumers from stranded assets. Clear transition strategies and policies are needed to support future emissions reduction efforts or conversion.

Power sector

Even as the share of gas in global electricity supply declines from 22% in 2024 to 12% in 2035 in the APS, investment in gas-fired capacity declines but does not disappear. In advanced economies, electricity generation from gas falls by almost 60% by 2035, given the growing role of renewable electricity but installed capacity falls by less than a quarter over this period. This highlights the ongoing role of gas plants in providing flexibility and reliability during the transition, especially where electricity demand is marked by significant regional swings.

In EMDE, rapidly growing electricity demand means that gas use in electricity rises by around 15% to 2035 in the APS (even as its share in the electricity mix drops) and gas-fired capacity grows by 14% to 1 130 GW in 2035. The role of gas-fired power evolves over time, as alternative low-emissions dispatchable sources of generation and flexibility grow and become more competitive. In the APS, advanced economies see around USD 7.3 billion average annual spending on gas-fired electricity capacity to 2035, more than half of which takes place in Europe and the United States (Figure 2.6). In EMDE, over USD 17 billion is invested in gas capacity annually to 2035. The majority takes place in the Middle East and Eurasia, but there are sustained capital flows in the major importing countries, such as Indonesia, China and India where gas-fired power serves both to diversify the energy supply and to displace coal and oil generation.

Figure 2.6 ▶ Average annual investment in natural gas-fired generation by region in the APS, 2026-2035



IEA. CC BY 4.0.

Gas-fired power investment continues in the APS, but the scale differs significantly between advanced and emerging economies.

2.4.3 Recent developments in finance frameworks and policies

Taxonomies and other measures to set standards

Robust taxonomies and sustainability standards including technology roadmaps are essential for directing capital towards activities aligned with lowering emissions. Frameworks vary in their design and stringency, reflecting differing national circumstances and developmental stages, with very different approaches to financing and investment activities in natural gas.

The EU Taxonomy is one of the most stringent standards that exists today. Under the 2022 supplementary delegated regulation (European Commission, 2022), financing natural gas-fired power generation is categorised as a “transitional activity” only if certain conditions are met, including that the plant must emit less than 100 g CO₂-eq/kWh over its lifetime or that direct emissions must be less than 550 kg CO₂-eq/kW of installed capacity over a 20-year period. In the latter case, this means in practice that unabated gas-fired power plants (with an average combustion intensity of around 500 g CO₂-eq/kWh) must operate at an average load factor of less than 10% over their 20-year lifetimes. Additional conditions include the need to demonstrate that gas-related investments replace facilities using coal or oil and ensure a full switch to renewable or low-emissions gases by 2035, and that a regular independent verification of compliance be carried out.

The ASEAN Taxonomy for Sustainable Finance Version 3 (ASEAN Taxonomy Board, 2024) is a differentiated framework that allows for flexibility given the diversity in development of countries within the region. This includes a three-tiered system, with natural gas-fired power generation classified as “green” only if lifecycle emissions are below 100 g CO₂-eq/kWh. There are two “amber” categories: Until 2030, gas plants with emissions less than 425 g CO₂-eq/kWh may qualify as Amber Tier 2 and those less than 510 g CO₂-eq/kWh as Amber Tier 3. After 2030, the Amber Tier 3 classification will no longer be available. All tiers require continuous methane leak detection, reporting protocols and, where applicable, integration with CCUS. Gas-related infrastructure – such as pipelines and storage – are similarly assessed under explicit lifecycle GHG intensity thresholds. Multi-year carbon intensity tracking is mandatory across all tiers.

The Canadian government is creating a “Made-in-Canada” sustainable finance taxonomy to direct investments towards activities that facilitate the transition to a low-carbon economy (Government of Canada, 2024). This framework classifies investment according to eligibility criteria aligned with 1.5 °C pathways. A “transition” category is included that is designed to identify and support credible strategies for rapidly reducing emissions in emissions-intensive sectors such as natural gas. Activities include major emissions cuts from current natural gas production or limited expansion of existing facilities, although new natural gas production projects are expected to be excluded from the taxonomy.

Japan has taken a strategy-driven rather than a taxonomy-based approach (Government of Japan, 2023). Through its Green Transformation (GX) Plan, Japan promotes transition finance for hydrogen, ammonia and CCUS, and positions natural gas as a “transitional measure”. The

GX-ETS, a voluntary baseline-and-credit system (mandatory cap-and-trade system from 2026) that is a part of the GX Plan, and transition bonds aim to mobilise long-term capital while supporting energy resilience. The Japanese government has formulated 11 sector-specific roadmaps to outline concrete pathways for achieving net zero emissions by 2050 in high GHG-emitting industries. In the gas sector, the roadmap covers the technologies required domestically and anticipated technological developments including high-efficiency plants, co-firing with low-emissions fuels, and future fuel switching to achieve net zero emissions by 2050. The roadmap also draws technology pathways for carbon neutrality in the gas sector including synthetic methane and LNG supply chains, supporting the gradual decarbonisation of gas infrastructure within broader industrial policy.

Multilateral development bank policies

Multilateral development banks are playing a growing role in operationalising transition finance, particularly in countries where capital scarcity and infrastructure gaps remain barriers to clean energy investment. They have taken different and evolving positions on natural gas. Various multilateral institutions are also engaged in the use of transition finance to support the managed phase-out of coal-fired power (Box 2.2).

The World Bank decided in 2017 to halt new investments in upstream oil and gas projects after 2019, with exceptions considered only in extraordinary circumstances for upstream natural gas projects that enhance energy access in poorer countries. The organisation can support midstream and downstream natural gas investments, which involve transport, distribution and power generation, as well as methane and flaring reductions. More recently, at the Mission 300 Africa Energy Summit in 2025, the World Bank President has stated that the Bank is supporting investments in natural gas that support the just energy transition (World Bank Group, 2025).

The Asian Development Bank (ADB) finances gas infrastructure (except for exploration and drilling activities), considering gas a “transitional fuel that can support power system flexibility under specific circumstances” (ADB, n.d.). Projects must contribute to reducing emissions intensity, improving energy system flexibility or integrating intermittent renewables. The ADB supports transition finance through guarantees, technical assistance and risk-sharing instruments that unlock private capital.

Other multilateral development banks, including the European Bank for Reconstruction and Development (MirbabaevaNigina, 2023) and the African Development Bank (AfDB, 2012), adopt comparable conditional approaches. These banks emphasise that any gas financing should be explicitly tied to plans for emissions peaking and subsequent decline.

Box 2.2 ► Transition finance and the managed phase-out of coal

Reducing emissions from unabated coal-fired power plants will be an important contributor to global emissions reductions. According to IEA’s 2024 Report *Accelerating Just Transitions for the Coal Sector*, there are four major approaches to enable this

reduction: repurposing plants to provide load balancing services rather than baseload power; retrofitting coal plants with CCUS technologies; co-firing with low-emissions fuels such as ammonia or biomass; and retiring plants early and converting existing sites for low-emissions power (IEA, 2024). To reduce emissions through early retirement, alternative power sources need to be developed to meet growing electricity demand. In addition, it usually takes 20 to 30 years for coal-fired plants to recover the invested capital and, given that the plants in EMDE in Asia are on average under 15 years old, many have not yet recovered their capital investments. Therefore, innovative solutions are needed to enable plant owners to recoup their capital through alternative revenue models.

Managed phase-out has emerged in recent years as one of the approaches designed to accelerate emissions reductions from coal. The Rocky Mountain Institute published guidelines for financing a credible coal transition in 2021. The GFANZ described managed phase-out as one of the key transition strategies and issued guidance for financial institutions in 2022 and 2023. The Coal to Clean Credit Initiative (CCCI), announced by the Rockefeller Foundation and the Global Energy Alliance for People and Planet, developed the world's first carbon credit methodology. The company ACEN announced the world's first market-based Energy Transition Mechanism with CCCI and the Monetary Authority of Singapore (MAS) at the 28th Conference of the Parties (COP28).

The TRACTION initiative of the MAS aims to identify system-wide barriers and develop solutions for transition credits to be used as a credible tool. The Kinetic Coalition (former Energy Transition Accelerator), a buyer-seller coalition of carbon credits, focuses on developing markets for power sector decarbonisation in EMDE, including early coal retirements. To develop a managed phase-out scheme, several areas need to be addressed. Reliable credit methodologies and procedures that ensure an adequate demand for credits are essential, and the pilot projects that MAS announced in December 2023 provide a valuable opportunity to test the feasibility.

Under the ASEAN Taxonomy classification, managed phase-out is classified as “green” or “amber”, and other taxonomies will also need to ascertain the transition value of such investments. To foster a holistic approach to emissions reductions from coal, activities related to repurposing, retrofitting with CCUS and co-firing with low-emissions fuels such as ammonia or biomass might also be considered as part of a managed phase-out with the application of the robust methodology for measuring emissions reductions and the guardrails. The financing required for such initiatives could, when underpinned by credible guardrails and transition strategies, be supported through transition finance.

2.4.4 *How transition finance can support future developments with KPIs*

Transition finance is relevant for several investment activities in the natural gas sector. Broadly, these can be grouped into six key areas that would support direct emissions

reductions, the integration of low-emissions energy sources and socioeconomic development and energy security. The key areas are as follows:

- **Reducing the emissions intensity of natural gas supply:** On average, producing and delivering natural gas to consumers causes emissions of around 12 g CO₂-eq/MJ, while for LNG the value is around 20 g CO₂-eq/MJ. Transition finance can support the deployment of measures to reduce these emissions, such as leak detection and repair programmes, capturing and storing the CO₂ from gas processing, electrifying upstream and liquefaction operations using low-carbon electricity and eliminating routine flaring.
- **Integrating low-emissions gases:** Today's natural gas infrastructure can be leveraged to carry biomethane or repurposed to carry low-emissions hydrogen and hydrogen-based fuels. Biomethane is a drop-in substitute for natural gas, but gas networks may need to be retooled to accommodate more dispersed supply connecting to multiple points on distribution networks. In the case of hydrogen, major modifications might be required.
- **Reducing end-use emissions from natural gas:** Power plants or energy-intensive industries such as steel plants, can be equipped with CCUS, enabling reductions of up to 95% of the combustion emissions from natural gas. If paired with the use of biomethane, negative emissions could be achieved. Enhancing the efficiency of gas-burning equipment can also contribute to emissions reductions, although it is important to consider that such upgrades may also extend the lifetime of the asset.
- **Use of natural gas in place of coal or oil:** Nearly all natural gas produced today has a lower lifecycle emissions intensity than coal and oil. Transition finance can provide a route for natural gas assets to replace coal or oil under specific circumstances. To qualify for transition finance, investments would likely adhere to well-designed criteria to avoid carbon lock-in effects, and to demonstrate that emissions are actually reduced over the lifetime of the asset relative to a case where oil and coal assets continue to be used until the end of their technical lifetimes. It may also be necessary to demonstrate that direct switching from coal or oil to low-emissions sources (e.g. renewables) is not viable.
- **Use of natural gas to support power system flexibility:** This activity does not directly reduce emissions but rather changes the operating profile of natural gas power plants to support the integration of renewables. To qualify as a transition investment, the plant would need to serve the specific purpose of providing system balancing or ancillary services, rather than participating in wholesale or regulated markets as “baseload” sources of generation. Operating as peaking plants may not necessarily mean they qualify for transition finance.
- **Use of natural gas for energy access:** In certain contexts – such as densely populated areas or gas-producing EMDE where infrastructure and industrial demand align – natural gas can play an effective though limited role as a clean cooking fuel. This activity does not necessarily reduce emissions but is an important part of meeting socioeconomic development goals and therefore may be included in transition finance frameworks.

Regularly reviewed plans and transparent reporting foster accountability, ensuring that gas infrastructure serves as a genuine bridge towards a lower-carbon future.

Table 2.4 presents a non-exhaustive set of indicators that can help inform whether natural gas investment can be supported by transition finance frameworks.

Table 2.4 ► KPIs for the natural gas sector

Supply chain segment	KPI
Upstream emissions	• Methane emissions intensity (kg CH₄/MJ or % of marketed gas) • Elimination of routine flaring • GHG emissions intensity (kg CO₂-eq/MJ) • Share of production powered by clean electricity • Share of production with CCUS capacity
Liquefaction	• Methane emissions intensity (kg CH₄/MJ or % of marketed gas) • GHG emissions intensity (kg CO₂-eq/MJ LNG produced) • Energy intensity of liquefaction (kWh/MJ LNG produced) • Share of electricity from low-emissions source
Regasification	• Methane emissions intensity (kg CH₄/MJ or % of marketed gas) • GHG intensity (kg CO₂-eq/MJ LNG regasified) • Share of low-emissions gases, e.g. biomethane, in regasified output • Utilisation of wasted heat and cold energy
Transport	<i>Pipelines</i> • Methane emissions intensity (kg CH₄/MJ or % of marketed gas) • Integrity management processes in place (e.g. leak detection) • Electrification of compression stations <i>Shipping</i> • GHG intensity (g CO₂-eq/tonne-mile LNG transported) • Share of fleet with energy-efficient design (Energy Efficiency Design Index compliance) • Share of vessels that are dual-fuel or ammonia or methanol ready • Share of vessels equipped with methane slip reduction technologies
Gas-fired power plants	• GHG intensity (g CO₂-eq/kWh) • Load factor in system context (share of capacity used for peaking/flexibility vs baseload) • CCS capacity added (t CO₂ captured/year) • Co-firing with low-emissions fuels by target year • Role in coal or oil displacement (MW capacity replaced)
Gas utilities	• Methane emissions intensity (kg CH₄/MJ or % of marketed gas) • Share of low-emissions gases in grid (blending %) • Customer energy efficiency savings (gas demand reduction via efficiency programmes) • Scope 1 and 2 emissions reductions targets aligned with net zero by 2050 • Scope 3 emissions intensity (kg CO₂eq per customer or per unit gas delivered)

Financial institutions and transition finance

A complementary source of finance for transitions

S U M M A R Y

- Transition finance rests on a practical partnership between corporates and financiers. Successful transitions need finance that goes where the emissions are; this means moving beyond the top performers and working with corporates with material environmental footprints that commit to transition strategies. A common alternative strategy, in which financial institutions simply shift emissions off their balance sheets, creates “financial carbon leakage” and does not reduce real-economy emissions.
- An IEA survey of financial institutions revealed that differences in regional taxonomies and frameworks pose challenges for cross-border financing. At the same time, it highlighted the important role financial institutions already play through transition finance in engaging with clients to support transition efforts. The immediate challenges facing transition finance essentially break down into two issues: expanding financial flows and clearly establishing the distinguishing “transition” characteristic.
- Scaling financial flows requires a broader conception of value. Emerging market and developing economies face outsized investment needs but have relatively shallow capital markets, necessitating cross-border finance that respects region-specific pathways. Two participation gaps must be addressed: “left-out” actors (e.g. small and medium enterprises and capacity-constrained firms) that need supportive access, and “opt-out” actors with capacity but limited incentives to participate. Equivalence across taxonomies and recognition of transition finance’s contribution, rather than a narrow, near-term focus on financed emissions, are essential to unlock capital.
- The distinguishing “transition” characteristic hinges on strategies and robust follow-up. Sector-appropriate key performance indicators, retrofit-ready design and periodic reviews maintain integrity as technologies and policies evolve. A two-speed approach can balance rigour with inclusion, offering high-quality detail for large issuers and pragmatic pathways for smaller corporates and developing economies. Governments have a critical role in facilitating alignment for actors lacking detailed transition plans or strategies, including through national roadmaps, simplified frameworks and enabling mechanisms that support credible action even without full planning capacity.
- The role of transition finance could be reaffirmed to enable progress where decarbonisation is most difficult and urgent, engaging with real-world constraints rather than avoiding them. This implies the possibility of moving away from viewing transition finance as a “second tier” of green finance and positioning it as an equal “second pillar” of global financing for emissions reductions. Public and private actors could design supportive frameworks to scale transition investments, including the safeguards that can ensure that they make a lasting contribution to strengthen energy security and deliver meaningful emissions reductions.

3.1 Transition finance and the finance industry

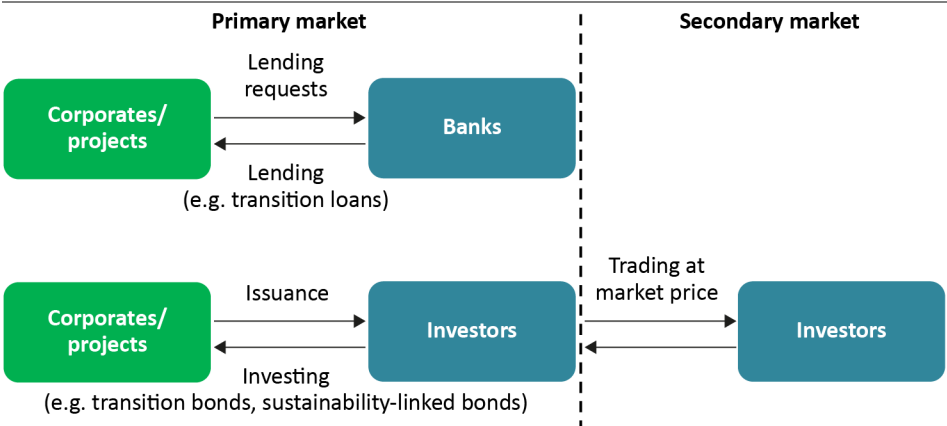
Transition finance can only be realised through a close partnership between corporates, finance industry, and governments, with each entity bringing expertise to the framework. This chapter focuses on the perspective of the financial industry, presenting their understanding of transition finance, the results of a survey of 23 institutions and an analysis of the key challenges currently facing the sector.

When assessing the impact of finance on energy investment, it is useful to distinguish between primary and secondary markets, and between direct and indirect finance (Figure 3.1). A primary market is where capital is raised for corporates or new energy projects. When corporates access capital markets directly, they may issue equities or bonds, including labelled instruments such as green, sustainability-linked, or transition bonds. Alternatively, when financing is obtained through banks as indirect finance, loans may be structured as green or transition loans. These forms of financing typically support the initial deployment of capital for new or transitioning infrastructure, retrofitting, managed phase out, or to cover the operating expenditures of corporates engaged in those activities.

A secondary market is where previously issued equities or bonds are traded among investors. While these transactions do not directly inject capital into the projects or issuing entities, they serve a critical role in price discovery and signalling. For example, if a corporate that engages in credible transition activities is rewarded through a rising stock price or declining bond yield, this can improve its future access to capital and enhance the attractiveness of its transition efforts.

Understanding this financial mechanism and the distinction between primary and secondary markets is essential for appreciating the fundamental value of transition finance. To achieve effective progress in emissions reductions, it is crucial to expand primary-market financing, enabling the financing of new projects or real-world assets by project developers. Secondary markets can support this by facilitating price discovery, improving liquidity, using engagement and stewardship as a way to promote transition efforts, and enhancing the attractiveness of future primary issuances. Because financial institutions exist to provide capital across various sectors, not only to a single industry, transition finance aligns with their core function. By responding to varied funding needs, institutions can meet public interest objectives, sustain their businesses and strengthen overall energy security and decarbonisation progress.

Figure 3.1 ▶ Different roles of primary and secondary markets



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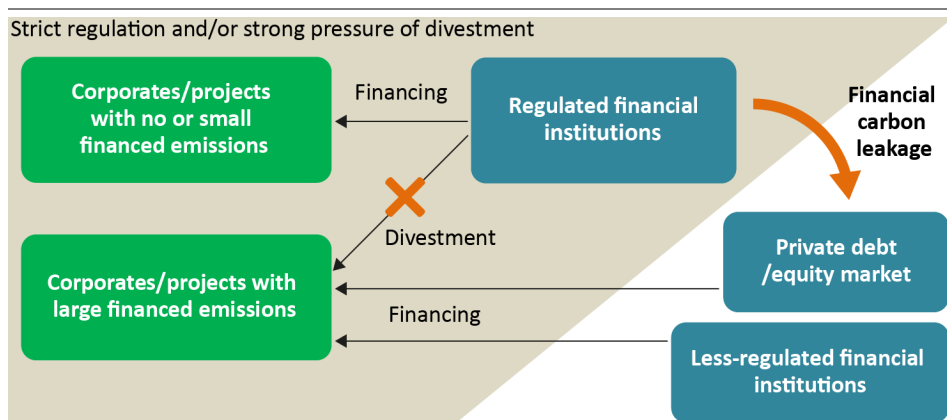
Primary markets are essential for financing energy projects and corporates, while secondary markets play a role in price discovery and signalling to support investment.

Note: Although it is smaller in scale compared with bonds and equities, a secondary loan market does exist, and in some cases loan syndications are also considered part of secondary activity. However, given their relatively limited size and their differing functions in terms of price discovery and signalling, these transactions are not included in figure 3.1.

Investments in projects that will be worth implementing regardless of how the market develops (known as “no-regret” projects) and that fully meet green criteria are valuable. However, when considering the transformation and development of the entire energy system, it is not enough to concentrate financing only on the leading corporates in a sector. It is equally important to include all active firms that are sincere in their efforts to move to a more sustainable footing, including corporates with large emissions, which often struggle to access green finance and risk delaying transition action due to lack of financing. Ensuring that no group is left behind through inclusive transition finance protects the integrity of institutions’ portfolios and accelerates national-level decarbonisation.

An overly rapid divestment from hard-to-abate sectors risks triggering financial carbon leakage. This is when overly strict regulations, narrow definitions of Paris Agreement alignment and unclear or implausible transition pathways for hard-to-abate sectors lead to divestment and capital shifting to less-regulated regions or markets, such as private debt and equity markets, which are harder to monitor (Figure 3.2). Financing hard-to-abate sectors and engaging them in credible emissions reduction pathways is a vital process and financial institutions are uniquely positioned to play a proactive role in this effort. With their capacity to integrate client engagement, investor disclosure and advanced risk management, they can support decarbonisation across the portfolios of hard-to-abate sector corporates by deploying transition finance. Avoiding financial carbon leakage and promoting emissions reductions requires an engaged approach rather than exclusion.

Figure 3.2 ▶ Financial carbon leakage



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Financial carbon leakage may falsely signal emissions progress despite unchanged real-economy emissions and weakening engagement, potentially delaying transition.

SPOTLIGHT

How are financial institutions positioning themselves on decarbonisation and transition finance?

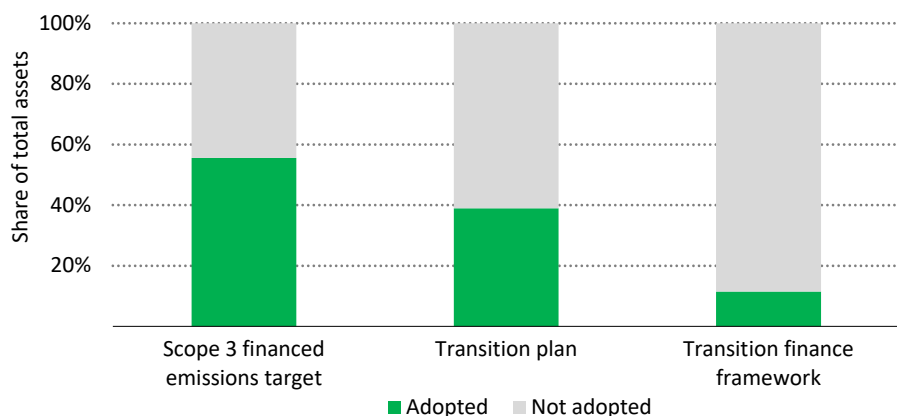
The finance industry, particularly major global financial institutions based in advanced economies, has engaged in different ways with energy transitions. Collective efforts have ebbed and flowed, notably with the rapid expansion of the Net-Zero Banking Alliance before multiple institutions withdraw in 2024 and 2025, leading the organisation to announce in October 2025 that it will cease operations. However, most financial institutions continued to pursue their climate-related targets independently.

Several of the institutions that exited the Alliance remain active in initiatives that focus on mobilising capital and implementing transition finance solutions. This repositioning underscores the potential for transition finance to serve as a bridge between ambition, practicality and action in a more complex policy and market environment.

Currently, the number of banks that have established their own transition plans is increasing, and although fewer in number, a growing share of banks are also establishing dedicated transition finance frameworks (Figure 3.3). Based on an analysis of the top 50 banks globally by market capitalisation, around 40% of assets were held by banks with a published transition plan while about 10% were linked to banks with a defined transition finance framework. Commitment to achieve net zero across Scope 3 activities was most widely adopted by banks: 33 banks, representing nearly 60% of total assets have set targets to achieve net zero Scope 3 emissions, typically by 2050. This outcome indicates that progress in the adoption of climate measures among banks is encouraging, yet it also

highlights the need to remain attentive to potential unintended consequences such as financial carbon leakage. At the same time, it underscores the importance of further strengthening efforts to mobilise transition finance.

Figure 3.3 ▶ Adoption rate of climate-related measures among the top 50 global banks, by share of total assets



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Progress in adopting financed emissions targets is noteworthy, while also highlighting the need to remain vigilant against potential unintended financial carbon leakage.

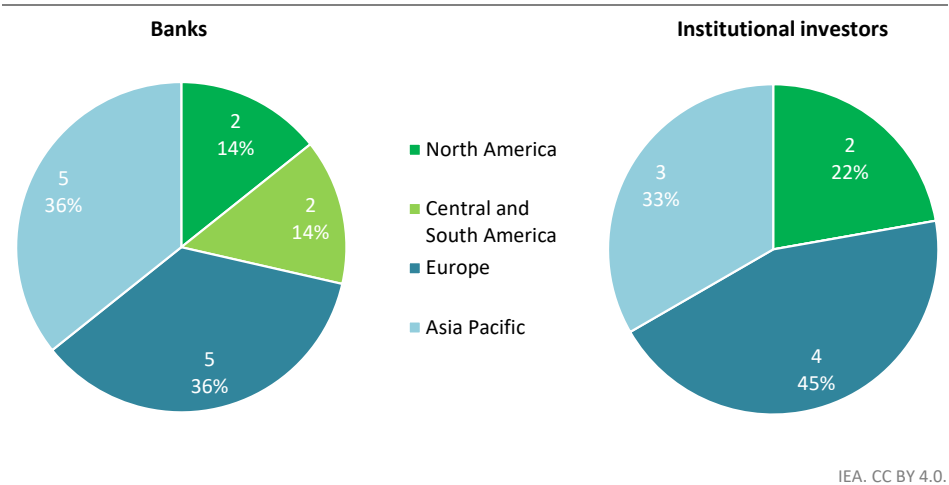
Notes: The top 50 banks are based on market capitalisation as of the end of December 2024.

Source: IEA analysis based on data from S&P Capital IQ and financial institutions' corporate reports.

3.2 Results of the IEA Transition Finance Survey

To better understand how financial institutions are approaching transition finance, the IEA conducted interview-based surveys with diverse range of financial institutions, 14 banks and nine institutional investors, between June and September 2025 (Figure 3.4). These discussions provided valuable insights into the development of internal frameworks, investment decision-making processes, risk assessments and approaches to aligning capital with long-term transition goals.

Figure 3.4 ▶ Characteristics of IEA Transition Finance Survey respondents

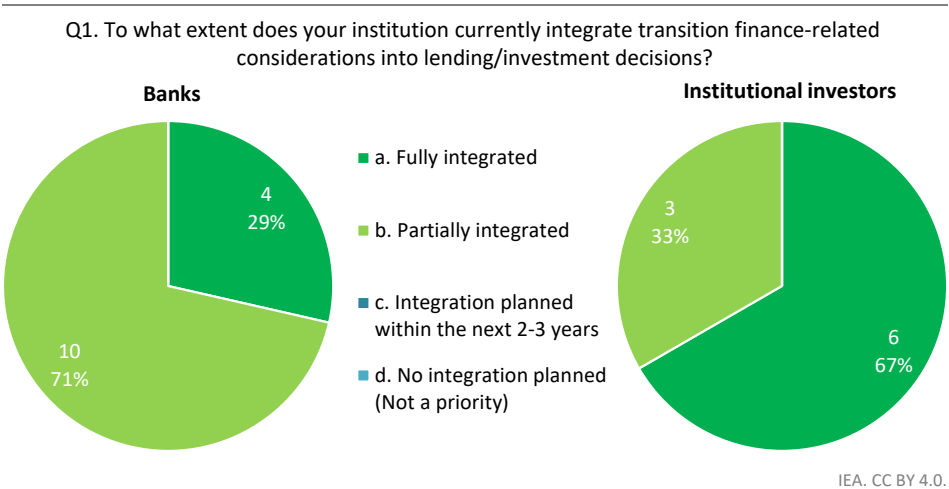


The survey conducted by the IEA gathered responses from banks and institutional investors across a broad range of regions worldwide.

Note: The IEA interviewed 14 banks and nine institutional investors across regions.
Source: IEA analysis based on interviews with financial institutions.

Most surveyed financial institutions reported that they have already integrated some elements of transition finance consideration into their operational frameworks, reflecting a relatively advanced level of institutional readiness (Figure 3.5).

Figure 3.5 ▶ Transition Finance Survey for financial institutions, Question 1



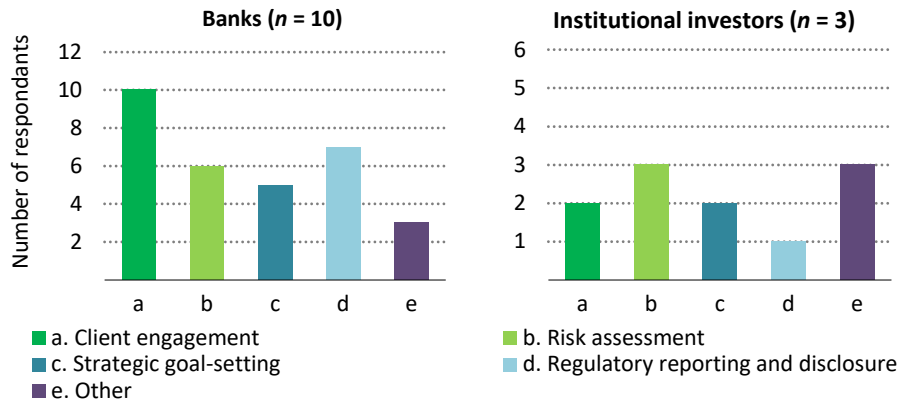
Many financial institutions have linked transition finance considerations to their decisions.

Source: IEA analysis based on interviews with financial institutions.

However, the integration process continues to face a range of challenges, including the need to ensure clear communication and obtain buy-in from clients, address regulatory differences across jurisdictions and align with internal functions such as risk management and strategy planning (Figure 3.6).

Figure 3.6 ▶ Transition Finance Survey for financial institutions, Question 2

Q2. Please indicate the main challenges you currently face or anticipate in fully integrating transition finance considerations into lending/investing decisions (multiple choices)



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The survey findings also highlight that integration involves a wide range of challenges.

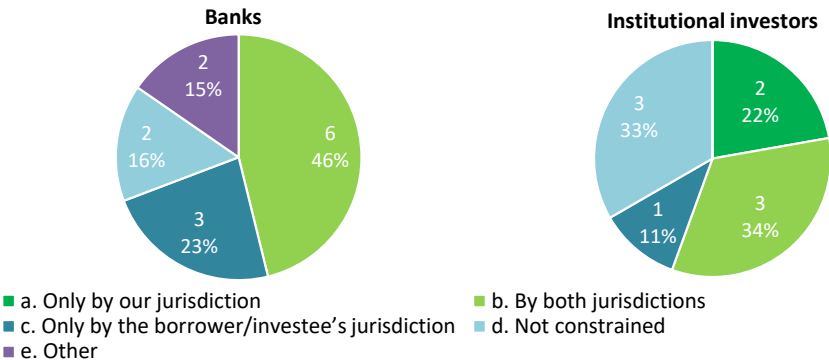
Note: Question 2 was answered only by institutions that selected option b or c in Question 1.

Source: IEA analysis based on interviews with financial institutions.

The third question aimed to assess whether the often-cited concern of interoperability of taxonomies (i.e. that differences in taxonomies or sustainability-related initiatives across jurisdictions can hinder activities) is reflected in practice. The responses confirmed that many financial institutions are indeed influenced by both the taxonomy of their own jurisdiction and that of the region in which the investment or lending takes place (Figure 3.7). Additionally, the survey also revealed that some entities are either less affected by taxonomy-related constraints or have internal decision-making processes that integrate and reconcile regional differences.

Figure 3.7 ▶ Transition Finance Survey for financial institutions, Question 3

Q3. To what extent are your lending/investing activities constrained by sustainability/transition criteria from your jurisdiction and/or the borrower/investee’s jurisdiction?



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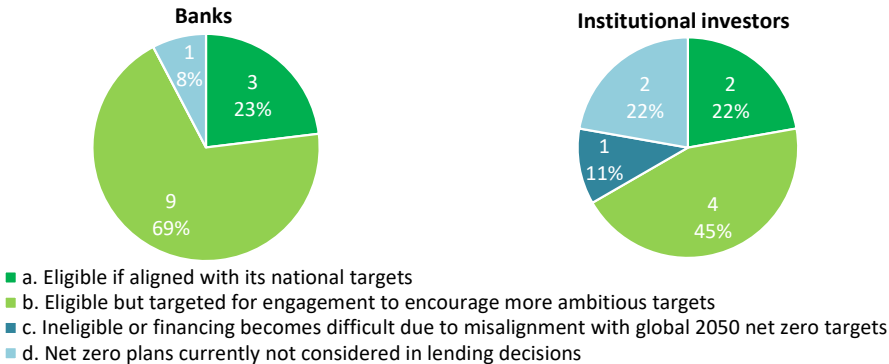
Responses to Question 3 indicate that in cross-border financing and investment, differing rules and taxonomies often interfere with decision-making on both sides.

Source: IEA analysis based on interviews with financial institutions.

To further examine how differences in regional decarbonisation pathways are reflected in practice, Question 4 elicited financial institutions’ approaches toward corporates operating in emerging market and developing economies (EMDE) that have national net zero targets set beyond 2050, often considered one of the most illustrative cases of such regional divergence. The responses showed that many institutions adopt a proactive stance, recognising corporate strategies that are aligned with their respective national targets (Figure 3.8). Furthermore, many of these institutions indicated that, while acknowledging the importance of such plans or strategies, they also engage in ongoing dialogue and partnership through their corporate engagement activities, underscoring a commitment to support the transition journey rather than assess it through a static lens.

Figure 3.8 ▶ Transition Finance Survey for financial institutions, Question 4

Q4. How does your institution treat net zero plans in lending/investing decisions and engagement activities for companies located in countries with net zero targets beyond 2050?



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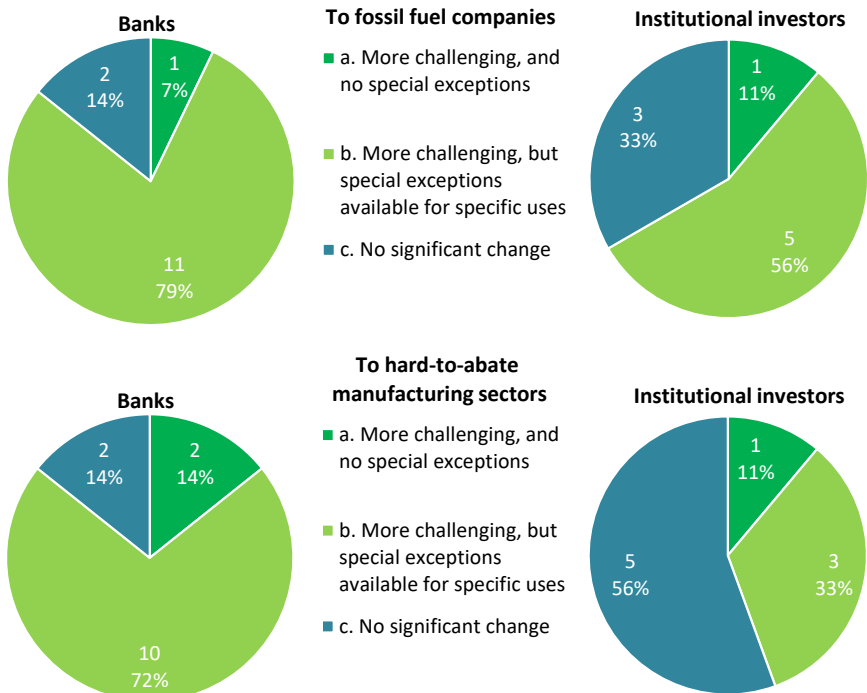
Financial institutions are recognising the importance of transition plans of corporates in EMDE with post-2050 net zero targets and are supporting them through active engagement.

Source: IEA analysis based on interviews with financial institutions

The final two questions in the survey aimed to assess whether transition finance can effectively serve as a financing mechanism for decarbonising GHG-intensive industries. Respondents were asked to compare their current financing approach to fossil fuel corporates and hard-to-abate manufacturing sectors with their approach in 2019, and to clarify the role transition finance plays within this context. The year 2019 was chosen as a baseline since it represents a period before significant climate policy developments and the launch of major initiatives. Many financial institutions reported that their overall approach to lending or investment in these sectors has become more stringent. However, they also indicated that transition finance plays a constructive role by supporting corporate actions linked to credible transition strategies, thus enabling continued engagement with corporates taking steps toward decarbonisation (Figure 3.9). Importantly, respondents also highlighted the existence of specific exclusions within their policies such as the exclusion of new coal projects from eligibility under transition finance frameworks, underscoring the selective and criteria-driven nature of these financial commitments. The balanced use of transition finance observed among the financial institutions points to the future potential of transition finance to bridge the gap between climate ambition and real-world sectoral transformation.

Figure 3.9 ▶ Transition Finance Survey, Questions 5 and 6

Q. 5 and 6 Compared to 2019, has lending/investing becoming more challenging due to your institution's net zero targets or strategic directions to fossil fuel companies and hard-to-abate manufacturing sectors?



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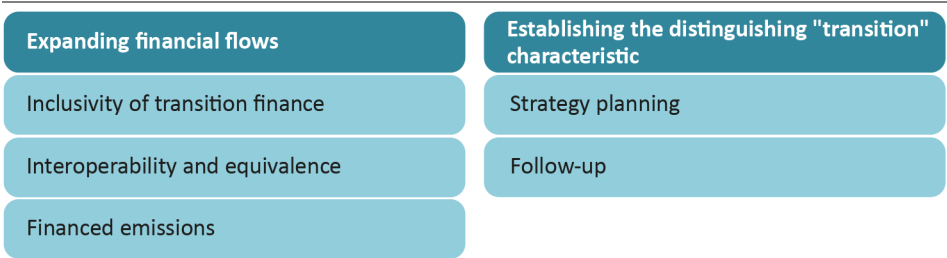
Stances toward fossil fuel and hard-to-abate manufacturing sectors have become more stringent and transition finance is key in supporting financial institutions' transition efforts.

Source: IEA analysis based on interviews with financial institutions.

3.3 Key issues and next steps

The immediate challenges facing transition finance essentially relate to two key issues, which are closely connected: expanding financial flows and clearly establishing the distinguishing “transition” characteristic that sets transition finance apart from conventional financing (Figure 3.10). Without adequate financial flows, any framework would lose its meaning and fail to generate societal or environmental benefits. Conversely, without a clearly established “transition” characteristic, the financing exercise would not differ from existing financial flows, thus failing to create additional social or environmental benefits. It is essential to address both issues to ensure no group is left behind in energy investment.

Figure 3.10 ▶ Key issues for transition finance



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Achieving both expanded financial flows and credible transition integrity can make transition finance a truly additional and meaningful contribution for the global agenda.

3.3.1 Expanding financial flows

Inclusivity of transition finance

There are already several successful examples of the implementation of transition finance driven by advanced initiatives in select jurisdictions. Japan stands out with a co-ordinated, government-led approach. Sector-specific roadmaps aligned with the country’s net zero nationally determined contribution by 2050 have provided a foundation for leading corporates in key sectors such as electricity, steel, chemicals, cement and transport to develop corporate-level transition plans or strategies. These have been supported by financial institutions offering transition-labelled finance, including the issuance of transition bonds, which totalled approximately USD 25 billion from 2021 to 2024. In the United Kingdom, the Transition Plan Taskforce has led the development of sectoral planning frameworks, and the government has launched an initiative to establish London as a global hub for transition finance under the leadership of the Transition Finance Council. These leading cases are expected to continue progressing and to serve as scalable models that can be adapted and expanded to other regions.

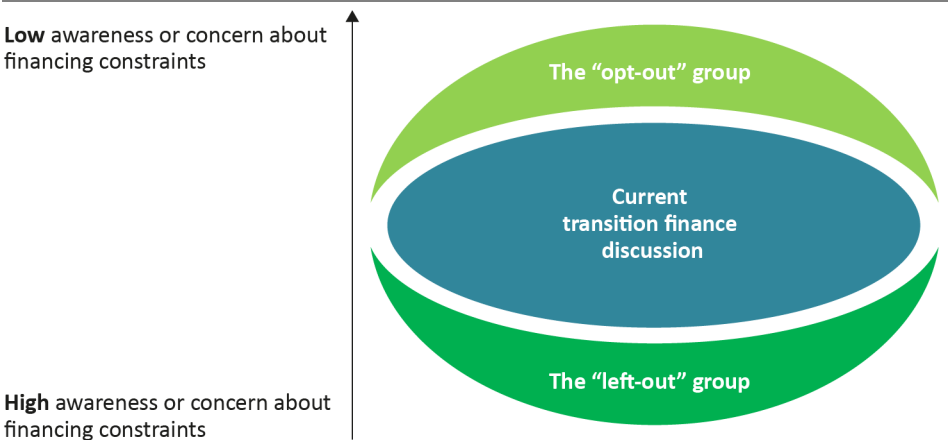
However, while these frontrunner cases demonstrate what is possible under ideal conditions, they inevitably cover a relatively limited scope. As expectations for technical rigour and procedural alignment increase, there is a risk that such frameworks become more exclusive, potentially leaving out large segments of the market. At the regional level, regions such as Southeast Asia, where this challenge is frequently raised, are actively addressing it. Efforts there have focused on how to support corporates that are not yet aligned with the Paris Agreement, as well as those lacking the technical or institutional capacity to prepare detailed and resource-intensive documentation, particularly among the many small and medium-sized enterprises (SMEs) that play a vital role in emissions reductions. Southeast Asia’s approach to fostering alignment, even among such actors, can be seen as a deliberate effort to include the “left-out” group that wish to participate in transition finance but are unable to do so under current criteria (Figure 3.11). Engaging these actors, who may be aware of the

need to invest in decarbonisation today but remain excluded from formal frameworks, is critical to delivering on the core value proposition of transition finance and scaling the market in an inclusive way.

At the same time, there exists another category of actors, the “opt-out” group, who have the capacity to use transition finance but see little immediate need or incentive to do so. These are entities that do not currently perceive financing constraints and often point to the fact that the market does not yet fully price in the value of transition alignment and activities. Their limited engagement suggests that the current incentive structures may be insufficient. Unlocking participation from this group will require a clearer articulation of the distinct value of transition finance separate from green finance, and the introduction of policy and financial mechanisms that reflect and reinforce this value within the financial system.

As shown in the results of Questions 5 and 6, transition finance serves as a tool to channel finance towards entities that can credibly demonstrate alignment with the distinguishing “transition” characteristic over time. Expanding the use of this tool is therefore essential to fostering more inclusive energy investments, strengthening energy security, and delivering meaningful emissions reductions.

Figure 3.11 > “Left-out” and “opt-out” groups in transition finance discussion



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While leading cases are emerging, attention must also be given to the “left-out” group that remain excluded and the “opt-out” group that sees little value in participating.

Interoperability and equivalence

The size of capital markets in EMDE other than China remains limited. In terms of equity market capitalisation, emerging markets represent less than one-tenth of the United States’ equity market, and roughly half that of Europe or China in 2024. Similarly, bond markets in these regions are only about one-eighth the size of the United States and one-quarter the

size of those in Europe or China. However, in the Announced Pledges Scenario (APS), these EMDE will require over USD 10 trillion in energy investment in the next decade, exceeding the cumulative energy investment needs of either the United States or China (Table 3.1). Given the underdevelopment of domestic capital markets, many EMDE must rely on international finance to support their energy investments. As illustrated in Table 3.1, many of the world's transition taxonomies have been developed in EMDE to reflect their region-specific decarbonisation pathways, shaped by distinct national contexts, development stages and energy system characteristics. However, a key barrier arises when international capital providers, particularly from advanced economies, apply their own taxonomies and climate standards when making investment decisions. This often results in emerging market investments being assessed as insufficiently ambitious even when they reflect regional transition pathways. Findings from Question 3 of the transition finance survey underscore the extent of this challenge, with over 40% of respondents indicating that differences in taxonomies present a constraint to cross-border capital flows. This outcome was also highlighted in the OECD's 2022 survey on transition finance, suggesting that the issue has persisted over time (OECD, 2022).

Table 3.1 ► Capital market size and future energy investment amount (Trillion USD, 2024, MER)

Country/ Region	Equity market capitalisation, 2024	Bond market outstanding, 2024	2026-2035 Cumulative energy investment, APS	Number of taxonomies issued by the country/region
United States	62.2	58.1	8.3	0
European Union	11.1	26.1	5.2	1
China	11.8	25.0	9.7	2
Japan	6.3	10.1	1.0	0*
United Kingdom	4.4	6.1	1.0	0
EMDE other than China	4.8	7.0	12.2	29 (Including 11 transition taxonomies)

Note: Definition of EMDE is aligned with 2025 SIFMA Capital Market Factbook, which lists China separately.

*Japan adopted a transition roadmap.

Source: IEA (2024) and IEA analysis based on 2025 SIFMA Capital Market Factbook and taxonomy documents.

When local standards in EMDE do not align with the home-country requirements of financial institutions, finance flow can be impeded, and current debates often focus on raising local standards to the level of advanced economies. While efforts to share technical expertise and strengthen capacity are valuable, discussions that take into account the circumstances of lenders and investees are equally essential. Efforts to fully unify these standards can sometimes be difficult, given the unique contexts and characteristics of regional pathways.

In such cases, the focus should not only be on imposing fund providers' regional standards whether they fit or not, but also on fostering discussions around how to accommodate diversity while ensuring credible guardrails. The priority is to secure financing mechanisms that can effectively support region-specific pathways, reflecting the varied realities of different economies. As highlighted in responses to Question 4 of the survey, the actions of financial institutions that are proactively engaging with corporates whose targets are aligned with national carbon neutrality goals extending beyond 2050 reflect a constructive response to the challenge. However, in order to shift from a stance of selectively permitting finance to EMDE towards actively expanding it, transition finance needs to be treated as a distinct contribution within the landscape of international capital flows.

To resolve this issue, reframing the value of transition finance is essential. Rather than evaluating transition finance solely based on emissions levels, the focus should be on recognising proactive efforts in regions and sectors where decarbonisation is most challenging, such as in Southeast Asia Africa, and other EMDE and in hard-to-abate sectors such as iron and steel and cement. This will require supportive policy measures that allow such capital flows to be recognised and encouraged, particularly by investors and financial institutions in advanced economies, without imposing excessive constraints on recipient countries. Rather than limiting finance based on rigid alignment criteria, the goal should be to enable and accelerate financing for credible, local-grounded transition efforts.

As a next step, although there are some challenges related to disclosure and data confidentiality, providing a framework in which transition finance efforts targeting EMDE, and the expansion of related financial flows, can be positively reflected in financed emissions accounting or international climate objectives may serve as a valuable entry point for broader dialogue and engagement.

Financed emissions

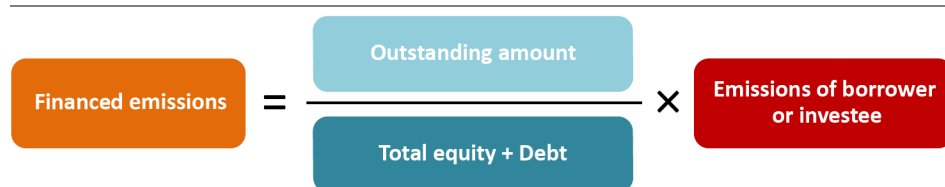
While financial institutions' climate goals are important motivations toward decarbonisation, these targets may also have an unintended impact on real-economy emissions reductions. Many large global financial institutions have adopted financed emissions targets, typically calculated by multiplying their share of a borrower's or investee's total outstanding debt and equity by that borrower's or investee's emissions (Figure 3.12). These targets are ideally meant to be met through reductions in a borrower's or investee's real emissions. However, when applied over short timeframes, especially to counterparties in EMDE or hard-to-abate sectors, these targets can incentivise financial institutions to reduce financing volumes rather than engage with corporates or project owners to support emissions reductions over time.

While such behaviour may improve an individual institution's metrics, it does not lead to actual reductions in global emissions. In fact, early-stage investments in EMDE or hard-to-abate sectors such as energy efficiency upgrades or clean infrastructure development are often necessary to achieve long-term emissions reductions. A focus on near-term financed emissions reductions can therefore obstruct the flow of capital needed to support credible transition pathways in these sectors. This concern was recognised by the Glasgow Financial

Alliance for Net Zero, who stated that “Financial institutions should consider the potential for real-economy emissions reductions in their activities, recognising that the greatest emissions reductions may be achieved by directing financing and related services to — rather than divesting from — firms and assets that need to transition”. The Alliance also proposed that “financial institutions should focus not only on reducing their financed emissions, but also on financing emissions reduction” (Glasgow Financial Alliance for Net Zero, 2022).

Moreover, exclusive reliance on this metric raises further the risk of financial carbon leakage. To avoid such unintended consequences, it is critical to promote a more nuanced understanding of the financed emissions metric. Rather than relying on it as a singular benchmark, financial institutions and regulators should recognise and positively evaluate the role of transition finance in enabling long-term emissions reductions even if such investments initially increase portfolio emissions.

Figure 3.12 ► Concept of financed emissions calculation



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Supporting emissions reductions can drive real-world impact but reducing outstanding amounts solely for short-term targets risks causing financial carbon leakage.

Note: Outstanding amount refers to the volume of debt and equity held by financial institutions.

3.3.2 Establishing the distinguishing “transition” characteristic

The expansion of transition finance, as highlighted in Chapter 2, must be accompanied by the clear establishment of its characteristic of “transition”. Given the inherently dynamic nature of transition finance, this relies on two core elements, the formulation of a credible transition strategy planning at the time of financing and the implementation of an effective follow-up process thereafter. Both components are essential to ensuring that transition finance remains a meaningful tool in supporting investment and decarbonisation over time.

Strategy planning

Strategy planning of transition is one of the most essential elements in establishing the distinguishing “transition” characteristic. As discussed in Chapter 1, nearly all existing guidance documents that define process-based requirements place emphasis on the importance of such planning. Moreover, the importance of transition plans or strategies extends beyond the context of transition finance and is increasingly recognised as a critical component of corporate disclosure frameworks under the Task Force on Climate-related Financial Disclosures and the International Financial Reporting Standards (IFRS). To support

the development of credible strategies, especially in the form of transition plans, several jurisdictions have launched targeted initiatives. In the United Kingdom, the Transition Plan Taskforce provides a sector-agnostic framework to guide corporate action across industries. Similarly, Japan's government-led publication of sectoral roadmaps is intended to assist private corporates in formulating transition plans that align with national decarbonisation pathways. These initiatives serve to anchor transition finance in the credible, transparent planning of strategies and to strengthen the market's ability to distinguish and support legitimate transition efforts.

The IEA does not seek to propose new additional requirements for transition plans beyond those already articulated in existing guidance frameworks. Rather, in support of establishing credible transition characteristics, the IEA highlights examples of relevant key performance indicators in several key sectors discussed in Chapter 2, drawing on its energy and industrial expertise. The use of such key performance indicators in combination can serve as a valuable tool in reinforcing the credibility of transition efforts. At the same time, it remains essential to consider the need for inclusivity in transition finance, particularly for EMDE and small and medium enterprises, where capacity and resources may be more constrained.

Transition plans are increasingly recognised as important tools for enabling investors and banks to understand the risks and opportunities associated with decarbonisation pathways, and in advanced economies, the demand for the development of such plans is growing. However, producing highly detailed and technically rigorous transition plans requires significant capabilities and resources, and as a result, the ability to prepare them is often confined to large firms with substantial expertise and capacity. Expecting the same level of detail and precision from SMEs or actors in EMDE without adjustment or support is not only impractical in the near-term, but also risks excluding key players during what is expected to be a decisive decade for investment in global decarbonisation effort. The City of London's Transition Finance Market Review states that:

“It will take time to build the market infrastructure to allow this both globally and within the UK. As such, in the meantime, a credible transition plan cannot always be a pre-requisite for access to transition finance, and a transition plan is not sufficient on its own to classify all finance as transition finance. Inconsistencies in disclosure requirements, and a lack of skills and capacity for many private sector companies and some institutions create barriers in the current context. As such, the Review focusses not only on transition plans but also on interim steps that can be taken now to empower a range of actors to participate in the market for transition finance.” (City of London, 2024)

The OECD's Guidance on Transition Finance (OECD, 2022) and ASEAN Transition Finance guidance (ASEAN Capital Markets Forum, 2024) similarly recognise the needs of flexibility for SMEs due to their challenging enabling conditions.

Taken together, these insights suggest the need for a two-speed approach to transition strategy planning. While leading corporate players have an important role to show leading transition finance cases, governments have a critical role to play in facilitating alignment for actors that may lack detailed transition plans or strategies, including through national roadmaps, simplified frameworks and other enabling mechanisms that support credible transition action even in the absence of full planning capacity.

Further expanding the inclusion of SMEs or corporates in EMDE within the framework of transition finance will require multifaceted efforts and the active engagement of a wide range of stakeholders. For instance, bridging the gap between the high expectations of capital markets and the often limited availability of information from SMEs and EMDE corporates highlights the potentially important role of financial institutions, particularly local banks. A variety of financial approaches could be employed. One example is a two-step loan structure in which banks receive transition finance through capital markets and subsequently channel these funds as transition loans to a wide range of domestic firms. This model is especially relevant in EMDE, where underdeveloped capital markets mean that bank lending continues to play a central role in corporate finance. This mechanism not only facilitates broader access to transition finance for SME borrowers, but also provides a potential means of managing challenges related to currency risk and the fragmentation of capital needs across a diverse set of enterprises, by leveraging the aggregation of borrowing demand, currency conversion and risk management functions provided by local banks.

Follow-up

Since transition finance is inherently dynamic, initial planning cannot solve every challenge from the outset. Technological progress, market conditions, and international and national policy priorities inevitably evolve during the financing periods. Therefore, the real test of clearly establishing the “transition” characteristic lies in the quality of the follow-up framework that ensures finances remain aligned with appropriately ambitious decarbonisation pathways. Japan’s *Transition Finance Follow-up Guidance* offers an instructive example in this regard (Financial Services Agency, Ministry of Economy, Trade and Industry and Ministry of Environment of Japan, 2023). The government, working closely with financial institutions and industry, has issued detailed guidance on how transition finance should be monitored, updated and, where necessary, recalibrated to reflect changing circumstances. Central to that guidance are clear disclosure expectations, predefined review checkpoints and a mechanism for tightening targets if national or international climate objectives accelerate.

Since decarbonisation policies are linked to national energy security, they can be adjusted upward or downward by unexpected delays, breakthroughs in technology or changing circumstances. Governments are uniquely positioned to balance the requirements of their nationally determined contributions and national decarbonisation strategies with domestic security considerations, and hence, government and public-sector leadership are indispensable. Once those revised policy signals are in place, private actors can conduct

credible follow-up, consider the underlying drivers of change including whether they stem from external factors, maintaining momentum and avoiding the risk that transition finance becomes a one-off exercise. An adaptive, clearly anchored follow-up framework is essential to keep corporates engaged, encourage continuous operational improvements and ensure that capital remains firmly aligned with long-term climate goals.

In the context of follow-up, determining how to respond when initial targets are not met can enhance the credibility of transition finance, even though such assessments inevitably involve complex questions, such as whether underperformance reflects a lack of ambition or genuinely unavoidable circumstances. This debate mirrors ongoing discussions in the field of sustainability-linked finance. In that market, common mechanisms include interest rate step-ups when key performance indicators are not achieved (or step-downs when they are met or overachieved) and alternative approaches that avoid direct pricing adjustments, such as requiring issuers to make donations if targets are missed. While these practices remain at an early stage of development, they point to the need for further financial innovation. With careful design, such mechanisms could be an option to strengthen the integrity and credibility of transition finance.

3.3.3 Recognising the distinct value of transition finance: From “second tier” to “second pillar”

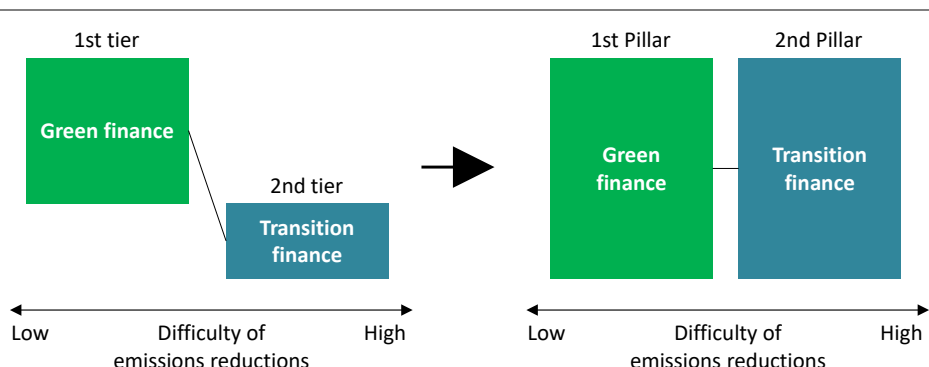
In the discussions of the current key issues, the need to reaffirm and elevate the value of transition finance has emerged multiple times with particular importance. While this may seem obvious, it has not always been fully internalised across stakeholders. Yet this recognition is essential for overcoming key issues and scaling up transition finance over the next decade.

A fundamental shift in how transition finance is understood is needed. Transition finance should not be judged solely against the emissions benchmarks that underpin green finance such as absolute emissions burden on the demand side or financed emissions metrics on the supply side. These frameworks, while essential, are often insufficient for addressing the complexity of hard-to-abate sectors or activities in EMDE that lie beyond the immediate reach of conventional green instruments. Instead, transition finance could be acknowledged for its contribution to enabling progress in areas where decarbonisation is difficult, and where the need for investment is urgent and cannot be addressed through current dominant approaches alone. Its core value lies in engaging with these realities, not avoiding them.

This means moving away from a framework in which transition finance is viewed as a “second tier” of green finance, offering fewer incentives and receiving lower recognition, and instead positioning it as an equal “second pillar” of global financing for emissions reductions. Its value lies precisely in its ability to mobilise capital into hard-to-abate sectors where standard green criteria fall short. This is a space of high climate impact and high strategic relevance (Figure 3.13).

Elevating the status of transition finance requires both public and private actors to explicitly acknowledge its role, and to design supportive frameworks that reflect its specific challenges and contributions. With these steps, transition finance can evolve into a disciplined yet flexible tool: one that supports the global scale-up of energy investment, strengthens energy security, and delivers meaningful emissions reductions.

Figure 3.13 ► **Recognising the distinct value of transition finance: From “second tier” to “second pillar”**



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Transition finance needs to move beyond being seen as a “second tier” of green finance to stand as a “second pillar” of global financing for emissions reductions.

Policy recommendations

1. Establishing national transition roadmap with sector breakdown by governments

The starting point for decarbonisation varies across countries, and the pathways and technologies required also differ by region. These differences need to be recognised in country and regional roadmaps. To support proactive investment by private industry and financial institutions, it is essential that each country or region present a clear blueprint outlining how investments will be channelled with emissions reductions. Such clarity not only provides direction for stakeholders but also serves as a foundation for mobilising international capital flows to underpin the transition.

2. Mutual recognition of different national and regional transition finance frameworks and their essential value of inclusivity

The current transition finance discussion lacks an overarching framework for the mutual recognition of different national and regional transition finance approaches, as well as for supporting the diverse actions announced by individual countries and regions. Establishing such mutual recognition would reinforce these regional efforts as legitimate and necessary components of transition, and help define the inclusivity as an essential value of transition finance. This could serve as a venue for co-ordinated global dialogue, thereby strengthening coherence and inclusivity in the international approach to transition finance.

3. Enhancing the role of transition finance in EMDE and advancing equivalence

Strengthening capital flows from advanced economies to EMDE is critical to advancing global decarbonisation goals. However, differences in regional taxonomies and frameworks combined with institutional complexity can lead to conservative decision-making that limits the flow of capital into EMDE. Supporting financial institutions willing to engage in complex transition finance in EMDE is essential to overcome those barriers. Unlike green finance, which has become more self-sustaining, transition finance in these contexts requires targeted support. This could include:

- Public recognition and disclosure of transition finance volumes directed towards EMDE;
- Preferential treatment in programmes supported by multilateral development banks;
- Adjustments in reporting and disclosure (e.g. excluding qualifying transition finance volumes from financed emissions metrics).

Such efforts would help ensure that transition finance is not only technically viable but is also rewarded in a way that strengthens participation.

4. Building a global transition finance database

Data on transition finance remain limited, reflecting both the complexity of ongoing discussions and the absence of an overarching global framework. To enable its effective development, the establishment and expansion of a global transition finance database will

be essential. In collaboration with second-party opinion providers and regional platforms, such a database would collect data on financial flows, project types and transition impacts. Enhanced data availability would enable improved assessment, transparency, accountability and the continuous improvement of transition finance mechanisms.

5. Creating a robust follow-up framework

Credibility in transition finance relies not only on sound strategy planning, but also on ongoing follow-up. Transparent monitoring mechanisms are essential to demonstrating progress and maintaining trust. A future-proof follow-up system should:

- Combine oversight and verification capabilities;
- Maintain flexibility to accommodate necessary adjustments in national or sectoral transition strategies.

This balance between credibility and adaptability is essential for transition finance to thrive in the face of evolving national priorities, especially in sectors and regions undergoing rapid change.

Definitions

This annex provides general information on terminology used in this report including units, regional and country groupings and abbreviations and acronyms.

Units

Area	m ²	square metre
Emissions	t CO ₂	tonnes of carbon dioxide
	g CO ₂ -eq	grams of carbon-dioxide equivalent
	kg CO ₂ -eq	kilogrammes of carbon-dioxide equivalent
	kg CO ₂ /t	Kilogrammes of carbon-dioxide equivalent per tonne
	tCO ₂ -eq	tonnes of carbon-dioxide equivalent
Energy	Mt CO ₂ -eq	million tonnes of carbon-dioxide equivalent
	MJ	megajoule (1 joule x 10 ⁶)
	kWh	kilowatt-hour
Gases	bcm	billion cubic metres
Mass	kt	kilotonnes (1 tonne x 10 ³)
	Mt	million tonnes (1 tonne x 10 ⁶)
	Gt	gigatonnes (1 tonne x 10 ⁹)
Monetary	USD million	1 US dollar x 10 ⁶
	USD billion	1 US dollar x 10 ⁹
	USD trillion	1 US dollar x 10 ¹²
Volume	GL	Gigalitre (1 litre x 10 ⁹)

Regional and country groupings

Advanced economies: OECD regional grouping and Bulgaria, Croatia, Cyprus^{1,2}, Malta and Romania.

Africa: North Africa and sub-Saharan Africa regional groupings.

Asia Pacific: Southeast Asia regional grouping and Australia, Bangladesh, Democratic People's Republic of Korea (North Korea), India, Japan, Korea, Mongolia, Nepal, New Zealand, Pakistan, The People's Republic of China (China), Sri Lanka, Chinese Taipei, and other Asia Pacific countries and territories.³

Caspian: Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan.

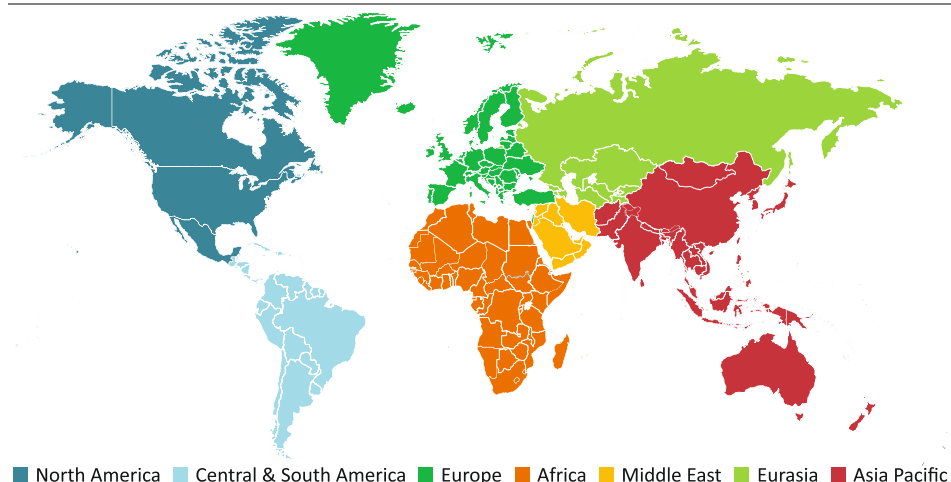
Central and South America: Argentina, Plurinational State of Bolivia (Bolivia), Bolivarian Republic of Venezuela (Venezuela), Brazil, Chile, Colombia, Costa Rica, Cuba, Curaçao, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Nicaragua, Panama, Paraguay, Peru, Suriname, Trinidad and Tobago, Uruguay and other Central and South American countries and territories.⁴

China: Includes (the People's Republic of) China and Hong Kong, China.

Developing Asia: Asia Pacific regional grouping excluding Australia, Japan, Korea and New Zealand.

Emerging market and developing economies: All other countries not included in the advanced economies regional grouping.

Figure A.1 ► Main country groupings



Note: This map is without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.

Eurasia: Caspian regional grouping and the Russian Federation (Russia).

Europe: European Union regional grouping and Albania, Belarus, Bosnia and Herzegovina, Gibraltar, Iceland, Israel⁵, Kosovo, Montenegro, North Macedonia, Norway, Republic of Moldova, Serbia, Switzerland, Türkiye, Ukraine and United Kingdom.

European Union: Austria, Belgium, Bulgaria, Croatia, Cyprus^{1,2}, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovak Republic, Slovenia, Spain and Sweden.

IEA (International Energy Agency): Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Estonia, **Finland**, France, Germany, Greece, Hungary, Ireland, Italy, Japan, Korea, Lithuania, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Spain, Sweden, Switzerland, Türkiye, United Kingdom and United States.

Latin America and the Caribbean (LAC): Central and South America regional grouping and Mexico.

Middle East: Bahrain, Islamic Republic of Iran (Iran), Iraq, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syrian Arab Republic (Syria), United Arab Emirates and Yemen.

Non-OECD: All other countries not included in the OECD regional grouping.

Non-OPEC: All other countries not included in the OPEC regional grouping.

North Africa: Algeria, Egypt, Libya, Morocco and Tunisia.

North America: Canada, Mexico and United States.

OECD (Organisation for Economic Co-operation and Development): Australia, Austria, Belgium, Canada, Chile, Colombia, Costa Rica, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Latvia, Lithuania, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Türkiye, United Kingdom and United States.

OPEC (Organization of the Petroleum Exporting Countries): Algeria, Bolivarian Republic of Venezuela (Venezuela), Equatorial Guinea, Gabon, Iraq, Islamic Republic of Iran (Iran), Kuwait, Libya, Nigeria, Republic of the Congo (Congo), Saudi Arabia and United Arab Emirates.

OPEC+: OPEC grouping plus Azerbaijan, Bahrain, Brunei Darussalam, Kazakhstan, Malaysia, Mexico, Oman, Russian Federation (Russia), South Sudan and Sudan.

Southeast Asia: Brunei Darussalam, Cambodia, Indonesia, Lao People's Democratic Republic (Lao PDR), Malaysia, Myanmar, Philippines, Singapore, Thailand and Viet Nam. These countries are all members of the Association of Southeast Asian Nations (ASEAN).

Sub-Saharan Africa: Angola, Benin, Botswana, Cameroon, Côte d'Ivoire, Democratic Republic of the Congo, Equatorial Guinea, Eritrea, Ethiopia, Gabon, Ghana, Kenya, Kingdom of Eswatini, Madagascar, Mauritius, Mozambique, Namibia, Niger, Nigeria, Republic of the Congo (Congo), Rwanda, Senegal, South Africa, South Sudan, Sudan, United Republic of Tanzania (Tanzania), Togo, Uganda, Zambia, Zimbabwe and other African countries and territories.⁶

Country notes

¹ Note by Republic of Türkiye: The information in this document with reference to “Cyprus” relates to the southern part of the island. There is no single authority representing both Turkish and Greek Cypriot people on the island. Türkiye recognises the Turkish Republic of Northern Cyprus (TRNC). Until a lasting and equitable solution is found within the context of the United Nations, Türkiye shall preserve its position concerning the “Cyprus issue”.

² Note by all the European Union Member States of the OECD and the European Union: The Republic of Cyprus is recognised by all members of the United Nations with the exception of Türkiye. The information in this document relates to the area under the effective control of the Government of the Republic of Cyprus.

³ Individual data are not available and are estimated in aggregate for: Afghanistan, Bhutan, Cook Islands, Fiji, French Polynesia, Kiribati, Macau (China), Maldives, New Caledonia, Palau, Papua New Guinea, Samoa, Solomon Islands, Timor-Leste, Tonga and Vanuatu.

⁴ Individual data are not available and are estimated in aggregate for: Anguilla, Antigua and Barbuda, Aruba, Bahamas, Barbados, Belize, Bermuda, Bonaire, Sint Eustatius and Saba, British Virgin Islands, Cayman Islands, Dominica, Falkland Islands (Malvinas), Grenada, Montserrat, Saint Kitts and Nevis, Saint Lucia, Saint Pierre and Miquelon, Saint Vincent and Grenadines, Saint Maarten (Dutch part), Turks and Caicos Islands.

⁵ The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD and/or the IEA is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

⁶ Individual data are not available and are estimated in aggregate for: Burkina Faso, Burundi, Cabo Verde, Central African Republic, Chad, Comoros, Djibouti, Gambia, Guinea, Guinea-Bissau, Lesotho, Liberia, Malawi, Mali, Mauritania, Sao Tome and Principe, Seychelles, Sierra Leone and Somalia.

Abbreviations and acronyms

ADB	Asian Development Bank
AEA	Ammonia Energy Association
APS	Announced Pledges Scenario
ASEAN	Association of Southeast Asian Nations
CCCI	Coal to Clean Credit Initiative
CCUS	carbon capture, utilisation and storage
CNY	Chinese Yuan Renminbi
EBRD	European Bank for Reconstruction and Development
EMDE	emerging market and developing economies
ETS	Emissions Trading System
EU	European Union
EUMOA	West African Economic and Monetary Union
EUR	Euro
GCCA	Global Cement and Concrete Association
GFANZ	Glasgow Financial Alliance for Net Zero
GHG	greenhouse gas
GX	Green Transformation
IFC	International Finance Corporation
ICMA	International Capital Market Association
IEA	International Energy Agency
IPSF	International Platform on Sustainable Finance
JPY	Japanese Yen
KPI	key performance indicator
MAS	Monetary Authority of Singapore
MDB	multilateral development bank
LNG	liquified natural gas
METI	Ministry of Economy, Trade, and Industry
NDCs	nationally determined contributions
NGFS	Network for Greening the Financial System
NZE	Net Zero Emissions
NZBA	Net-Zero Banking Alliance
OECD	Organisation for Economic Co-operation and Development
R&D	research and development
SBTi	Science Based Targets initiative
SEK	Swedish Krona
SME	small and medium-sized enterprise

TRACTION	Transition Credits Coalition
TWD	New Taiwan Dollar
WB2°C	well below 2°C
WSA	World Steel Association
USD	United States Dollar

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Scaling Up Transition Finance

Actions by emissions-intensive sectors, companies, and countries are crucial to placing the world on a sustainable pathway. Yet, investments that could deliver meaningful reductions in their environmental footprint often do not receive sufficient financial support. Currently, finance is drawn heavily to certain “green” assets and activities. While vital, these investments alone cannot deliver all the changes needed to cut global emissions, especially in areas where clean technologies are not yet commercially available or cost competitive. This is where *transition finance* comes in: it can help emissions-intensive countries, companies, and sectors shift over time towards sustainable practices, aligned with long-term climate and development goals.

In this new report, the International Energy Agency (IEA) provides analyses to map the landscape for transition finance, explains why it matters, and highlights approaches that could move the debate forward.

The report also examines the role of transition finance in the steel and cement, critical minerals, and the natural gas sectors. It further presents findings from a survey of financial institutions on transition finance, along with an assessment of current challenges and emerging trends.

