A New Reality Check: Unlocking Transition Finance for Net-Zero

GIP Transition Finance Working Group

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Acknowledgement

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Executive Summary

The decisive question for the global net-zero transition has shifted from high-level ambition to real-world execution. While over 100 countries and hundreds of major corporations have pledged to reach net-zero emissions, a massive investment shortfall persists. At the same time, geopolitical tensions and energy market disruptions have reinforced the importance of energy security and resilient energy systems. Delivering both objectives will require a massive scale-up of transition finance to transform carbon-intensive assets, industries, and economies.

The Core Challenge

Transition finance operates at a complex intersection of public policy and private capital, facing structural hurdles from both sides:

- **Private Sector Constraints:** Financial institutions are often hindered by short-term return expectations, risk-reward imbalances in unproven technologies, and currency volatility in emerging markets. Furthermore, well-intentioned net-zero portfolio metrics can inadvertently trigger "decarbonization by exclusion," where banks divest from "brown" assets rather than financing their transformation.
- **Public Sector Limits:** Governments face severe fiscal constraints and rising debt, short political cycles that threaten policy continuity, and the complex social imperative of managing a "just transition" for regions heavily dependent on legacy fossil fuels.

Emerging Sectoral & Regional Opportunities

Despite these hurdles, decarbonizing energy-intensive industries presents a multi-trillion-dollar commercial opportunity:

- **Steel:** Breakthroughs in hydrogen-based Direct Reduced Iron (DRI) and Electric Arc Furnaces (EAF) are scaling, with pioneered frameworks showing that phased, cross-sector partnerships can successfully commercialize green steel.
- **Oil & Gas:** The sector can halve operational emissions by 2030 through highly cost-effective, low-carbon adjustments—predominantly methane abatement, flaring elimination, and operational electrification.
- **Power and Heat:** Managed coal phase-out models are shifting toward clean thermal repowering and energy storage retrofits, unlocking substantial value by reusing legacy brownfield grid infrastructure.
- **Cement:** Immediate carbon reductions are being achieved by scaling low-carbon alternative materials like Limestone Calcined Clay Cement (LC3), complemented by frontier public-private Carbon Capture, Utilization, and Storage (CCUS) infrastructure.

On a geographical level, the deployment of capital must be highly tailored. While the **Asia-Pacific (APAC)** region requires blended finance for its young coal fleets , **Latin America (LatAm)** demands foreign exchange-protected logistics infrastructure , the **Middle East & Africa (MEA)** benefits from sovereign-backed industrial CCUS and mining mini-grids , and **Eastern Europe & Central Asia (EECA)** relies on multilateral risk-sharing for brownfield municipal upgrades.

Financial Innovations and Strategies

The sustainable bond ecosystem has diversified significantly over the past five years. Green bonds remain the cornerstone of the market, and together with social and sustainability bonds, account for more than 90% of total issuance. At the same time, more specialized instruments have gained traction. Transition

bonds, strongly anchored by sovereign issuance in Japan, and sustainability-linked instruments, including SLBs and SLLs, have emerged as important tools for providing general-purpose corporate financing linked to verified, science-based emissions reduction targets.

To effectively scale these innovations and bridge the gap between ambition and execution, financial institutions must embed transition finance into their core plumbing via four strategic pillars:

Strategic Pillar	Core Operational Action
1. Credible Frameworks	Adopt evidence-based, Paris Agreement aligned sector pathways and clear taxonomies to actively prevent carbon lock-in and "transition-washing".
2. Core Business Integration	Incorporate client transition readiness straight into underwriting credit policies, utilizing pricing-incentive structures.
3. Data & Capacity	Invest in granular asset-level tracking for Scope 1, 2, and material Scope 3 emissions, while technically upskilling frontline deal teams.
4. Blended Finance Collaboration	Co-design programmatic, standardized risk-sharing templates and fast-tracked guarantees with Multilateral Development Banks (MDBs) to efficiently crowd in private capital.

Looking Ahead

As market infrastructure matures, the future of transition finance will be shaped by the harmonization of regional taxonomies, which will lower cross-border transaction costs and strengthen guardrails against transition-washing. Evolving standards like ICMA and CBI will enforce strict, science-based entity-level targets, while slow, bespoke public-private deals will transition into programmatic, platform-led blended finance models backed by fast-tracked MDB risk guarantees. Crucially, the commercial viability of hard-to-abate retrofits will progressively improve, shifting deep decarbonization efforts from pure compliance costs into viable commercial propositions. Financial institutions that move past simple exclusion and actively fund these "brown-to-green" asset transformations will secure a leading position in the global reallocation of capital.

1.The Challenge

1.1 Investment Shortfall

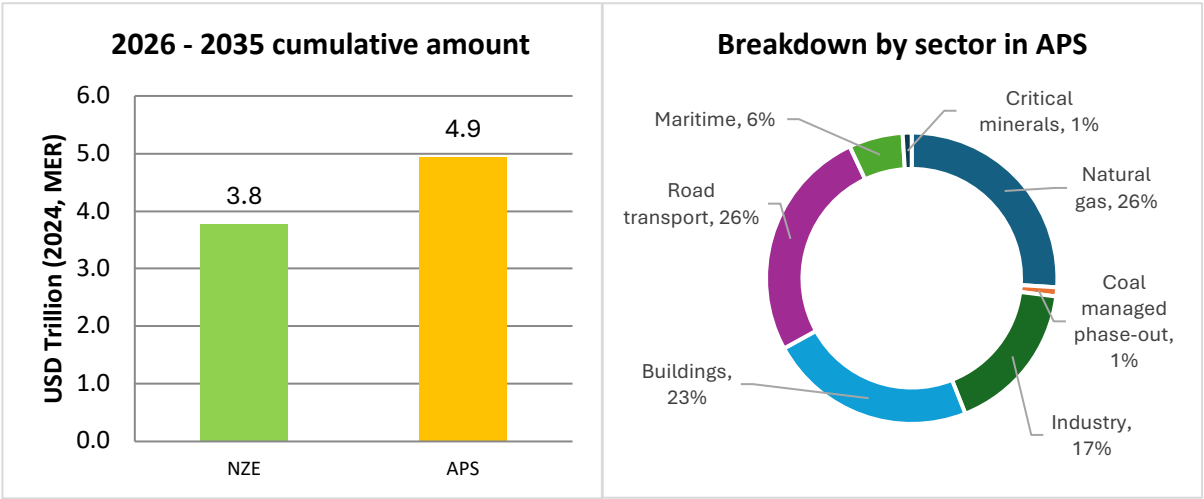
The global push for net-zero emissions is now mainstream – around 107 countries (representing ~82% of global emissions) have adopted net-zero pledges[1], while hundreds of major companies have committed to decarbonisation pathways. Yet the transition is unfolding against an increasingly complex global backdrop. Regional conflicts, geopolitical fragmentation, and energy supply disruptions have exposed vulnerabilities in existing energy systems and elevated energy security as a strategic priority for governments worldwide. **Rather than slowing the transition, these developments have strengthened the case for accelerating investment in resilient, diversified, and low-carbon energy infrastructure.** The decisive question is therefore no longer ambition, but execution. Delivering on net-zero commitments will require a massive scale-up of transition finance: capital that enables today's carbon-intensive assets, industries, and economies to move credibly toward low-carbon pathways.

Transition finance targets the harder, riskier, and more consequential part of decarbonization, including steel, cement, oil and gas operations, coal-based power generations and transportations. These sectors account for the bulk of global emissions and cannot be replaced overnight. We've seen a growing effort to direct capital and investment, driven by G20 frameworks, evolving taxonomies, and national transition-finance guidance in countries such as Japan[2], Singapore[3], China[4 5], Australia[6], and Canada[7], complemented by regional frameworks such as the EU[8] and ASEAN[9]. Yet they remain structurally underfinanced.

Emerging markets and developing economies (excluding China) will require roughly **USD 2.4 trillion per year by 2030** to remain on a net-zero trajectory, compared with current flows of under USD 1 trillion[10]. A large share of this gap is linked to the challenge of replacing or repurposing coal-fired power and transforming heavy industry at scale[11].

The International Energy Agency (IEA) adopts a practical and analytical approach, identifying and aggregating investments in key sectors where transition finance can have meaningful impacts. As illustrated in the Figure below, IEA research demonstrates the massive scale of capital required to support the global energy transition. Under both the Net Zero Emissions by 2050 (NZE) and the Announced Policies Scenario (APS), the **ten-year cumulative investment requirement reaches approximately USD 4 to 5 trillion** (roughly **USD 400 to 500 billion annually**). These critical funding targets are systematically distributed across seven key high-emission sectors requiring immediate transition capital injection.

Figure: Investment need to support transition



Source: IEA (2025), Scaling Up Transition Finance, Figure 1.8. License: CC BY 4.0.

Transition finance sits at the intersection of public policy goals and private capital decisions, so it faces challenges from both the private sector perspective and the public sector perspective. Fundamentally, there is a collective action problem: private investors hesitate to fund uncertain, long-term transitions, while governments alone cannot shoulder the trillions needed for a net-zero transformation. Below we frame the challenge from each perspective:

1.2 Private Sector Perspective

For many banks, institutional investors, and corporations, the business case for transition investments is not yet compelling enough given current market signals. Private financiers are profit-driven and risk-aware; they face pressures to deliver returns on timelines much shorter than the climate transition requires. In practice, this means:

- **The business case dilemma** – Many investors remain focused on quarterly or annual results, which discourages long-term climate investments. "Impatient capital" often pushes companies to delay or weaken transition plans that may reduce near-term profits. BP's 2025 decision to scale back its net-zero ambition under shareholder pressure illustrates this tension. Roughly 60% of companies with net-zero pledges still lobby against climate policies—showing that financial self-interest continues to outweigh long-term transition goals.[12]

- **Reporting and portfolio pressures** – Well-intentioned sustainability rules can unintentionally deter transition finance. Financial institutions in net-zero alliances are judged by annual financed-emission metrics, which incentivize divestment from "brown" assets rather than engagement. A coal plant or steel mill needing upgrades may be dropped from portfolios to reduce reported emissions, even if refinancing it could deliver real-world decarbonization. This "decarbonization by exclusion" leaves critical industries—steel, cement, shipping, aviation—struggling to find the capital needed to transform.

- **Risk–reward imbalance** – From a private investor's viewpoint, transition projects in hard-to-abate sectors often look too risky and unprofitable. New technologies such as green hydrogen or carbon capture carry high upfront costs, uncertain policy support, and unclear demand. Without tools like carbon pricing or contracts-for-difference (CfD) to stabilize returns, few projects meet investors' hurdle rates. Producing green steel, for example, costs 20–30% more than conventional steel[13], so most investors default to safer bets such as solar and wind, leaving industrial transformation underfunded.

- **Emerging market and SME constraints** – where capital is needed most Future emissions growth is concentrated in emerging markets, but these economies attract the least private investment. Excluding China, around 90% of needed climate finance must come from private sources, yet most developing countries lack investment-grade ratings or stable currencies.[14]Local SMEs face additional barriers—limited collateral, small scale, and high due diligence costs. As a result, transition finance is least available where it is most critical, constraining decarbonization in fast-growing economies and industries.

Despite these hurdles, it is worth noting that the private sector also holds enormous potential to drive transition finance if these barriers are addressed. There is growing recognition among leading financial institutions that financing the transition is a strategic opportunity: it can open new markets, preempt regulatory shocks, and align portfolios with the economy of the future. The challenge is converting that high-level recognition into concrete action under current market conditions.

1.3 Public Sector Perspective

From the public sector side – governments, policymakers, and development finance institutions – the challenge is about creating an enabling environment and direct support for transitions while managing political and social considerations. Key issues include:

- **Scale of needs vs. fiscal limits** – The investment required for a net-zero transition far exceeds public budgets, particularly in developing economies that need trillions in new infrastructure and industrial upgrades. Yet many governments face mounting debt, post-pandemic fiscal strain, and competing priorities like health and education. Even advanced economies struggle to balance large climate packages such as the EU Green Deal[15] or the U.S. IRA[16] with concerns over taxpayer costs and energy prices. The public sector's core dilemma is how to mobilize vast private capital without breaching budgets—hence the growing emphasis on public-private "transition finance" partnerships.

- **Policy and regulatory dilemmas** – balancing ambition with political realities Governments must steer markets toward low-carbon choices through carbon pricing, subsidy reform, or phase-out mandates—but such measures often provoke industry and voter resistance. Short political cycles heighten the risk of policy reversals, as seen in several Belt-and-Road economies (Vietnam[17], Pakistan[18]) where long-term climate commitments clash with short-term stability goals. Consistent, credible policy signals are essential to attract investment, yet regulators also face technical hurdles in defining what counts as "transition" finance and in adjusting prudential rules to capture climate risks without stifling growth. Building stable, transparent regulatory frameworks remains a central challenge for the public sector.

- **Ensuring a just and orderly transition** – Decarbonization inevitably creates winners and losers, and public authorities must ensure the transition is fair. Regions dependent on coal, oil, or heavy industry risk major job losses and social disruption—South Africa's Mpumalanga province, where over 40 % of GDP and half of local jobs rely on coal, is a vivid example. The government's Just Energy Transition Partnership (JETP) — an USD 8.5 billion agreement with international partners — seeks to support the shift from coal by investing in clean energy and worker transition. Progress, however, remains uneven: local plans are still limited, and funding is far below what's needed to secure lasting jobs and sustainable growth. Without such equity measures, public backlash could derail climate goals.

- **Capacity and data constraints** – Many emerging-market governments lack the technical and institutional capacity to identify bankable green projects or monitor climate outcomes. Data gaps on emissions, project pipelines, and performance tracking hinder evidence-based policymaking. Regulators are still building systems for climate disclosure and supervision, meaning policies often outpace implementation capacity. Strengthening institutional expertise and data infrastructure is therefore vital.

In summary, the public sector's perspective centers on how to guide and catalyze the transition at a societal level – crafting the right incentives, safeguards, and partnerships. They must instill confidence that if the private sector steps up with capital, there will be supportive policy frameworks and risk-sharing in place. It is a delicate balancing act between ambition and realism, speed and stability, global goals, and local conditions.

2.Emerging Opportunities

2.1 Key Transitioning Sectors

Decarbonizing energy intensive industries is not only crucial for climate goals but also a major market opportunity. Across key sectors – steel, oil & gas, power generation, and cement – the transition to cleaner technologies demands *trillions of dollars* in investment, opening avenues for lenders and investors[19]. Below, we outline the transition potential in steel, oil & gas, power, and cement, with case studies illustrating commercial prospects and financing opportunities in each.

Steel: Toward Green Steel and Hydrogen DRI

The steel industry accounts for 7–8% of global CO_2 emissions, making it a prime target for transition efforts. The traditional coal-fired blast furnace route is carbon-intensive, but emerging technologies like hydrogen-based Direct Reduced Iron (DRI) and electric arc furnaces (EAFs) powered by renewables promise drastic emission cuts. The commercial potential for "green steel" is immense. Studies suggest that the cost impact of green steel on many end products is relatively small. For example, several analyses have found that using near-zero-emission steel would increase the total cost of a passenger vehicle or a typical building by well below 1% [20], even though the steel itself may carry a significant price premium. By 2030, DRI is expected to account for around 10% of global iron production [21], with some industry outlooks projecting a higher share as new DRI-EAF capacity comes online.

The business case for hydrogen-based DRI is driven by growing demand for low-carbon steel and the need to manage future carbon policy risks, including CBAM. However, project economics remain sensitive to EAF electricity costs and the supply of high-grade iron ore, which are among the key factors determining the competitiveness of green steel production.

- Sweden's **HYBRIT** project (a joint venture of SSAB, Vattenfall, and LKAB) delivered the world's first batch of fossil-free steel in 2021, using hydrogen instead of coal. This steel was supplied to Volvo for prototype vehicles, marking a breakthrough that "looks to revolutionize an industry" that had been dependent on coal[22]. SSAB issued Sustainability-Linked Bonds totaling SEK 2,100 million in 2023 and subsequently issued Green Bonds of SEK 2,800 million in 2025, under its expanded Green and Sustainability-Linked Finance Framework aligned with SBTi targets. [23]
- **Stegra (formerly H2 Green Steel)** has secured approximately EUR 6.5 billion in committed financing by 2024 for its hydrogen-based DRI and green steel facility. The project has attracted substantial customer demand

Case Study: HYBRIT (Sweden)

Launched in 2016 by SSAB, LKAB, and Vattenfall, HYBRIT aims to produce fossil-free steel using hydrogen instead of coal. The project is financed through a **blend of industrial investment and public funding**. The three owners jointly provided early capital (around SEK 1.7 billion), while the **Swedish Energy Agency** supported both pilot and demonstration phases with over **SEK 3 billion** in grants. In 2023, HYBRIT also secured **€143 million from the EU Innovation Fund**, covering part of the first industrial-scale plant in Gällivare.

Lessons learned:

- Cross-sector partnerships align energy, mining, and steel interests.
- Public grants are essential to de-risk new technology and attract private capital.
- A phased approach—pilot, demonstration, then commercial scale—builds confidence.
- Integration of renewable electricity and hydrogen infrastructure is critical for cost and scalability.

Key takeaway: HYBRIT shows that successful transition finance in heavy industry requires shared industrial commitment, strong state support, and structured scaling to move from innovation to commercial reality.

through long-term offtake agreements. However, cost overruns and construction delays have led to liquidity pressures, prompting the company to seek an additional EUR 1.4 billion financing package in 2026. Although the plant has yet to begin commercial production, the project highlights both the commercial potential and execution risks of first-of-a-kind green industrial investments.

- **Baowu Group** commissioned a 1 million-tonne-per-annum hydrogen-capable DRI-EAF facility in Zhanjiang, Guangdong, which entered full operation in 2025. The project achieved a metallisation rate above 94% and is expected to reduce CO_2 emissions by 50–80% relative to conventional blast furnace steelmaking. Baowu benefits from significant scale and integration advantages, enabling a phased transition toward hydrogen-based ironmaking. However, the long-term competitiveness of the pathway will depend on the cost and reliability of low-carbon hydrogen supply, which remains a key constraint for wider deployment.

Oil & Gas: Shifts in markets and business models

The net zero transition is reshaping the value chain across **upstream**, **midstream**, and **downstream** operations in the oil and gas industry.

- **Upstream:** Exploration intensity is expected to decline in the medium term, reducing rig utilization and asset value. Efficiency and decarbonization measures—particularly methane abatement and electrification—are becoming core investment areas. Offshore support vessels are being repurposed for offshore wind services, while onshore fields increasingly use renewable power or grid electricity to replace diesel generation.

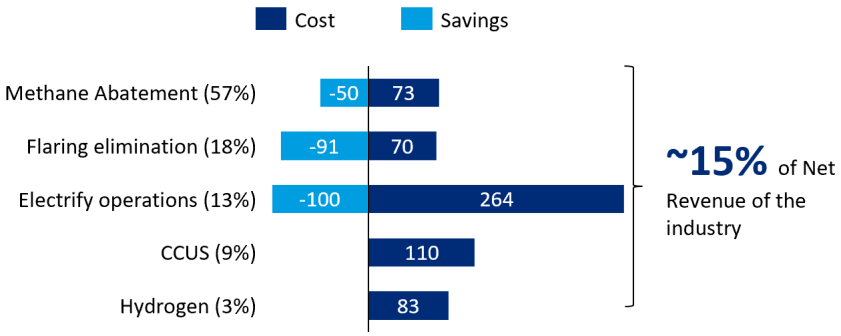
- **Midstream:** Pipeline networks and storage systems are adapting to new molecules—hydrogen, CO_2, and biofuels. Hydrogen blending (up to 25% in pilot projects) and CO_2 transport infrastructure for CCUS hubs are expanding. Traders are shifting toward low-carbon LNG and hydrogen, supported by national policy incentives and pilot trading platforms.

- **Downstream:** Refineries are upgrading for green operations, energy efficiency, and carbon utilization in chemical production. Demand for sustainable aviation fuel (SAF), bio-based plastics, and recycling technologies is rising. Retail fuel stations are transforming into integrated "energy service hubs" offering EV charging and hydrogen refuelling.

- These shifts create significant financing needs and commercial opportunities in emission reduction, fuel diversification, and low-carbon infrastructure — investments that, importantly, remain **well within the financial capacity of oil and gas companies** to undertake.

According to the International Energy Agency's *Emissions from Oil and Gas Operations in Net Zero Transitions* (2023), the sector can halve its operational emissions by 2030 through five key levers. Reducing methane emissions is the most impactful action to cut overall emissions (57%) from oil and gas operations, with flaring elimination and electrification following closely behind. Meanwhile, scaling up CCUS and increasing the use of low-emission hydrogen serve as complementary measures—offering substantial spillover benefits across the broader energy transition by accelerating deployment, driving cost reductions, and advancing technological learning.

Figure: Emissions reductions (%) and cost-savings (Bn US$) of five key levers, 2022–2030



Source: Emissions from Oil and Gas Operations in Net Zero Transitions, IEA 2023

Achieving a 50% reduction in the emissions intensity of oil and gas operations by 2030 will require approximately USD 600 billion in upfront investment, equivalent to just **15% of the net profits** the industry earned in 2022. The first three measures—methane, flaring, and electrification—account for over two-thirds of the achievable cuts at the lowest cost, adding less than USD 2 per barrel of production cost while often improving efficiency or generating revenue from recovered gas.

Oil and gas companies are reinventing themselves for a low-carbon future, which creates significant financing needs in clean energy, carbon capture, and transition technologies. While the core business of oil & gas still generates substantial cash (often reinvested in fossil assets), many firms now view decarbonization as a *new profit center*.

- **Methane Abatement**

  Business and technology opportunities in methane abatement are expanding as oil and gas firms invest in practical, high-return solutions. These are increasingly supported by **digital monitoring platforms** that verify reductions and enable carbon-credit trading. Together, such technologies turn methane control from a compliance cost into a commercially attractive, revenue-generating activity.

- **Flaring Elimination**

  Recovering and monetizing flare gas can deliver near-term abatement and new revenue. **Saudi Aramco** has implemented one of the world's largest flare-gas-reduction programs at its Ghawar field, the biggest onshore oil field globally. By installing **flare-gas-to-power and gas-recovery systems**, the company captures previously flared associated gas and channels it into on-site power generation and processing units. This initiative has **cut flaring volumes by more than 50%**, equivalent to several million tonnes of CO_2-equivalent emissions avoided annually. Beyond its environmental benefits, the project also delivers **economic returns**: recovered gas is monetized as fuel and feedstock, and the improved energy balance enhances operational resilience.

- **Electrifying Operations**

  CNOOC is integrating offshore wind power into its Bohai Sea oil and gas platforms to reduce emissions and fuel costs. By connecting platforms to nearby wind farms and developing projects such as the "Haiyou Guanlan" floating wind-power platform, CNOOC replaces diesel and gas-fired generators with clean electricity. The initiative has already supplied "green power" to most Bohai production sites and is part of CNOOC's broader plan to build multi-energy offshore hubs combining oil, gas, and renewables. Even without subsidies, the project yields an 8–12% IRR, driven by fuel-cost savings and carbon avoidance revenues.

  Switching from diesel or gas-fired generators to grid or renewable power offers clear cost and emission benefits. Additional opportunities include co-investment in hybrid renewable microgrids and "electrification-as-a-service" models for remote sites, where service providers supply clean power under long-term contracts. Local renewable IPPs can also gain stable returns

through power purchase agreements (PPAs) with oil companies—making electrification a practical and profitable step in the low-carbon transition.

The oil and gas transition is shifting from a compliance narrative to a **commercial reinvention**. Globally, companies are leveraging their engineering and project-management strengths to build low-carbon infrastructure—CCUS hubs, hydrogen pipelines, renewable microgrids, and biofuel plants. For investors, this represents an expanding field of **transition.**

Power and Heat: Managed coal phase-out

Driven by electrification and an unprecedented boom in renewables, clean energy investment reached an estimated USD 2 trillion in 2024[24]. For financial institutions, utility-scale renewables backed by long-term power purchase agreements (PPAs) represent mature, stable investments. Concurrently, upgrading grids and energy storage to integrate intermittent power—amplified by the data demands of AI—presents a rapidly growing frontier in infrastructure finance.

However, coal still generates over one-third of global electricity, with capacities rising across Asia. Clean expansion alone is insufficient; financial markets must manage the orderly, viable, and socially responsible phase-out of existing coal assets while balancing grid reliability, heat supply, and community livelihoods.

Beyond the three traditional coal-mitigation pathways—capital-intensive carbon capture (CCS), low-carbon fuel co-firing, or early retirement—a fourth alternative is emerging: **clean thermal repowering**.[25] Instead of full decommissioning, this approach replaces the coal boiler with zero-carbon heat sources (such as small modular nuclear reactors, advanced geothermal, or molten-salt storage) while reusing existing steam turbines, regulatory permits, workforce talent, and high-voltage grid infrastructure. By capturing this structural arbitrage, developers can drastically cut CAPEX and permit timelines compared to greenfield projects.

Case Study 1: Poland's DEsire Project (Coal-to-Nuclear Repowering)

Launched under the national "Gospostrateg VI" program (2022–2025), **DEsire Project** provides a scalable framework for converting retired brownfield coal plants into nuclear sites using Small Modular Reactors (SMRs) or Generation III+ units. Developed by a consortium including the Silesian University of Technology and the Ministry of Energy, it serves as a leading model for managed coal phase-out through three core lessons:

- **Government-Led Strategy with Asset Owner Engagement:** Successful coal-to-nuclear conversion requires a comprehensive national framework and close institutional coordination to provide long-term regulatory certainty for utilities.
- **Value Unlocking via Financial and Infrastructure Arbitrage:** Reusing legacy brownfield infrastructure—such as high-voltage grid connections, switchyards, and cooling systems—creates significant financial arbitrage by saving developers 15% to 30% in overnight CAPEX and bypassing grid interconnection backlogs.[26]
- **De-Risking via a Managed Just Transition Play:** By retaining and upskilling the existing regional utility workforce rather than executing abrupt plant closures, the model eliminates mass severance liabilities and lowers the socio-political risk premium for institutional capital.

Case Study 2: CHN Energy's Suzhou Project (Thermal Energy Storage Retrofits)

While complete brownfield repowering addresses retiring assets, operating coal fleets require deep retrofits to support clean energy expansion. Commissioned by CHN Energy at its Suzhou Power Plant in Anhui Province, this 1,000 MWh coal power plus molten salt energy storage project stands as the world's

largest system of its kind. The system enables "heat-power decoupling," allowing the plant to cycle down to a 30% electrical load during high renewable generation periods while maintaining full industrial heating output. Structurally, this operational flexibility allows the local grid to accommodate an additional 128 million kWh of variable renewable power annually and directly offsets 85,000 tons of carbon dioxide emissions.

Key Takeaway: Both projects demonstrate that legacy brownfield assets hold measurable financial value. By funding bridging infrastructure that converts coal plants into clean baseload sites, transition finance achieves structured returns while bypassing the high costs and grid bottlenecks of greenfield construction.

Cement: Low-Carbon Materials and Carbon Capture

Cement production is one of the hardest industries to decarbonize (accounting for ~7% of CO_2 emissions) due to the CO_2 released from limestone calcination. Over recent years the industry's carbon intensity reductions have been modest and, in some geographies, the absolute emissions have even increased — underscoring the urgency of deploying deeper transformation levers.

The Global Cement & Concrete Association (GCCA) 2050 Roadmap identifies key levers to drive the decarbonisation of this 'hard-to-abate' sector. Four major "CO_2-emission reduction levers" are highlighted:

- **Clinker production savings** – reducing the ratio of clinker (the most emission-intensive component of cement) by substituting with alternative raw materials or increasing the use of supplementary cementitious materials (SCMs). One of the most promising examples is **LC3 (Limestone Calcined Clay Cement)**. In 2025, **CBI Ghana**, in partnership with Heidelberg Materials, commissioned the world's largest calcined clay production facility, enabling large-scale production of low-carbon cement with up to 40% lower emissions than conventional Portland cement. The project demonstrates how lower-clinker cement pathways can deliver meaningful emissions reductions while improving resource efficiency, reducing reliance on imported clinker, and creating a commercially attractive decarbonisation opportunity for emerging markets.

- **Cement and binder efficiency** – redesigning cement formulations, optimising binder use and improving mixing/production practices to reduce total cementitious input per volume of concrete. Leading producers including **Holcim's ECOPact** combine optimised mix designs and lower-carbon binders to reduce embodied carbon while maintaining performance requirements. The product has been deployed across major infrastructure and building projects worldwide, demonstrating how material innovation can deliver emissions reductions without requiring major changes to construction practices.

- **Carbon capture, utilisation and storage (CCUS) plus decarbonised power** – applying capture technologies at kiln exhausts, switching to low-carbon electricity and fuels (e.g., biomass, waste-derived fuels) and storing or utilising CO_2. The most prominent example is **Heidelberg Materials' Brevik CCS project in Norway**, which became the world's first industrial-scale carbon capture facility at a cement plant in 2025. The facility is expected to capture approximately 400,000 tonnes of CO_2 annually, equivalent to around 50% of the plant's emissions. Supported by Norway's Longship programme and the Northern Lights CO_2 transport and storage network, the project illustrates how public-private partnerships and innovative financing can accelerate deployment of frontier decarbonisation technologies.[27]

- **Material efficiency and demand-side measures** – reducing the total demand for cement and concrete through design innovation, reuse/recycling of concrete, and improved efficiency in construction and demolition. **Noida International Airport adopted LC3 cement supplied by JK Cement in 2025**, becoming India's first large-scale infrastructure project to deploy the low-carbon material. LC3 can reduce cement-related emissions by up to 40% by replacing a significant share of clinker with calcined clay and limestone while maintaining comparable performance. The project illustrates how procurement decisions by major infrastructure developers can help create demand for low-carbon construction materials, providing market signals that support investment in cleaner production pathways across the cement sector.

Together, these levers create a portfolio of transition opportunities. Lower-clinker cement solutions such as LC3 can deliver immediate emissions reductions with relatively low capital requirements and strong commercial viability, while technologies such as CCS offer a pathway to address residual process emissions. As carbon regulations tighten and demand for low-carbon construction materials grows, both mature solutions and frontier technologies are attracting investment through sustainability-linked instruments, green bonds and other transition finance mechanisms. Together, they demonstrate how decarbonisation in the cement sector is evolving from a compliance challenge into a growing commercial opportunity.

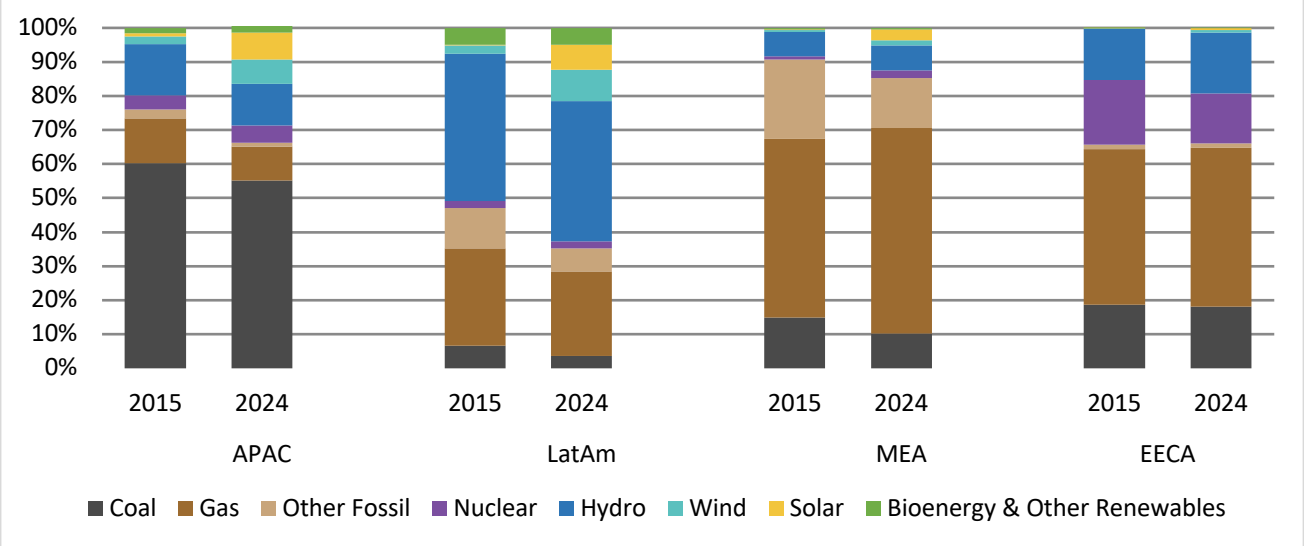
2.2 Mapping Regional Opportunities

The commercial and technical pathways to net-zero vary significantly by geography due to distinct asset lifecycles, resource endowments, and regional macro-fiscal realities. This section outlines the primary structural opportunities, capital deployment entry points, and validated transaction models across four macro-regions.

Takeaways for Transition Capital Allocators

Data compiled from EMBER's global tracking[28] reveals stark structural disparities in grid composition across key geographies:

Figure: Electricity generation mix by region (2015 vs 2024)



Source: EMBER Data Methodology, Global Electricity Review 2024.

- **APAC Reaching an Accelerated Tipping Point:** Between 2015 and the present, APAC has cut its total dependency on fossil generation by a substantial 12%. The rapid scaling of solar and wind means that transition investments must pivot from financing alternative capacity to structural grid integration, battery storage, and active coal retirement mechanisms.
- **Latin America Reaffirming Matrix Leadership:** Already starting from a highly decarbonized baseline, LatAm continues to push its clean electricity mix upward. This structural insulation from heavy power sector emissions means that the transition finance framework here should target end-use sectors like heavy industrial green hydrogen and land-use frameworks.
- **MEA Requires Structural De-Risking:** The Middle East and Africa region exhibits a persistent, high baseline dependency on fossil fuels. This slow organic displacement indicates that transition finance instruments must tackle structural financial de-risking to make large-scale clean utilities competitive against subsidized domestic hydrocarbons.
- **EECA's Infrastructure Stagnation Needs MDB Intervention:** The lack of major multi-year movement across the Eastern Europe and Central Asia region indicates severe capital blockages. Transition finance cannot expand organically here; it requires Multilateral Development Banks (MDBs) to deploy credit guarantees that absorb structural risks, while leveraging policy loans to mandate the regulatory and subsidy reforms needed to make commercial private investment viable.

Regional Archetype Matrix

The table below serves as the analytical anchor, demonstrating that a region's structural bottleneck directly determines the financial instrument required.

Region	Primary Emissions and Drivers	Primary Structural Bottleneck	Dominant Transition Finance Instrument
Asia-Pacific (APAC)	Power generation (coal-heavy) and industrial manufacturing (steel, cement, chemicals).	Asset Lock-In: Exceptionally young coal fleet infrastructure (~13–15 years average age) with decades of remaining unamortized debt and economic life.	Blended Transition Funds & SLBs: Managed early retirement mechanisms (e.g., ETM) and Sustainability-Linked Bonds pegged to strict industrial decarbonization KPIs.
Latin America & Caribbean (LatAm)	Agriculture, Forestry, and Other Land Use (AFOLU), alongside heavy transport networks.	Macro-Fiscal Constraints: Volatile local currencies and high sovereign risk premiums that artificially inflate the upfront cost of capital for green infrastructure.	Sovereign Debt-for-Climate Swaps: Performance-linked sovereign bonds and nature-focused debt restructurings that free up domestic fiscal capacity.
Middle East & Africa (MEA)	Oil & gas extraction/refining (Middle East); widespread energy poverty and reliance on biomass (Sub-Saharan Africa).	Dual Extremes: Pervasive fossil-fuel subsidy regimes anchoring national grids (ME) vs. extreme greenfield financing deficits and lack of transmission grids (Africa).	First-Loss Blended Capital & Co-Investment Funds: Concessional MDB risk guarantees to crowd in private equity, alongside state-backed sovereign wealth platforms.
Eastern Europe & Central Asia (EECA)	Centralized municipal district heating networks and inefficient legacy heavy manufacturing.	Brownfield Inefficiencies: Aging, centralized Soviet-era infrastructure (>35 years average age) requiring deep capital injections just to retrofit.	MDB Risk-Sharing Facilities: Multilateral-backed project bonds and partial credit guarantees to lower risk profiles for municipal utility upgrades.

Case Studies for Target Entry Point

Asia-Pacific (APAC): The Repurposing and Retrofit Arbitrage

- Target Entry Point: Synthetic Buyouts for Coal-to-Clean Repurposing.
- The Commercial Mechanism: Allocators target young, regulated-tariff coal plants ($150–600 MW, average age under 15 years) operating under fixed Power Purchase Agreements (PPAs) that create legal and financial lock-in. A specialized transition vehicle acquires a controlling stake, structures an early retirement timeline (compressing the asset's lifespan from 30 years to 10–12 years), and immediately uses the locked-in PPA cash flows to anchor the development of co-located solar, wind, and utility-scale battery storage.[29] [30]
- The Alpha Driver: By leveraging existing grid-interconnection permits, land rights, and transmission infrastructure, developers eliminate up to 30% of standard greenfield development costs and bypass multi-year grid queue bottlenecks.

> Precedent: This model is actively proven by the Asian Development Bank's (ADB) Energy Transition Mechanism (ETM) and the Just Energy Transition Partnerships (JETP) in Southeast Asia. For instance, the landmark agreement to prematurely retire the 660 MW Cirebon 1 coal plant in Indonesia serves as a definitive structural blueprint for synthetic PPA buyouts.

Latin America & Caribbean (LatAm): Supply Chain and Logistics De-Risking

- Target Entry Point: FX-Protected Sustainability-Linked Logistics Infrastructure.
- The Commercial Mechanism: Capital is deployed into midstream transport fleets and agricultural logistics hubs to execute deep decarbonization mandates. Because local-currency volatility historically stalls international private equity in LatAm, investments are structured via onshore local-currency Sustainability-Linked Loans (SLLs) backed by a third-party development finance institution (DFI) providing a subsidized FX-hedging or first-loss currency guarantee.[31]
- The Alpha Driver: The interest coupon is structurally indexed to dual performance indicators: verified zero-deforestation across the corporate supply chain and fleet emissions reductions via electrification[32]. This structure insulates institutional investors from currency tail-risks while offering a 25–50 basis point step-up in yield if targets are missed, cleanly aligning impact underperformance with financial compensation.

> Precedent: The use of macro-de-risking mechanisms to unlock private transition equity is validated by IDB Invest and TCX (The Currency Exchange Fund). TCX specializes in providing the exact local-currency risk-hedging and cross-currency swaps required to protect international investors against extreme FX volatility in emerging markets.

Middle East & Africa (MEA): Hydrocarbon Decoupling and Localized Processing

- Target Entry Point: Sovereign-Backed Industrial CCUS and Mining Mini-Grids.
- The Commercial Mechanism: This entry point operates on a dual track based on sub-regional resource profiles:
    - In the Middle East: Allocators enter via co-investment platforms alongside Sovereign Wealth Funds (SWFs) to finance the high upfront capital expenditures required for Carbon Capture, Utilization, and Storage (CCUS) retrofits on gas-fired chemical and refining infrastructure, turning legacy assets into low-carbon export hubs[33].

    - In Africa: Capital targets decentralized, behind-the-meter solar-plus-storage mini-grids powering critical mineral extraction sites (e.g., copper and lithium mines)[34].
- The Alpha Driver: Replacing high-cost, volatile diesel fuel logistics with localized renewable baseload provides the mine operator with immediate OPEX savings, allowing the transition fund to secure stable, long-term infrastructure yields backed by hard-currency commodity off-take agreements.

Precedent: In the Middle East, this is validated by state-backed commercial joint ventures, such as Masdar (Abu Dhabi Future Energy Company) and Saudi Aramco's multi-billion-dollar allocations into commercial CCS hubs. In Africa, the behind-the-meter mining play is actively validated by commercial operators like CrossBoundary Energy and Infraco Africa, who deploy private capital into solar-plus-storage hybrids directly at remote mining sites, legally structured through hard-currency corporate PPAs.

Eastern Europe & Central Asia (EECA): Brownfield Efficiency and Interconnection

- Target Entry Point: MDB-Guaranteed Third-Party Energy Service Company (ESCO) Assets.
- The Commercial Mechanism: Instead of taking direct municipal or sovereign balance-sheet exposure, transition finances specialized ESCO structures targeting aging Soviet-era municipal district heating networks and heavy industrial pumping systems. The ESCO executes deep thermal retrofits—replacing inefficient boilers with industrial heat pumps and upgrading insulated piping systems—guaranteeing a specific percentage reduction in thermal loss.
- The Alpha Driver: Private capital is paid back directly out of the verified, long-term utility cost savings generated by the upgraded infrastructure. To protect against municipal payment or liquidity defaults, the mechanism is wrapped in a Multilateral Development Bank (MDB) second-loss guarantee, converting a high-risk brownfield retrofit into a highly predictable, credit-enhanced yield play.[35][36]

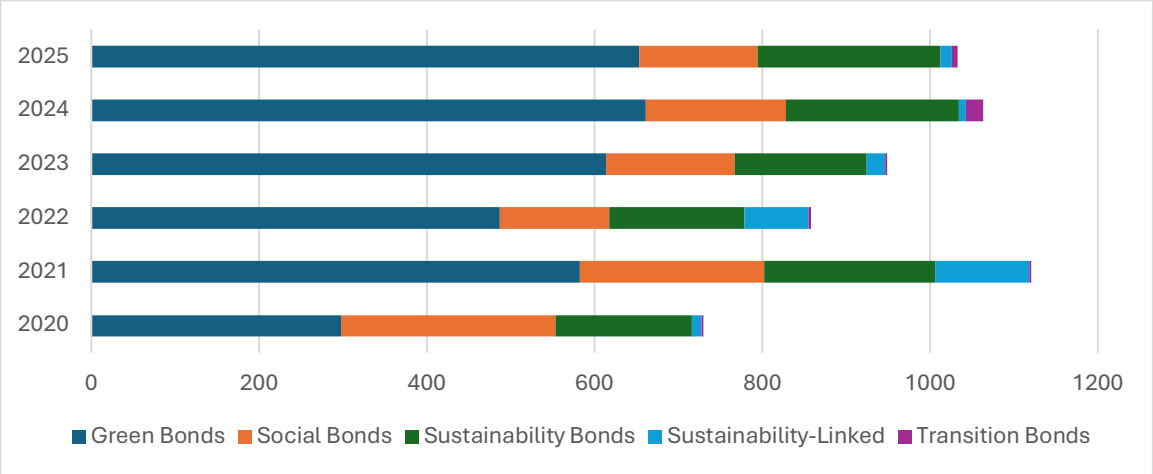
Precedent: Third-party ESCO risk-sharing models backed by multilateral guarantees are the core operational modality of the European Bank for Reconstruction and Development (EBRD) through its Green Cities framework, and the International Finance Corporation (IFC).

2.3 Financial Innovations Supporting the Transition

The financial sector has developed **innovative products and frameworks** tailored for decarbonization. From 2020 to 2025, the global sustainable bond market holds steady, with 2021 marking a peak driven by pandemic recovery and supportive policies such as the EU Green Deal and China's green finance taxonomy.

Green bonds remain the cornerstone of the sustainable finance market, with annual issuance consistently reaching **USD 650–660 billion**. Social and sustainability bonds follow, together accounting for approximately **USD 300 billion** in annual issuance. Meanwhile, sustainability-linked and transition bonds have emerged as important growth areas, reflecting both increasing investor interest in transition-related opportunities and evolving market dynamics. This section highlights key financial innovations—including transition bonds, sustainability-linked instruments, and other emerging tools—and examines their market development, issuance trends, and distinctive characteristics.

Figure: Global Green, Social and Sustainable Bonds Issuance 2020 to 2025, (USDm)



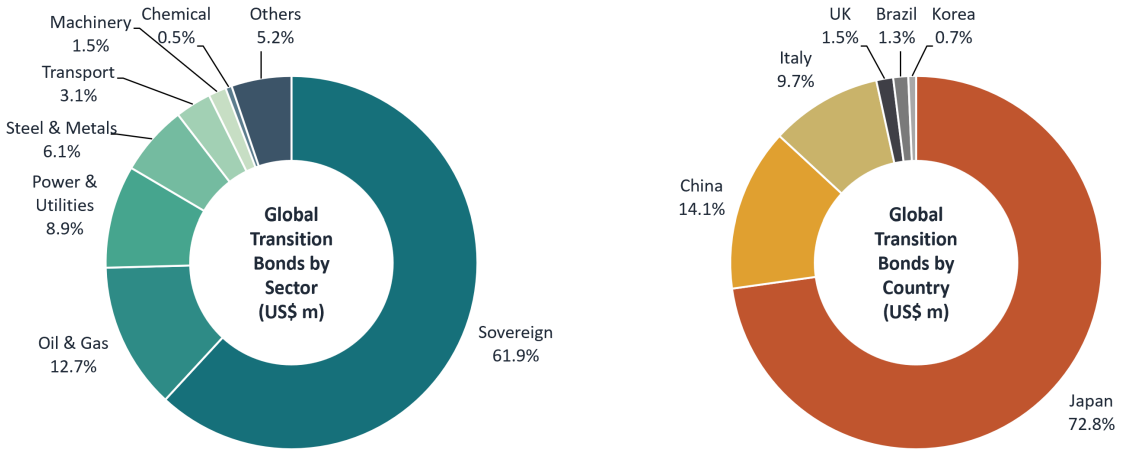
Source: Environment Finance, CBI, ICMA, Bloomberg, Individual Bond Issuers

Transition Bonds Market Overview

Transition bonds are use-of-proceeds instruments engineered to enable carbon-intensive industries to finance credible, multi-decade decarbonization pathways. While still representing a nascent niche within the broader sustainable debt market, issuance has scaled rapidly. Cumulative global issuance has progressed from an initial baseline of approximately USD 4 billion to more than USD 38 billion today.

As captured in Figure below, the market exhibits high concentration metrics across both structural and geographical axes. **Japan** represents the foundational anchor of the global market, accounting for **72.8%** of total historical geographical issuance. Concurrently, **Sovereign** issuances comprise **61.9%** of all global allocations. This deep structural alignment emphasizes the critical role of public-sector capitalization in establishing localized transition finance taxonomies and absorption frameworks before commercial corporate issuance can organically scale.

Figure: Global Transition Bond Market by Sector and Country by 2025



Source: CBI, Individual Bond Issuers

National Case Studies: Japan and China

From 2024 through 2025, the Japanese government executed the issuance of over USD 23.7 billion in sovereign **Japan Climate Transition Bonds** (JCTBs). This historic mobilization serves as the operational mechanism for its JPY 20 trillion (~USD 150 billion) Green Transformation (GX) Economy Transition Strategy. These sovereign funds are explicitly structured to finance front-end research and development (R&D) alongside industrial subsidy programs. By focusing public funds on breakthrough initiatives deemed "truly difficult" for private actors to undertake in isolation, Japan has established an influential blueprint for state-backed transition mechanisms.

In parallel, Chinese corporate and banking entities have taken a proactive market-building role, accounting for **14.1%** of global transition debt placement. Under a targeted pilot program spearheaded by **National Association of Financial Market Institutional Investors** (NAFMII), China introduced interbank transition bonds tailored to provide lower-carbon modernization capital to high-emitting industries.[37][38] A milestone transaction materialized in 2023 when the **Bank of China (BOC)** issued a **EUR 300 million global transition bond** via its Luxembourg branch. As the world's first transition finance bond dedicated to the iron and steel sector, the proceeds were allocated to a flagship steel-scrap recycling project for the **Hebei Iron and Steel Group**. Backed by BOC's strong credit rating, the financing cost dropped to 4%—saving 1–2 percentage points against the corporate offshore baseline—proving cross-border capital's ability to optimize heavy industrial transition costs.

Evolving International Standards and Quality Controls

To protect market integrity against "transition-washing" or simple legacy asset rebranding, global underwriting standards have sequentially strengthened:

- **ICMA Guidelines:** The International Capital Market Association (ICMA) updated its *Climate Transition Finance Handbook* to enforce strict criteria regarding science-based emission targets and organizational transition transparency. ICMA reinforced this momentum by codifying targeted *Climate Transition Bond Guidelines* to provide explicit governance overuse-of-proceeds verification.
- **Climate Bonds Initiative (CBI):** The implementation of *Climate Bonds Standard Version 4.0* systematically formalized localized sector pathways. Under this rigorous architecture, corporate placement within legacy brackets—such as steel, cement, chemistry, and aviation—must conclusively prove alignment with science-based 1.5°C multi-year carbon trajectories to achieve standard certification.

Looking ahead, the use-of-proceeds transition structure is positioned for sustained geographic and volume expansion. For institutional capital markets, these instruments provide a vital, transparent risk-mitigation tool to fund real-economy decarbonization within hard-to-abate sectors while enforcing structural accountability through mandatory post-issuance impact tracking. As technical taxonomies harmonize globally and project pipelines mature, transition bonds will serve as an indispensable bridge connecting legacy industrial operations to a net-zero future.

Sustainability-Linked Instruments

Core Mechanics and Market Dynamics

Sustainability-linked bonds (SLBs) and sustainability-linked loans (SLLs) fundamentally diverge from traditional green instruments by tying financial terms directly to a borrower's achievement of predefined Sustainability Performance Targets (SPTs). Instead of earmarking or ring-fencing proceeds for specific green assets, these instruments provide general corporate-purpose capital. Financing terms—such as coupon step-ups, step-downs, or margin discounts—are pegged to verified Key Performance Indicators

(KPIs). This structural flexibility enables capital raising to align directly with whole-of-entity ESG roadmaps, making them highly attractive for carbon-intensive companies undergoing complex operational retrofits.

While the SLB market expanded aggressively over the past five years, exceeding USD 130 billion in annual issuance in 2022, the asset class cooled significantly through 2023 and 2024. This contraction was driven by escalating investor scrutiny regarding the ambition of targets, "weak" structural penalties, and the overall credibility of embedded KPIs. In response, international standard-setters are reinforcing performance benchmarks and penalty parameters to safeguard market integrity and ensure material environmental impact.

The Ascent of Sustainability-Linked Loans (SLLs)

SLLs have experienced a strong uptake in Asia, where commercial banks and sovereign borrowers utilize them to integrate ESG criteria into mainstream corporate revolving lines and term facilities. Although data methodologies vary across indexing platforms, annual issuance of SLLs has averaged around USD 300 billion globally. SLLs have consistently outpaced traditional project-specific green loans by volume, accounting for over 70% of total sustainable loan activity in 2024, compared with less than 20% for green loans in highly localized corporate debt datasets [39]. This dominance reflects the growing corporate demand for performance-linked debt that incentivizes comprehensive operational transformation.

Prominent corporate applications demonstrate this transition utility:

- **Trafigura:** The global commodities trader has secured multiple syndicated SLL tranches legally tied to corporate-wide emissions intensity and governance parameters, including progressive compliance metrics tracking the reduction of Scope 3 supply-chain emissions.
- **Pertamina:** In Indonesia, the state-owned oil and gas enterprise arranged a large-scale SLL with preferential interest margins strictly linked to aggressive renewable energy capacity deployment and absolute greenhouse gas (GHG) reduction milestones—marking one of Southeast Asia's most prominent applications of entity-level, transition-aligned bank financing.

Complementary Financing Innovations: Transition Factoring

Complementing these general corporate-purpose tools, the transition finance ecosystem is rapidly diversifying into specialized trade finance and supply-chain structures. In March 2026, **DBS Bank (China)** extended a landmark **RMB 1.776 billion (~USD 250 million)** transition factoring facility to CES International Financial Leasing, fully aligned with the *Shanghai Transition Finance Catalogue*.

The proceeds funded the acquisition of highly fuel-efficient cargo aircraft for China Cargo Airlines, establishing verifiable emissions reduction efficiency as a core, traceable KPI. Structurally, the transaction establishes a product innovation benchmark through its lease-receivables factoring mechanism. It demonstrates how advanced commercial banking solutions can secure closed-loop funds tracking to optimize capital costs for heavy industrial and supply-chain decarbonization.

Blended Finance and Specialized Funds

Blended finance structures—combining public, concessional, or philanthropic capital with private investment—are critical to scaling transition efforts, especially in emerging markets and high-risk technologies. They de-risk early-stage projects in sectors like hydrogen, CCUS, and clean industrial heat.

Several institutional vehicles illustrate the shift towards transition-finance at scale: the Climate Investment Funds (CIF)' Industry Decarbonization Programme targets heavy emitters, and the ADB-led Energy Transition Mechanism supports coal-phase-out in Asia-Pacific as previously mentioned. Private investment is also moving sizable infrastructure and energy-transition funds are now being structured,

many targeting asset-repurposing (e.g., hydrogen or CO_2 transport pipelines) in the US $1-2 billion+ range, though publicly documented examples remain emerging.

Complementary innovations include carbon-offtake agreements to underwrite CCUS projects and sustainability-linked derivatives that embed ESG triggers in hedging contracts. Policy-driven vehicles such as green banks, loan guarantees, and **central-bank facilities in the EU[40], China[41], and Japan[42]** further amplify capital deployment—offering low-cost funding or preferential treatment for green and transition lending, thereby de-risking projects, lowering capital costs, and scaling finance toward high-impact decarbonization sectors.

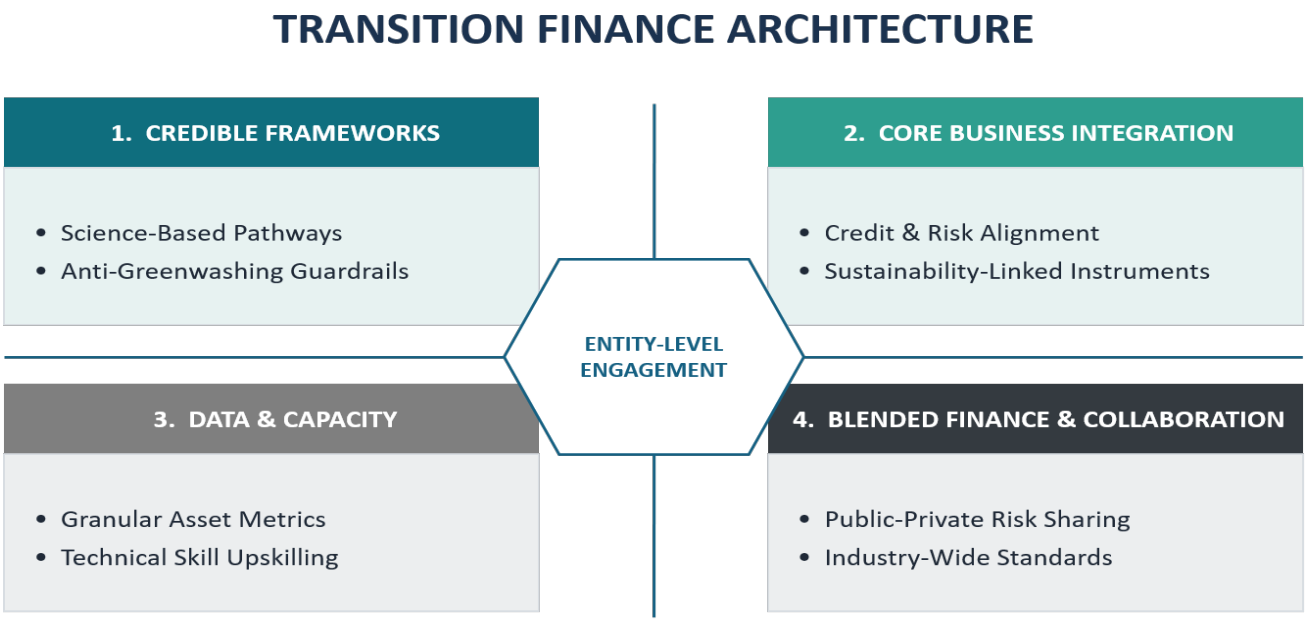
These mechanisms not only unlock finance but also improve bankability and scalability of complex, capital-intensive transition assets. As global regulation matures—with EU taxonomy updates, China's SOE transition guidelines, and GFANZ frameworks—these innovations will underpin the next wave of transition finance, linking commercial returns with measurable climate progress.

3.Strategies for Bridging Ambition and Execution

To bridge the gap between global climate ambition and execution, a massive scale-up in transition finance is essential. Current investment flows into emerging markets and developing economies remain significantly below the requirements for a net-zero trajectory, highlighting a critical structural underfinancing of the assets most consequential to global emissions.

Addressing this structural underfinancing is now a global priority, with market momentum pivoting toward emerging national and regional taxonomies designed to align capital allocation with credible, net-zero transition pathways. For financial institutions, capitalizing on this shift requires moving from simple divestment to active, structured engagement with high-emitting clients. This report outlines **four validated strategic pillars** to institutionalize, scale, and de-risk transition finance, aligned with leading international frameworks.

Figure: The Four Strategic Pillars



Sources: NGFS, GFANZ, IEA, UNEP FI

3.1 Establish Credible Frameworks and Guardrails

Because "transition" finance involves funding currently high-emitting assets, it requires more rigorous safeguards than traditional green finance to mitigate the risk of "transition-washing." Market standards now provide specific structures to ensure these transactions lead to real-world decarbonization.

- **Adopt Evidence-Based Pathways:** Assess client decarbonization targets against established science-based benchmarks like the IEA Net Zero Roadmap, restricting financing to entities with verifiable, time-bound strategies. This requires a strategic focus on the exact sectoral and regional pathways where your institution's commercial exposures matter most.
- **Leverage Evolving Taxonomies:** Align internal product frameworks with emerging standards—such as the EU Commission Recommendations, ASEAN Transition Finance Guidance, or Japan's METI Guidelines—to clearly separate "green" activities from eligible "transition" activities.

- **Prevent Carbon Lock-In:** Conduct rigorous technical due diligence to ensure that capital provided for efficiency improvements does not inadvertently extend the economic lifespan of high-carbon assets beyond what is strictly required to bridge to low-carbon alternatives.

3.2 Embed Transition into Core Business Processes

Transition finance must be integrated directly into an institution's core operational plumbing rather than being treated as an isolated sustainability initiative. The Glasgow Financial Alliance for Net Zero (GFANZ) emphasizes that financial institution transition plans must bridge high-level targets with everyday products and decision-making [43].

- **Integrate Transition Risk into Credit Policies:** Incorporate a client's transition readiness into standard credit and underwriting assessments. A robust, forward-looking decarbonization plan should be viewed as a mitigant to future regulatory, carbon-pricing, and market risks.
- **Innovate Financial Products:** Expand offerings beyond standard green bonds to include Sustainability-Linked Loans (SLLs) and transition bonds. These feature pricing adjustments tied to audited Key Performance Indicators (KPIs), such as absolute emissions reductions.
- **Optimize Portfolio-Level Carbon Intensity:** Manage financed emissions strategically. Instead of immediate divestment—which merely transfers emissions to less regulated owners—institutions should back "brown-to-green" transformations that yield long-term value [44].

3.3 Build Specialized Capacity and Data Infrastructure

The execution of transition finance relies on granular asset-level data and sector-specific engineering expertise. Data indicates that while most institutions monitor climate metrics, few effectively utilize forward-looking targets to guide real-time transaction underwriting [45].

- **Enhance Client Emissions Data Ingestion:** Invest in platforms capable of verifying Scope 1, 2, and material Scope 3 emissions. Assign data leads within risk teams to standardize how transition plans are quantified and monitored.
- **Upskill Frontline Relationship Managers:** Equip sector-specific deal teams with the technical literacy required to evaluate emerging technologies, such as green hydrogen, carbon capture and storage (CCS), and industrial electrification.
- **Align with Standardized Disclosures:** Prepare internal reporting systems to align with global standards (e.g., ISSB). Consistent tracking of transition KPIs reduces regulatory friction and builds credibility with investors.

Framework Comparison

Traditional "Green" Finance	Emerging "Transition" Finance
Focuses on already low-carbon assets (e.g., solar, wind).	Focuses on decarbonizing high-carbon assets (e.g., steel, cement).
Evaluated at the isolated project level.	Evaluated primarily at the entity level (corporate business plan).
Primarily utilizes use-of-proceeds structures.	Heavily utilizes sustainability-linked and KPI-driven structures.

Strategic Takeaway: The ultimate measure of success in transition finance is active engagement. Financial institutions that build the capabilities to assess, fund, and steer high-emitting clients through their decarbonization journeys will capture a central position in the global reallocation of capital.

3.4 Leverage Collaborative Mechanisms

Transitioning heavy industry and energy infrastructure, particularly in emerging markets, often carries elevated risk profiles that private commercial capital cannot bear alone. International milestones have prioritized mobilizing private investments through structured co-investment platforms.

- **Address Blended Finance Limitations with Actionable MDB Partnerships:** While partnering with Multilateral Development Banks (MDBs) offers a theoretical pathway to de-risk projects, these structures remain bottlenecked by low scale, high complexity, and prohibitive transaction timelines. Financial institutions must actively advocate for, and co-design with, MDBs to standardize risk-sharing templates, deploy fast-tracked first-loss guarantees, and transition from bespoke, slow-moving deals to programmatic, platform-led entry points that allow commercial capital to scale efficiently. [46]
- **Collaborate with Project-Preparation and Public-Private Platforms:** Engage with or co-fund multilateral platforms and project-preparation facilities (PPFs)—such as South Africa's JET Funding Platform, IRENA's ETAF, and the Climate Policy Initiative's PPF Connector—which provide the grants, technical assistance, and rigorous due diligence necessary to build systemic capacity and deliver vetted, investor-ready project pipelines.
- **Participate in Global Initiatives:** Engage with GFANZ workstreams on transition planning or the Green Investment Principles (GIP) for the Belt and Road. These frameworks help standardize expectations and lower the transaction costs of cross-border transition deals [47].

Prospects

The global transition finance landscape is shifting from high-level ambition to a critical phase of execution. As market infrastructure matures, four key trends will define the future of capital allocation for net-zero goals:

- **Taxonomy Harmonization:** Evolving regional and national frameworks—such as the EU, ASEAN, Japan, and China taxonomies—are sequentially harmonizing. This alignment will reduce cross-border transaction costs and establish strict, unified guardrails against "transition-washing".
- **Rigorous Performance Instruments:** Evolving underwriting benchmarks like ICMA and CBI Standard are enforcing strict, Paris Agreement aligned pathways. Future market growth will favor highly transparent, entity-level instruments with robust penalties for target underperformance.
- **Platform-Led Blended Finance:** To bridge the massive funding gap in emerging markets, public-private partnerships must transition from slow, bespoke deals into standardized, platform-led models. Fast-tracked MDB risk-guarantees will be crucial to efficiently de-risk and crowd in private equity.
- **Commercialization of Industrial Retrofits:** Technological transformation across hard-to-abate sectors—such as green hydrogen DRI for steel, methane abatement in oil & gas, clean thermal repowering for coal, and calcined clay in cement—is progressively improving project economics, helping transition these deep decarbonization efforts from pure compliance costs into viable commercial propositions.

Sources:

[1] Net-zero Coalition, United Nations
[2] METI's *Basic Guidelines on Climate Transition Finance* (latest 2025 edition)
[3] MAS's supervisory *Guidelines on Transition Planning* for FIs
[4] 关于进一步强化金融支持绿色低碳发展的指导意见
[5] 关于金融支持新型工业化的若干意见
[6] Government-backed Sustainable Finance Taxonomy released in 2025
[7] Government support for a national taxonomy/guideline that separate "green" and "transition" activities (2024)
[8] Commission Recommendation (EU) 2023/1425 on transition finance
[9] ASEAN Transition Finance Guidance
[10] OECD, Independent High-Level Expert Group (IHLEG) on Climate Finance, 2023
[11] Accelerating Just Transitions for Coal Sector, IEA
[12] Fighting the Future: Short-Term Investors and Business Opposition to Climate Policy
[13] https://www.globalefficiencyintel.com/green-steel-economics
[14] Emerging Economies Need Much More Private Financing for Climate Transition, IMF
[15] Green investment needs in the EU and their funding, ECB
[16] Republican's megabill
[17] Over $13 billion in solar, wind investment at risk in Vietnam, industry letter says, Reuters
[18] Shift to solar comes at a price for Pakistan's national grid, Financial Times
[19] Hard-to-abate sectors must invest trillions to hit net zero, World Economic Forum
[20] IEA 2023
[21] Assuming DRI production (175mt), and global crude steel output (1.8-2.0bt) by 2030
[22] Sweden's HYBRIT delivers world's first fossil-free steel, Reuters
[23] SSAB press release, 2023, 2025
[24] World Economic Forum
[25] RePower Initiative
[26] https://projektdesire.pl/en/
[27] Heidelbergmaterials press release, 18 June 2025
[28] EMBER, Global Electricity Review
[29] ADB, The Energy Transition Mechanism (ETM): Retiring Coal Early and Scaling Up Clean Energy.
[30] Climate Policy Initiative (CPI), Financing the Managed Phase-Out of Coal-Fired Power Plants in Southeast Asia.
[31] The Financial Stability Board (FSB) & TCX, Managing Currency Risk in Transition Finance for Emerging Markets.
[32] IDB Invest, Sustainability-Linked Bonds: A Guide for Issuers and Investors in Latin America and the Caribbean.
[33] IRENA, Renewable Energy Market Analysis: GCC Region.
[34] IEA, The Role of Critical Minerals in Clean Energy Transitions' & 'Africa Energy Outlook.
[35] EBRD, Financing District Heating Efficiencies: Lessons from the Green Cities Framework.
[36] IFC, De-Risking Public-Private Partnerships in Municipal Infrastructure via Energy Service Companies (ESCOs).
[37] 关于开展转型债券相关创新试点的通知
[38] Five transition bond issuances by Huaneng, Datang, Wanhua, Shandong Steel, and CHALCO
[39] BBVA, Feb 2025
[40] Climate Risk Adjustment in the Eurosystem's Corporate Sector Purchase Programme (CSPP) and the Planetary AND Transition (P&T) Bond Framework, ECB
[41] 中国人民银行的碳减排支持工具
[42] Bank of Japan instituted a zero-interest climate-related lending programme
[43] Glasgow Financial Alliance for Net Zero (GFANZ). (2024). Technical Review Note on Scaling Transition Finance and Real Economy Decarbonization.
[44] United Nations Environment Programme Finance Initiative (UNEP FI). (2025). 2025 in Review: Building Resilience and Advancing the Transition. UNEP.
[45] Bloomberg NEF. (2025). Tracking Financial Institution Climate Transition Plans 2025. Bloomberg L.P.
[46] World Resources Institute (WRI). (2026). Sustainable Finance in 2026: Opportunities to Move Beyond the Headwinds. WRI Technical Perspectives.
[47] United Nations Environment Programme Finance Initiative (UNEP FI). (2025). 2025 in Review: Building Resilience and Advancing the Transition. UNEP.