



Navigating Transition Finance: An Action List

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EXECUTIVE SUMMARY

Transition finance is any form of financial support that helps decarbonize high-emitting activities or enables the decarbonization of other economic activities. The pivotal role played by transition finance in achieving net-zero goals, however, is not universally recognized. Currently, no standardized definition of eligible activities and entities exists, no international organization has endorsed transition finance instruments, and high-risk perceptions associated with the novel technologies involved in decarbonizing high-emitting sectors are common. Consequently, many investment strategies that incorporate net-zero considerations exclude or underweight high-emitting sectors for the creation of low-emission portfolios.

Navigating the complex landscape of economic, regulatory, environmental, and technological considerations, transition finance requires a collaborative effort for success. This report explores actions that investors, asset managers, corporations, and policymakers should consider to enhance awareness of the role of transition finance in achieving net zero, to improve the disclosure of credible transition plans, to provide clarity on transition activities and transition finance products, and to mitigate risks associated with transition finance.

Traditionally framed as green and clean, sustainability requires a significant paradigm shift to incorporate transition finance. All stakeholders in the transition finance system must cultivate new skills, establish fresh priorities, and, above all, embrace a new mindset. Collaboration synergy is crucial to achieving change and enabling transition finance to play a bigger part in supporting net-zero goals.

We make the following recommendations to advance transition finance.

Summary Recommendations

- **Institutional investors** that wish to intentionally incorporate net-zero considerations into their investment strategy and process should disclose both portfolio emissions and decarbonization progress (year-on-year reduction of portfolio emissions) and establish portfolio decarbonization targets. Institutional investors could use a dashboard with multiple metrics and attribution analysis to report to clients on how their investment strategies promote low emissions or emissions reduction. This approach would improve transparency and awareness of portfolio decarbonization goals.
- **Corporations** should provide feasible and credible transition plans to assure investors/financiers of their steadfast commitment to attaining transition targets. Further, corporations should provide inflation- and forex-adjusted carbon intensity per revenue so investment managers can better measure the impact to the real economy of their portfolios and should include decarbonization targets as part of a balanced scorecard for executive remuneration to incentivize accountability and intentionality.
- **Governments and regulators** should work with industry stakeholders to develop transition taxonomies, harmonize transition plan disclosures, and require economic feasibility disclosures. They should also allocate additional public and blended finance to better mobilize private sector investment, consider using reverse auctions/climate bad banks to manage phaseout, and use labeling to help individual investors navigate the investment product landscape, thereby creating a more informed and sustainable financial ecosystem.

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1. INTRODUCTION

Transition finance facilitates the decarbonization efforts of high-emitting industries, such as steel, cement, chemicals, aviation, and shipping, with the ultimate goal of reaching net zero. According to Net Zero Climate, *net zero* is “a state in which the greenhouse gases going into the atmosphere are balanced by removal out of the atmosphere,” and the scientific consensus is that “global net human-caused emissions of carbon dioxide need to fall by about 45% from 2010 levels by 2030” to reach net zero by 2050.¹ Currently, the production of steel and cement contributes to approximately 14% of global emissions (World Economic Forum 2023). Achieving a net-zero world is unattainable without decarbonizing high-emitting industries (UNIDO 2023).

Efforts to decarbonize high-emitting industries require a collaborative approach. High-emitting corporations must strategize and implement environmentally sustainable practices; investors and financiers have to facilitate emissions reduction through capital allocation and stewardship; and governments need to incentivize decarbonization and foster the development of the transition finance market. Based on a survey of 500 senior executives working in the high-emitting industries by Masdar (2023), however, only 40% of respondents have developed plans to achieve net zero. According to Goldman Sachs research (Tylenda, Chen, Aggarwal, and Corbett 2023), transition strategies totaled USD50 billion in assets under management (AUM) in July 2023, representing less than 0.2% of AUM by investment funds promoting or targeting sustainability that are sold in the EU. In addition, many governments have yet to clarify what constitutes transitional activities and transition finance.

The additional capital expenditure (CAPEX) needed for decarbonization of steel, cement, aviation, shipping, trucking, aluminum, and ammonia (for fertilizers and as a clean fuel) totals USD370 billion per year between 2024 and 2050, according to the World Economic Forum (2023). The objectives of this report are to enhance comprehension of transition finance, pinpoint obstacles to

¹Go to <https://netzeroclimate.org/what-is-net-zero/>.

widespread implementation, and explore collaborative initiatives required from the investment community, high-emitting corporations, and policymakers to overcome these obstacles.

To identify obstacles and possible solutions, we conducted intensive individual interviews with over 20 market participants working on transition finance issues, and we organized an environmental, social, and governance (ESG) virtual roundtable in May 2023.

Section 2 of this report outlines the present status of transition finance, and Section 3 examines the impediments to transition finance as derived from interviews with investment professionals and desk research. In Sections 4–6, we offer solutions for addressing transition finance challenges.

2. THE CURRENT STATE OF TRANSITION FINANCE

Transition finance can be used to describe financing the decarbonization of high-emitting activities and financing developing countries/regions as they develop while tackling environmental and social challenges (Caldecott 2020). This report focuses on the former. Funds committed to transition finance are used to improve economic activities that are not currently green (transitional activities) and to support innovation and infrastructure that will enable economic activities to achieve net zero (enabling activities) (Cesaro 2023). The transition of high-emitting industries includes managed phaseout, where applicable, and must be substantiated by borrowers' and investees' credible transition plans that align with the Paris Agreement. The overarching objective is to generate material impact, contributing to the realization of a net-zero economy.

2.1. Countries/Regions Are at Different Stages of Transition Finance Readiness

In this section, we discuss the complexities in transition finance that arise from the varying conditions in different regions.

2.1.1. No Universal Standard of Eligible Activities

Many countries/regions use taxonomies to define eligible activities for green or sustainable finance. These taxonomies act as a common language between investors, issuers, policymakers, and other actors and help prevent greenwashing. Different countries/regions use different approaches to develop their taxonomies, which may define only green activities but not transitioning activities/entities at this stage. Japan diverges from using a taxonomy and instead provides technology roadmaps to shape corporate transition strategies of high-emitting sectors for transition finance. Examples of national/regional taxonomies and roadmap that help define eligible activities for transition finance are shown in **Exhibit 1**.

Given the spatial and temporal variations of transition pathways of different countries/regions and taking nationally determined contribution (NDC) targets² into consideration, the divergences of approaches, criteria, and levels of granularity used to screen and thus label eligible activities/entities are wide. For instance, there are only 78 transitional/enabling activities in the EU taxonomy³ but 422 in Indonesia (classified as "Amber" activities; Larasati and Mafira 2022), and focus sectors vary depending on the country's or region's

²According to UN Climate Change, each party to the Paris Agreement is required to establish an NDC, which is a climate action plan to cut emissions and adapt to climate impacts, updated every five years. See www.un.org/en/climatechange/all-about-ndcs.

³See the European Commission's EU Taxonomy Compass: <https://ec.europa.eu/sustainable-finance-taxonomy/taxonomy-compass>.

Exhibit 1. Examples of Taxonomies and a Roadmap for Transition Finance in Different Countries/Regions

	Transition Taxonomies		Roadmap
Countries or regions	EU, UK (pending), Canada (pending), South Africa, Association of Southeast Asian Nations (ASEAN), Indonesia, Thailand, Singapore, China (national taxonomy pending, governments of Huzhou and Chongqing published local taxonomies)	Malaysia	Japan
Screening methodologies	Activities by technical screening criteria or thresholds	Activities and entities by principles	Assets and entities by sectoral technology roadmaps (with technologies, emission thresholds, and timeline)
Eligibility	List of transitional and enabling activities by EU; catalogs of eligible activities by Huzhou and Chongqing; list of “Amber” activities under a traffic light system adopted by ASEAN, Indonesia, Thailand, and Singapore	Tier 2 and 3 activities in the “Transitioning” class under a three-class, five-tier system	Nine high-emitting sectors

composition of emissions, which means an economic activity can be eligible for transition finance in one but not another taxonomy. For example, in China, while the national taxonomy is still pending, the local governments of Huzhou and Chongqing have published local taxonomies. In Chongqing, clean production and efficient use of coal are classified as transitional, whereas in Huzhou, they are not. Separately, disclosure of taxonomy-aligned activities is currently required in the EU.

In countries/regions with no transition taxonomy, there is no clear definition or scope of transitional and enabling activities, which may lead to underinvestment in promising technologies and greenwashing probes (Ma and Terada-Hagiwara 2022; Baraldi, Chitre, and Khaykin 2022). For instance, Asia accounts for half of the world’s greenhouse gas (GHG) emissions and approximately 85% of the energy consumed in Asia comes from fossil fuels, but China (the world’s largest GHG emitter) and India (the world’s third-largest GHG emitter) have yet to create a national transition taxonomy.

In countries/regions with a taxonomy, the lack of interoperability in the “jungle of taxonomies” could be a barrier to international capital flows (Ehlers, Gao, and Packer 2021). To facilitate international capital flow, in 2021, China joined the EU in building the Common Ground Taxonomy for areas of commonality between the EU’s and China’s green taxonomies. Currently, China is in discussion with Singapore to achieve taxonomy interoperability, which will enhance understanding of transition activities defined by China and Singapore.

2.1.2. No Mandatory Transition Plan Disclosure

To support transition finance, financial institutions will likely experience a short-term increase in their financed emissions (referring to the GHG emissions linked to their investment and lending activities). Financial institutions with net-zero commitments or decarbonization targets can justify the consistency of their capital allocation only if high-emitting borrowers/investees present credible transition plans aligning with the Paris Agreement (Menon 2023). A credible transition plan delineates how a corporation intends to translate its net-zero ambition into actionable steps, which involves aligning not only its assets but also its operations and overall business model. The plan also serves as a tool for stakeholders to monitor and track the progress of the corporation's efforts.

While the justification for transition finance relies on borrowers' and investees' transition plans, there is no universally defined standard for what qualifies as a credible transition plan. According to the European Securities and Markets Authority's (ESMA's) progress report on greenwashing risks and the supervision of sustainable finance policies, one of the identified high-risk areas is issuers' net-zero commitments and "so-called transition plans," given that these commitments to future performance rely on judgments and projections, which, when misstated, may provide misleading information (ESMA 2023). For corporations and financial institutions to mitigate this risk, the harmonization of definitions, standards, and frameworks for a credible transition plan is needed to help differentiate genuine efforts from those that might be misleading or nothing more than window dressing.

In October 2023, the UK Transition Plan Taskforce (TPT) published a disclosure framework. The TPT also aims to make the framework a globally transferable standard, and the UK and Singapore governments are exploring a collaboration to drive international consistency in design and disclosure of transition plans (HM Treasury 2022). However, it is more likely that different countries/regions will continue to develop their own frameworks with differing approaches (Fergusson, Strachan, and Purdie 2023).

The UK Financial Conduct Authority (FCA) plans to adopt the TPT framework as disclosure requirements for listed companies, asset managers, and FCA-regulated asset owners (FCA 2023a). Meanwhile, the Hong Kong Stock Exchange plans to require listed companies to reveal details of their transition plans in alignment with the IFRS Foundation's IFRS S2 *Climate-related Disclosures* starting in 2025.

2.1.3. Scaling Blended Finance Is Important for Developing Countries/Regions

To finance the net zero transition, a collaborative effort across the financial system is required. This effort must encompass both public and private finance, as well as domestic and international capital flows. In developed markets,

governments can use various mechanisms and instruments, such as budget allocations, grants and subsidies, tax incentives, and sovereign sustainable bonds, to mobilize private sector investment. For developing markets, where public resources for climate investments are often limited, the role of development financial institutions and blended finance becomes crucial.

Developed markets use a variety of these techniques. In the United States, for example, the Inflation Reduction Act (IRA) earmarks USD369 billion for climate and energy investments, including generous tax credits for hydrogen and carbon capture, utilization, and storage (CCUS). In Japan, the government plans to issue USD150 billion in sovereign bonds, with USD60 billion earmarked to build clean hydrogen and ammonia capacity, including investment in production in Australia and the Middle East, to be shipped back to Japan for storage and use (Komachi, Neilson, and Voss 2023). In the EU, ArcelorMittal (the world's second-largest steel maker by production volume) requires USD10 billion to achieve its 2030 decarbonization target and expects public funding to cover 50% of the total cost of decarbonization. The European Investment Bank (EIB) has granted a combined USD388 million loan to ArcelorMittal through the EU's various initiatives and funding programs, including the following:

- The European Fund for Strategic Investments, an initiative launched by the European Commission (EC) and the EIB to support the implementation of strategic projects
- InnovFin, a joint initiative of the EC and the EIB that offers a range of financial instruments designed to support research and innovation activities
- Horizon 2020, the EU's research and innovation funding program
- NER 300, the EU's initiative to support innovative low-carbon energy demonstration projects

For developing markets, national and international development financial institutions are funded by governments of developed countries/regions with mandates to mobilize financial support for social and environmental objectives. For instance, the Just Energy Transition Partnership is an agreement announced at COP26 in which the United Kingdom, the EU, and the United States pledged USD8.5 billion to support South Africa's plans on climate action and energy transition (UK PACT 2020). The World Bank, together with the Canadian Clean Energy and Forest Climate Facility and Energy Sector Management Assistance Program, extended USD497 million in loans and grants to decommission and repurpose a coal-fired power plant in South Africa (World Bank 2023). The USD13.5 billion Green Climate Fund, a fund established under the United Nations Framework Convention on Climate Change, cofinances such projects as the innovative mechanisms for industrial energy efficiency in Indonesia and the e-mobility program in India (Green Climate Fund 2023).

The term "innovative" is frequently associated with the decarbonization of high-emitting activities because it often requires the development and adoption

of new technologies and solutions. However, the technological uncertainties inherent in these innovations can make investment in low-carbon and other climate-related innovations risky. The risk is further heightened for transition projects in developing markets due to regulatory and political risks, long transaction lead times, large startup capital, and limited access to expertise in project development and financing (Menon 2022a).



In both developed and developing markets, blended finance plays a crucial role by bringing different sources of public and private capital together. Public financial resources and philanthropic activities help reduce and mitigate the upfront risks for such investments to mobilize private sector investments, particularly in developing markets (Prasad, Loukoianova, Feng, and Oman 2022).

Despite the challenges, there are a number of promising initiatives. For instance, Breakthrough Energy Catalyst (over USD1 billion committed capital), founded by Bill Gates, funds demonstration projects using emerging climate technologies, including clean hydrogen to decarbonize industry and transportation, sustainable aviation fuel, direct air capture, and manufacturing for cement, steel, and plastics decarbonization, through a blended finance mechanism. Breakthrough Energy Catalyst will provide selected projects with equity investment, grant funding, and/or an offtake agreement for the purchase of upcoming products/services at predetermined terms, thus providing certainty about future revenue streams. Eligible projects may also receive financing under the InvestEU Programme (Breakthrough Energy 2022).

Finance in Motion is a leader in structuring multilayered blended finance funds where public monies serve as a risk cushion for private impact investors. One of the Finance in Motion impact funds is the Green for Growth Fund, which channels resource efficiency and renewable energy dedicated financing to small and medium-sized enterprises and households through local financial institutions. The fund was initiated by EIB and KfW Development Bank in 2009 and uses a tranche capital structure to address the wide range of risk profiles of public and private sectors (**Exhibit 2**). The fund has helped the agricultural industry upgrade equipment in Ukraine and the tourism industry upgrade a bus fleet in Georgia to reduce fuel consumption and thus reduce emissions.

Blended finance helps bridge the financing gap, and more importantly, it plays a role in demonstrating “investability” of developing markets to mobilize private sector finance (Network for Greening the Financial System 2023). However, according to the Monetary Authority of Singapore, the average annual flows of blended finance have been less than USD10 billion since 2015 (Menon 2022a). This amount constitutes a tiny fraction of the estimated USD2 trillion annual investment needed in developing countries/regions to achieve net-zero emissions by 2050, as projected by the International Energy Agency (Ananthakrishnan, Ehlers, Gardes-Landolfini, and Natalucci 2023).

Exhibit 2. Green for Growth Fund Structure

	Share Class	% of Total Funding (March 2021)	Income Distribution ^b	Risk Taking ^b
Private sector ^a	Notes	27%		
Development finance institutions	Senior A shares	36%		
	Mezzanine B shares	2%		
Public sector	L shares	6%		
	Junior C shares	29%		

^aIn the most detrimental scenario, at least 62.5%, 25%, or 12.5% of the losses will be absorbed by subordinated classes.

^bAsymmetric distribution of income and risks.

Source: Finance in Motion (2023).

2.2. High-Emitting Corporations Are at Different Stages of Transition Finance Readiness

Based on a survey of 500 senior executives working in the high-emitting sectors by Masdar (2023),

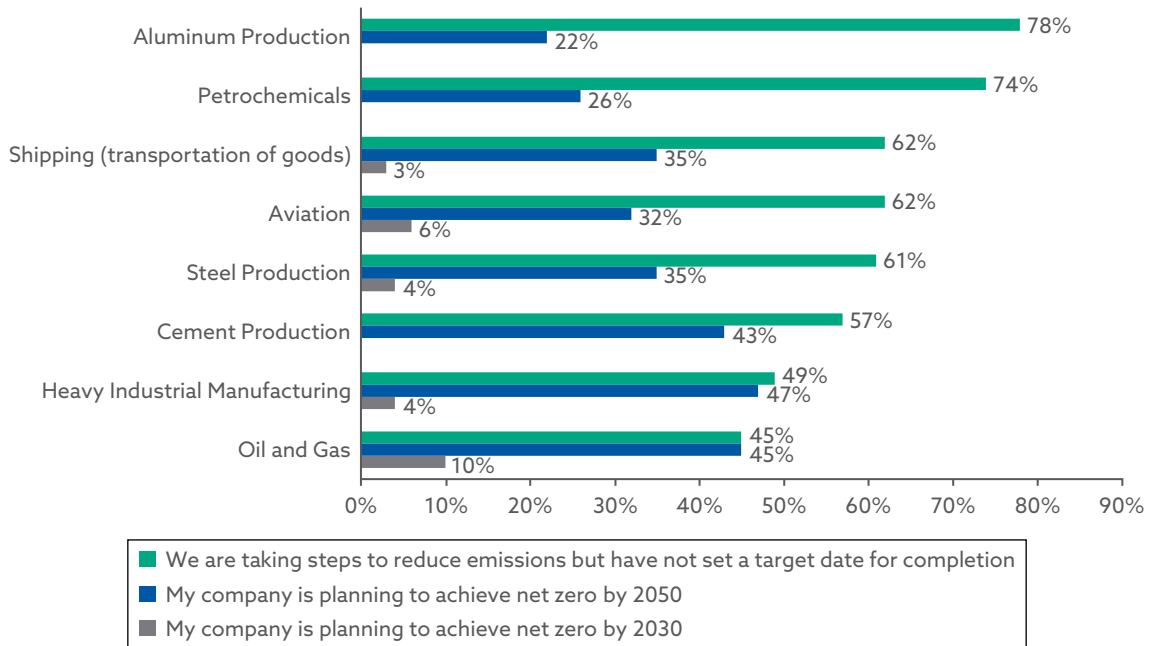
- only 40% of respondents have drawn plans to achieve net zero by 2050 (see **Exhibit 3** for a breakdown by sector), out of which only 30% said their budgets will be adequate to support their decarbonization targets, and
- out of those who have yet to set net-zero targets, 53% said the main obstacle is the lack of reliable financing.

Moreover, the decarbonization of high-emitting industries will require an additional annual CAPEX of USD370 billion between 2024 and 2050 (World Economic Forum 2023), with the scale and pace greatly influenced by the availability of transition finance vehicles. Nevertheless, based on the survey results from Masdar (2023), not all high-emitting corporations are adequately prepared to secure the necessary capital.

More importantly, a high-emitting corporation *without* a net-zero target will not be able to secure transition finance.

Transition finance must be substantiated by borrowers' and investees' credible transition plans that align with the Paris Agreement. According to EY (2023), although over 80% of FTSE 100 constituent firms have made a net-zero commitment, 78% of firms disclosed only partial transition plans (with key elements, such as strategy and execution plan, missing), and 17% have yet to publish any plan. Of the 5% that have disclosed sufficiently detailed transition

Exhibit 3. Which of the Following Statements Best Describes Your Company’s Plans for Decarbonization? (survey responses)








Source: Masdar (2023).

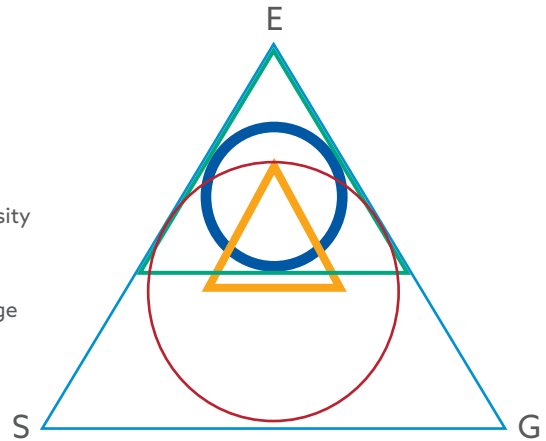
plans, they are not fully TPT aligned. Whether the 23 index constituents in high-emitting sectors (energy, industrials, materials, and utilities) have disclosed TPT-aligned transition plans is not reported, but EY’s (2023) findings imply that a majority of them are not sufficiently prepared for transition finance.

2.3. Limited Private Sector Investment in Transition Finance

Public finance plays a crucial role because there are many actions that private finance either cannot or is unwilling to undertake. Nevertheless, recognizing the scale of transition finance needed, the mobilization of private capital flows becomes imperative. The EC expects that most of the investment required to achieve the EU’s climate objectives will need to come from the private sector (Elderson 2023). In developing markets, the International Monetary Fund (2023) projects that around 80% of the necessary investment in climate mitigation by 2030 will have to be supplied by the private sector. Contrary to this finding, the Climate Policy Initiative found that the private sector accounted for only 50% of global climate finance (including transition finance) from 2011 to 2020 (Naran, Connolly, Rosane, Wignarajah, Wakaba, and Buchner 2022). According to the Energy Transitions Commission (2023), capital commitments from the private sector remain “vague and insufficient.”

Exhibit 4. Overlapping Scope of Sustainable, Impact, Green, Climate, and Transition Finance

-  Sustainable finance covers environmental, social, and governance factors (Spinaci 2021)
-  Impact finance aims to accelerate transition of the real economy, based on intentionality, additionality, and impact measurement (Institut de la Finance Durable 2023)
-  Green finance covers all environmental goals (e.g., biodiversity protection/restoration) (Spinaci 2021)
-  Climate finance provides funds for addressing climate change adaptation and mitigation (Spinaci 2021)
-  Transition finance provides funds for decarbonization of high-emitting activities, including managed phaseout



Sources: Based on information in Spinaci (2021) and Institut de la Finance Durable (2023).

Sustainable, impact, green, climate, and transition finance are interconnected, as depicted in **Exhibit 4**, and can be in the form of equity, debt, loans, or grants. Sustainable finance adopts a holistic approach, integrating environmental, social, and governance considerations. Within this framework, green finance focuses on diverse environmental aspects, such as biodiversity protection and pollution reduction. Climate finance, a subset of green finance, specifically targets activities mitigating/adapting to climate change impacts and reducing emissions. Impact finance, in contrast, aims to generate measurable positive social and/or environmental impact alongside financial returns.

Transition finance funds the decarbonization of high-emitting activities. It places a strong emphasis on the credibility of the issuer's or borrower's transition strategy, commitments, and practices and manages phaseout transactions that are socially inclusive. Thus, transition finance aims to address both social and governance factors and intersects with sustainable, impact, green, and climate finance, bridging social and governance factors.

Sustainable funds, impact funds, and climate funds can potentially support transition finance, depending on the funds' investment objectives and methodology. Nonetheless, transition strategies accounted for less than 0.2% of AUM by sustainable funds sold in the EU as of July 2023 (Tylenda et al. 2023), despite the substantial financing needed for the decarbonization of high-emitting sectors, such as cement, chemicals, fertilizers, steel, and transportation—which collectively contribute to about one-third of global emissions.

2.3.1. Debt Financing

Currently, transition finance is extended primarily through sustainability-linked bonds (SLBs) and sustainability-linked loans (SLLs; OECD 2022). In Q4 2022, outstanding SLBs represented only 11% of the value of green bonds (see **Exhibit 5**; Mahmood and Tiftik 2023). The disparity in outstanding values suggests a certain inclination or prioritization in the investment community toward green bonds.

SLBs are instruments designed for general corporate purposes (proceeds not restricted to specific transitional or enabling activities) with coupons linked to predefined sustainability performance targets (SPTs). If an SLB issuer fails to meet its SPTs, the issuer will be subject to a punitive coupon step-up, often set at 25 bps. Issuers will enlist independent verifiers to confirm their compliance with the International Capital Market Association's (ICMA's) Sustainability-Linked Bond Principles (ICMA 2020) and/or other pertinent guidelines. As of 1 February 2023, approximately USD130 billion has been raised by high-emitting sectors (energy, industrial, materials, and utilities) through SLBs (ICMA 2023). Based on the top 10 SLB issuers of the selected sectors, the most common SPTs are the reduction of GHG emissions or emission intensity (GHG emissions per output; see **Exhibit 6**).

A transition bond is typically a plain vanilla use-of-proceeds instrument (proceeds dedicated to specific transitional or enabling activities). Since 2017, over USD13 billion of transition bonds have been issued, with total issuance reaching USD3.5 billion in 2022, primarily driven by Japanese and Chinese issuers (Climate Bonds Initiative 2023). In Japan, the government plans to issue JPY20 trillion (approximately USD130 billion) in transition bonds (to be labeled Green Transformation or GX bonds) over the next 10 years. These funds are earmarked for the deployment of such technologies as hydrogen supply networks, CCUS, synthetic fuels, and small nuclear reactors (Obe 2023). Nonetheless, the market for Japanese and Chinese transition bonds is largely domestic, since investors outside Japan and China are hesitant to invest in these bonds because of the absence of an international standard for transition bonds (Environmental Finance 2023).

ICMA has published principles for green bonds, sustainability bonds, social bonds, and SLBs but not for transition bonds. Instead, it published the Climate Transition Finance Handbook to provide guidance on transition strategies and disclosures for issuers that seek transition finance through all types of sustainable bonds (**Exhibit 7**).

Exhibit 5. Outstanding Sustainable Debt Securities, Q4 2022 (USD billions)

	Debt Securities (a)	Green Bonds	Green Asset-Backed Securities	Sustainability Bonds	Social Bonds	Green Municipal Bonds	SLBs	Loans (b)	Green Loans	SLLs	Total (a + b)
Global markets	3,223	1,755	78	580	530	89	191	1,562	530	1,031	4,785
Mature markets	2,211	1,283	75	269	352	89	143	1,212	337	875	3,423
Emerging and frontier markets	449	302	4	74	24	0	45	232	144	88	682
Offshore centers	38	30	0	3	2	0	3	117	49	68	155
Supranationals	525	139	0	235	152	0	0	0	0	0	525
Top seven mature markets	1,522	850	73	165	243	89	102	902	229	673	2,424
Top seven emerging markets	353	249	4	43	20	0	38	131	71	60	484
Two offshore centers	37	30	0	3	2	0	3	110	49	61	147

Notes: The top seven mature markets by size are the United States, France, Germany, the United Kingdom, Spain, Italy, and the Netherlands. The top seven emerging markets by size are Mainland China, Chile, India, Mexico, Brazil, Turkey, and the United Arab Emirates. The two offshore centers are Singapore and Hong Kong SAR.

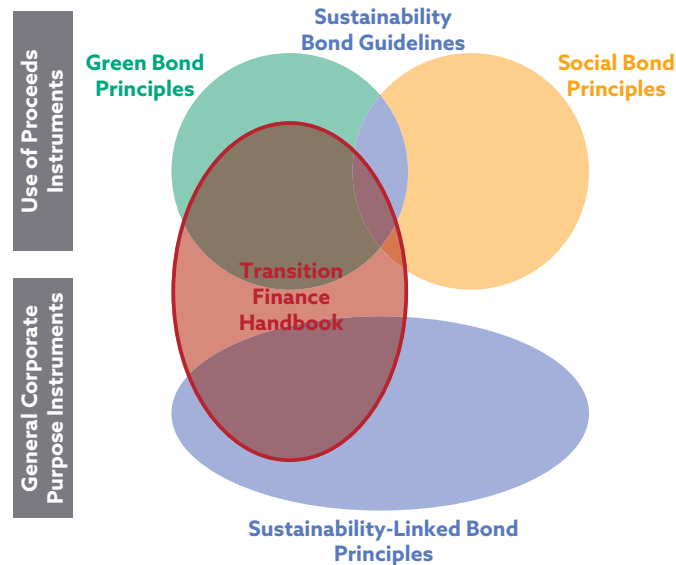
Sources: Mahmood and Tiftik (2023) using data from Bloomberg, BloombergNEF, and Institute of International Finance. Exhibit numbers may not sum to 100 because of rounding.

Exhibit 6. Top 10 SLB Issuers by Amount Issued in Energy, Industrial, Materials, and Utilities Sectors

Issuer Name	Location	Issuer Sector	Amount Issued (USD billions)	Examples of SPTs
ENEL FIN INTL	Netherlands	Utilities	28.92	Scope 1 carbon intensity (2025: 130 g CO ₂ e/kWh)
ENEL FIN AMERICA	US	Utilities	2.75	Scope 3 emissions (2025: gas retail, 20.9 million t CO ₂ e) Renewable installed capacity (2025: 76% of total) EU taxonomy-aligned CAPEX (2025: 80%)
ENI S.P.A.	Italy	Energy	5.30	Renewable installed capacity (2025: 5 GW) Scope 1 and 2 emissions (2024: 7.4 million t CO ₂ e)
ENBRIDGE INC	Canada	Energy	5.12	Scope 1 and 2 carbon intensity reduction (35% from 2018 to 2030) Racial and ethnic group workforce representation (2025: 28%) Female board representation (2025: 40%)
ASTM SPA	Italy	Industrial	3.39	Scope 1 and 2 emissions reduction from 2020 (2024: 10%; 2027: 17%; 2030: 25%) Scope 3 emissions reduction from 2020 (2027: 9%; 2030: 13%)
SUZANO AUSTRIA	Austria	Materials	2.75	Industrial water withdrawal intensity reduction from 2018 (2026: 12.4%; 2030: 14.8%) Women in leadership positions (2025: 30%)
VESTAS WIND SYSTEMS	Denmark	Energy	2.17	Scope 1 and 2 emissions reduction from 2019 (2025: 55%; 2030: 100%) Supply chain emissions reduction from 2019 (2030: 45%) Material efficiency ratio reduction from 2021 (2030: 90%)
NRG ENERGY INC	US	Utilities	2.00	Scope 1, 2, and 3 emissions reduction from 2014 (2030: 50%; 2050: 90%)
WEIR GROUP PLC	UK	Industrials	1.97	Scope 1 and 2 emissions reduction from 2019 (2026: 19.1%; 2028: 24.6%; 2030: 30%)
PCF GMBH	Germany	Materials	1.79	Recycled wood use (2025: 50%) Scope 1 and 2 emissions reduction (21% from 2020 to 2025)

Sources: ICMA sustainable bonds market data (ICMA 2023); SPTs from respective companies' SLB frameworks; processed by authors.

Exhibit 7. Definition of Transition Finance Instruments from ICMA's Climate Transition Finance Handbook



Source: Financial Services Agency; Ministry of Economy, Trade and Industry; and Ministry of the Environment, Japan (2021).

2.3.2. Equity Financing

Sustainable/ESG equity funds can accelerate the net-zero transition through stewardship and engagement strategies as contemplated by the Net Zero Asset Managers Commitment.⁴ However, many ESG investment strategies tend to underweight high-emitting sectors and create low-carbon portfolios, according to Goldman Sachs Asset Management (see van Nieuwenhuijzen 2023).

High-emitting sectors count on hydrogen, CCUS, and other innovative technologies mostly at nascent or early stages of technological/financial maturity. Up to USD13 trillion in cumulative private sector investment will be required in hydrogen projects and CCUS by 2050, based on an estimate from a BCG report (Beetz, Hegnholt, Rakhou, Clayton, Jamal, and Jumani 2023), or over USD480 billion annually. According to another BCG report, venture capital firms and private equity firms have played a critical role in supporting innovation and emerging technologies (Backler, Goydan, Herhold, Pieper, Shandal, Sethurathinam, and Sharma 2021). Leading private equity and venture capital firms have made important commitments to transition finance. For instance, the USD15 billion Brookfield Global Transition Fund I plans to allocate half of the fund on transitioning of carbon-intensive companies (Flood 2022), and reportedly, the USD15 billion Fund II (launched in 2Q 2023) intends to invest in green hydrogen and CCUS for green steelmaking (Slav 2023). Climeworks (a direct air capture company) raised USD634 million, and Carbon Clean

⁴For information on the Net Zero Asset Managers initiative, go to www.netzeroassetmanagers.org/commitment/.

(a carbon capture company) raised USD150 million from venture capital firms in 2022 (MacDonagh 2022).

Nonetheless, investment in carbon capture and storage (CCS) and hydrogen totaled only USD7.5 billion in 2022, according to BloombergNEF (2023a), and the funding gap between need and actual investment remains wide.

2.3.3. Impact Investing

Impact investments are “made with the intention to generate positive, measurable social and environmental impact [including decarbonization] alongside a financial return”⁵ and are characterized by

- intentionality, referring to the investor’s intention to contribute to the generation of a measurable environmental and/or social benefit;
- additionality, referring to the financial and nonfinancial contribution of the investor that enables the investee company or the project financed to increase the net positive impact; and
- impact measurement, referring to the process of measuring the environmental and/or social outcome of investments against the investor’s intended impact goals (France Invest 2021).

According to the Global Impact Investing Network’s (GIIN’s) annual survey in 2010, out of approximately 50 respondents, 75% believed the market was in its infancy; in aggregate, they expected to invest USD4 billion in the following year. The number of respondents to the same survey jumped to around 300 in 2020, of whom 69% regarded the market as growing steadily, and the respondents expected to invest USD48 billion in 2021.⁶ GIIN estimated that in 2022, the AUM of the global impact investing market was USD1.2 trillion, managed by 3,349 organizations (Hand, Ringel, and Danel 2022).

According to a Fidelity Charitable (2022) survey, 34% of the 1,200 respondents participated in impact investing. Of this number, 61% of millennial respondents were actively involved, compared to only 23% of baby boomers. The report highlights that millennials will continue driving adoption of impact investing as they come to control more wealth. Another key driver of impact investing is corporations’ increasing allocation to impact investment in response to rising shareholder expectations of using cash reserves to make meaningful contributions in addressing such issues as climate change and social inequity, according to GIIN (Hand et al. 2022). The growing capital allocation to impact investing could help fill the funding gap in decarbonization of high-emitting sectors.

⁵This definition is from the Global Impact Investing Network: <https://thegiin.org/impact-investing/need-to-know/>.

⁶This information is from the Impact Investing Institute: www.impactinvest.org.uk/learning-hub/the-impact-investing-market/?level=introductory.

3. CHALLENGES IN TRANSITION FINANCE

Given the current context of transition finance, this section consolidates the challenges for scaling transition finance based on both a literature review and input from market participants. We conducted intensive individual interviews with over 20 market participants among the numerous stakeholders in the transition finance system (see **Exhibit 8**; Appendix A provides a full mapping of actors in the transition finance system). Here, we explore perspectives on the challenges and solutions for transition finance development in practice. Each interview included a mix of structured questions and unstructured free-flowing discussion in the context of our research objectives. We also invited volunteers through an ESG virtual roundtable organized by CFA Institute in May 2023.

In the following sections, we outline the three key reasons why transition finance has been limited in scope, despite the enormity of the problem. In sum, these challenges are as follows:

- Knowledge gaps in transition finance hinder mainstream adoption and create challenges in effectively communicating and implementing transition strategies, despite substantial net-zero commitments.
- Lack of credible transition plans and fit-for-purpose disclosure and greenwashing concerns discourage financial institutions from transition finance, while the absence of clear taxonomies and labeling standards complicates risk evaluation and limits international capital flows.
- The risk/return profile is unfavorable because of inadequate government support for improvement of commercial viability of transition projects.

3.1. From Lack of Awareness to Limited Action

At the outset, we note that the Net-Zero Banking Alliance (2022) identifies the inadequate recognition of the pivotal role played by transition finance in achieving net-zero goals as a key constraint to the mainstream adoption of transition finance. Our work supports this conclusion.

Exhibit 8. Role of Interviewees by Actor Group

Actor Groups	Role of Interviewees
Private finance	Asset managers, asset owners, stewardship lead, investment bankers, sustainability research, internal sustainable finance framework development, corporate sustainability
Blended finance	Impact investment fund manager
Systemic enablers	Market exchanges, advisers to regulatory bodies, standard setters
Service providers	Sustainability consultants, sustainable investment research, disclosure platforms, data analytics, and intellectual property development

Our interviewees observed that the market has yet to fully understand why and how a low-emission investing strategy does not necessarily equate to decarbonizing the real economy. In Asia, our interviewees found it difficult to communicate transition strategy to individual investors, partly because messages are lost in translation as a result of a long chain of gatekeepers (e.g., fund distributors, investment advisers, and relationship managers), and in some cases, they found that transition finance (as well as sustainable finance) is not sufficiently understood among institutional clients.

As of December 2023, 87 asset owners (AUM of USD9.5 trillion) had joined the Net-Zero Asset Owner Alliance and 315 asset managers (AUM of USD57 trillion) had joined the Net Zero Asset Managers initiative. Signatories to both initiatives are dedicated to achieving net-zero emissions in their investment portfolios by 2050. However, these well-intentioned pledges raise operational challenges, particularly the trade-offs related to investments in hard-to-abate sectors where complete decarbonization remains unattainable based on current technologies. Consequently, net-zero portfolios often prioritize clean projects over transition initiatives (Bobro 2022). Even for long-term and patient investors, such as development finance institutions, a net-zero portfolio target may incentivize early divestment to achieve short- and medium-term portfolio decarbonization targets (Fankhauser, Srivastav, Sundvor, Hirmer, and Shrimali 2023).

Most of our interviewees pointed out that portfolio decarbonization is frequently achieved by emphasizing low-emission sectors, a practice criticized as mere window dressing. Moreover, they noted that the short-term objectives of linear portfolio decarbonization often fall short of supporting the long-term and dynamic goal of achieving net zero. Despite numerous net-zero commitments from asset owners and managers, there is a notable absence of commitments to allocate a proportionate amount of capital based on real-economy impact.

Our interviewees also observed that commonly used reporting metrics, such as portfolio carbon footprint and portfolio weighted average carbon intensity (WACI),⁷ focus on portfolio emissions but do not effectively convey a transition strategy and do not effectively track the impact performance. These metrics fail to highlight the changes in emissions of portfolio companies and their contributions to decarbonizing the real economy. Ultimately, the emphasis on portfolio emissions may undermine actual progress toward real-world transition goals. Beyond investors, regulators continue to predominantly concentrate on financed emissions.

As for impact investing, our interviewees highlighted that (1) asset managers find it challenging to substantiate additionality (effecting change through engagement) when reporting to asset owners, (2) the impetus for the development of more pertinent impact metrics/indicators comes from asset

⁷WACI = $\sum_i^n \left(w_i \frac{\text{Issuer's Scope 1 \& 2 emissions}}{\text{Issuer's revenue in millions}} \right)$, where w = portfolio weight.

owners, and (3) although the reality of climate change is indisputable, insisting on waiting for perfect metrics/indicators can impede progress.

3.2. Lack of Clarity and Insufficient Disclosure

In a survey conducted by Ninety One (formerly Investec Asset Management) of asset owners and advisers, 60% of respondents cited the lack of corporations with credible and feasible transition plans as a barrier to transition finance (Ninety One 2022). Currently, transition plan disclosure is not mandatory, which leads to a lack of fit-for-purpose disclosure. Inadequate disclosure requirements may encourage false transition activities (Bobro 2022; Ma and Terada-Hagiwara 2022), and a lack of comparability of reported data and transition plans makes the evaluation of investment risks/opportunities difficult (OECD 2022).

One interviewee considers feasibility to be a crucial component of a transition plan, yet it is frequently overlooked. Without due consideration for feasibility, the validity of the transition plan becomes uncertain. Further, relying on uncertain decarbonization targets for forecasting could impede progress toward achieving net zero. Although large and well-resourced listed companies have the ability to address this issue, there seems to be a reluctance to do so.

According to S&P Global Ratings (2021), the evolution of the transition finance market has heightened greenwashing concerns, primarily stemming from the absence of clarity and standardized terminology regarding what qualifies as a transition activity or project. With the lack of universally accepted definitions and clear standards, financial institutions that deploy transition capital to high-emitting sectors on their own terms may face accusations of greenwashing (Harnett, Holland, and Kessler 2023). In addition, there are no clear standards and benchmarks for transition finance products (e.g., transition bonds), which could raise suspicions of greenwashing because net-zero investors in these products technically support high-emitting sectors (Bobro 2022). The absence of transition taxonomies and the lack of interoperability of existing sustainability-related taxonomies could also be a barrier to international capital flows (see Section 2.1). The Net-Zero Banking Alliance (2022) identifies the lack of transition taxonomies and the absence of clearly defined labeling standards as core issues leading to the restricted availability of transition finance.

Our interviewees showcased two distinct perspectives on taxonomies and labeling. One group emphasized the importance of taxonomies, viewing them as a common language for all stakeholders to build consensus on disclosure requirements. Part of this group also asserted the necessity of establishing a separate transition finance asset class, acknowledging that there may be some challenges, particularly in the early stages. The other group leaned toward national or sectoral transition pathways/roadmaps, expressing the belief that the transition label may struggle to adapt to evolving regulations and technologies, particularly in the case of multinational corporations (MNCs).

Two interviewees concurred that corporations' low-carbon investments (those directed toward transitional and enabling activities) can serve as a leading indicator for their future decarbonization performance. However, these indicators are constrained to markets with established transition taxonomies.

3.3. Inadequate Government Support to Derisk Transition Finance

There is a widespread belief that climate-related investing carries a higher financial risk, primarily stemming from the perceived challenges in scalability and commercial viability of specific transition solutions. This dynamic contributes to an unfavorable risk/return profile (Bobro 2022; Menon 2022b; Ehmann, Reisser, Iten, Kellenberger, and Reinhart 2022; Baraldi, Chitre, and Khaykin 2022).

Moreover, transition finance could heighten reputational risk, as it will increase portfolio emissions of financial institutions, which are facing stakeholder scrutiny to cut exposure to high-emitting sectors (Furness 2022). It undermines the confidence of financial institutions in extending transition finance. For instance, while financing the mining of critical raw materials is crucial for the energy transition, the simultaneous increase in portfolio emissions and exposure to the high-emitting mining sector could generate unwarranted false negative greenwashing concerns (British International Investment 2022). The Taskforce on Climate-related Financial Disclosures (TCFD) has identified the stigmatization of high-emitting sectors as a source of reputational risks in the analysis of climate-related risks (TCFD 2017).

OECD (2022) conducted an industry survey on transition finance. The findings revealed numerous shortcomings in the facilitating environment. These include insufficiently detailed disclosures and data from corporations, a lack of fiscal incentives (such as ineffective carbon pricing and limited public investments), as well as deficient policy frameworks. These frameworks notably lack prohibitions or restrictions on the use of polluting technologies, and there is a notable absence of green public procurement initiatives.

One interviewee highlighted the need for increased government support to make the returns of low-carbon solutions more evident. Measures such as carbon pricing, carbon border taxes, and the promotion of a green premium are essential for mobilizing private sector investment. Another interviewee called for a collective shift in mindset, from a focus solely on risk and return to a consideration of real-economy impact. This shift, the interviewee argued, should extend beyond investors to encompass policymakers, regulators, and all other actors in the transition finance system (see Appendix A for a mapping of actors in the transition finance system).

Two interviewees noted that governments rely on market forces, including the stewardship efforts of financial institutions, to drive advancements toward

decarbonization targets. However, this process takes time, and consequently, the investable universe for transition finance has remained limited.

To help accelerate transition finance development, we will explore solutions in the following sections to

- empower the transition finance storytelling in order to foster increased awareness and facilitate the conversion of awareness into action, by using relevant metrics/indicators to differentiate investment strategies that promote low emissions or emission reduction and by labeling to provide a proper identity to transition finance products (Section 4);
- enhance the robustness of transition plans and make disclosures fit for purpose by requiring economic feasibility to demonstrate the achievability of decarbonization targets, thus discouraging the practice of greenwashing (Section 5); and
- derisk transition finance and improve the enabling environments by additional government support, such as creating taxonomies and establishing transition finance standards to improve legal clarity, using blended finance facilities to mobilize private sector investment, and using reverse auctions and climate bad banks for managed phaseouts to alleviate stranded asset risks (Section 6).

4. EMPOWER THE TRANSITION FINANCE STORYTELLING

A report by Churches, Charities and Local Authorities (CCLA 2023) found that asset managers commit to portfolio net zero in one of two ways. The first is a “transactions” approach, under which asset managers reduce portfolio emissions by selling high-emitting assets and buying/holding low-carbon ones, but it is unlikely to bring an impact to the real economy because the assets will continue to emit regardless of who holds them. The second is an “action” approach, whereby asset managers engage with their portfolio companies to incentivize decarbonization in the real economy, and as a result, the portfolio is decarbonized. In this context, supporting transition finance is an “action” approach for achieving portfolio net zero.

We will discuss the use of relevant metrics/indicators to explain this action approach, to increase investors’ awareness of their options between emission reduction and maintaining low emissions and ultimately to translate awareness into informed investment decisions (Section 4.1). We will also discuss the use of labeling as a recognition of the significance of transition finance (Section 4.2).

4.1. Interplay between the Real Economy and Portfolio Decarbonization

In this section, we discuss several aspects pertaining to the relationship between the real economy and portfolio decarbonization.

4.1.1. Eyeing Both Decarbonization and Emissions

Weighted average carbon intensity,⁸ a commonly used metric recommended by the TCFD to measure a portfolio’s emissions exposure, is widely used for reporting on portfolio climate performance (TCFD 2021). Insights from our interviewees emphasize the importance of focusing on the change in WACI. In practical terms, the UBS Climate Action Fund, dedicated to decarbonizing emission-intensive industries, establishes an average decarbonization target of 5% per year at the portfolio level. AllianzGI introduced an approach based on key performance indicators (KPIs) for its sustainability-focused products in late 2022. The objective is to connect sustainability performance with the investment process through measurable indicators. The initial KPI that was introduced was the reduction of portfolio carbon intensity, with targets set either at a minimum of 5% WACI reduction per year or lower than the benchmark. These targets are integrated into investment objectives and restrictions where applicable (Allianz Global Investors 2022; see **Exhibit 9**).

⁸WACI = $\sum_i^n \left(w_i \frac{\text{Issuer's Scope 1 \& 2 emissions}}{\text{Issuer's revenue in millions}} \right)$, where w = portfolio weight.

Exhibit 9. Change of Investment Objective and Investment Restrictions of Allianz European Equity Dividend

	Previous Approach	New Approach
Investment Objective	Long-term capital growth by investing in companies of European equity markets that are expected to achieve sustainable dividend returns.	Long-term capital growth by investing in companies of European equity markets that are expected to achieve sustainable dividend returns, as well as to achieve the Sustainability KPI (as defined in the "Investment Restrictions" below) with the adoption of the Sustainability Key Performance Indicator Strategy (Absolute) ("KPI Strategy (Absolute)").
Investment Restrictions	<ul style="list-style-type: none"> Climate Engagement with Outcome Strategy (including exclusion criteria) applies 	<ul style="list-style-type: none"> KPI Strategy (Absolute) (including exclusion criteria) applies. Min. 80% of Sub-Fund's portfolio shall be evaluated by the "Weighted Average GHG Intensity (in terms of sales)." Portfolio in this respect does not comprise derivatives and instruments that are non-evaluated by nature (e.g., cash and deposits). The Sustainability KPI is at least a 5% year-on-year reduction in the Weighted Average GHG Intensity (in terms of sales) on an improvement pathway starting at the Reference Date (i.e. first date of adoption of the KPI Strategy (Absolute)). For the period between Reference Date and the first fiscal year end of strategy adoption, a pro rata temporis rate of the Sustainability KPI will be applied.

Source: Allianz Global Investors (2022).

Presenting both WACI (reflecting emissions) and the change in WACI (indicating decarbonization) while establishing explicit decarbonization targets can serve as a useful reminder to investors. This approach underscores the significance of not only maintaining low emissions but also actively working toward reducing emissions.

WACI measures portfolio carbon intensity per the issuer's revenue and is applicable to all commercial entities. However, its sensitivity to inflation and exchange rate fluctuations is noteworthy. For example, in the fiscal year ending March 2022, Nippon Steel (the world's fourth-largest steelmaker) reported a 20% year-on-year decline in carbon intensity per Japanese yen million revenue, while emissions per unit of output decreased by only 5% year on year. This disparity is largely attributed to a 14% increase in average selling prices during the period. Furthermore, if we recalculate carbon intensity per revenue using millions of US dollars for portfolio WACI computation, the company's carbon intensity, adjusted for the sharp Japanese yen depreciation, decreased by only 11%.

Exhibit 10. Reported vs. Adjusted WACI, 2012–2019

	Pension Funds		Insurance Companies	
	Reported	Adjusted	Reported	Adjusted
Change in WACI	34.4%	24.1%	31.0%	23.7%
Non-real greening effect	10.3 pps		7.3 pps	

Source: Janssen et al. (2021).

To interpret and compare WACI meaningfully, adjustments for inflation and exchange rate fluctuations are necessary, as illustrated by an analysis by Janssen, Dijk, and Duijm (2021). The authors compared the change of reported WACI with that of WACI adjusted for inflation and exchange rate fluctuations of Dutch pension funds and insurance companies between 2012 and 2019, and they labeled the difference of 7.3–10.3 percentage points (pps) the “non-real” greening effect (see **Exhibit 10**).

However, determining the appropriate deflator and exchange rate for such adjustments remains challenging for global funds unless portfolio companies, particularly MNCs, report their adjusted carbon intensity per revenue.

While such disclosure is unavailable, an alternative approach to interpret and compare portfolios’ environmental outcomes is presented in a report by Horan, Dimson, Emery, Blay, Yelton, and Agarwal (2022). The authors develop tools and a framework to evaluate ESG outcomes, evaluating investment products according to the outcomes relative to their objectives (e.g., decreased emissions, increased human rights). The report suggests measuring year-on-year change of ESG performance at the security level rather than the portfolio level:

$$\Delta \text{ESG} = \sum_i^n w_i d_i \left(\frac{\text{ESG}_{i,t}}{\text{ESG}_{i,t-1}} - 1 \right),$$

where

ESG = chosen ESG metric

w = portfolio weight

d = duration of holding

Weighting the portfolio by duration of holding mitigates the effect of divestment in the middle of the reporting period and window dressing on the outcome. We can aggregate at the security level the change of carbon intensity per revenue based on the reporting currency to mitigate the effect of the exchange rate (Δ Carbon intensity per reporting currency revenue) or the change of carbon intensity per output (Δ Carbon intensity per output) to reflect the

portfolio's environmental performance while eliminating the effect of changes in price, exchange rate, and volume and align with target setting of companies with commoditized output. There is no one-size-fits-all metric for reporting/ assessing portfolio carbon exposure and decarbonization (refer to Illustration 1 to see the results of measuring decarbonization by different metrics based on a hypothetical portfolio), and a dashboard approach using multiple metrics is needed, as recommended by Simmons, Jain, Bourne, and Kooroshy (2022).

Illustration 1. Evaluation of Decarbonization by Multiple Metrics

The following illustration is based on a hypothetical portfolio, which is composed of two steel companies and two cement companies by assuming equal portfolio weight throughout FY2021-FY2022 and constant portfolio value at the end of the reporting period for simplicity (see **Exhibit 11**). Using the previous formula, the hypothetical portfolio's change in WACI per revenue in millions of US dollars and in local reporting currency, per output, and change in total emissions are shown in **Exhibit 12**.

Exhibit 11. Reported Data for the Hypothetical Portfolio (for illustration only)

	Portfolio Weight × Duration of Holdings	Total Emissions			Revenue			Carbon Intensity per Output		
		FY2021	FY2022	YoY	FY2021	FY2022	YoY	FY2021	FY2022	YoY
		Million t CO ₂ e			USD Millions*			t CO ₂ e/output		
Steel A	25%	139	118	-15.4%	76,571	79,844	4.3%	2.11	2.05	-2.8%
Steel B	25%	74	84	13.2%	43,626	55,584	27.4%	1.97	1.88	-4.6%
Cement A	25%	86	83	-3.5%	29,432	31,644	-7.5%	0.61	0.60	-2.0%
Cement B	25%	74	70	-5.3%	21,292	22,629	6.3%	0.61	0.59	-2.5%

*Based on end of reporting period exchange rate.

Note: YoY represents year over year, and t CO₂e represents tonnes of carbon dioxide equivalent.

In Exhibit 12, we can see the WACI change is largely attributable to price hikes and a strong US dollar during the period. This finding highlights the limitation of relying on each metric independently to convey the complete narrative.

Ideally, examining both carbon intensity per output and total emissions provides insights into how portfolio companies contribute to global emission reductions. However, it is essential to note that carbon intensity per output may not be applicable to companies without commoditized outputs (e.g., those in the service industry). Additionally, relying solely on total emissions may not unveil the carbon efficiency of outputs, such as in the case of a decarbonization leader gaining market share.

Exhibit 12. Comparison of Portfolio Decarbonization by Different Metrics

Portfolio Weighted	Change YoY	Remarks
ΔCarbon intensity per USD million revenue	-12.8%	Proxy to change of WACI
ΔCarbon intensity per reporting currency revenue	-16.5%	- Forex rate change
ΔCarbon intensity per output	-2.9%	+ Price change (including inflation, post-pandemic recovery, product mix change)
ΔTotal emissions	-2.8%	+ Output change

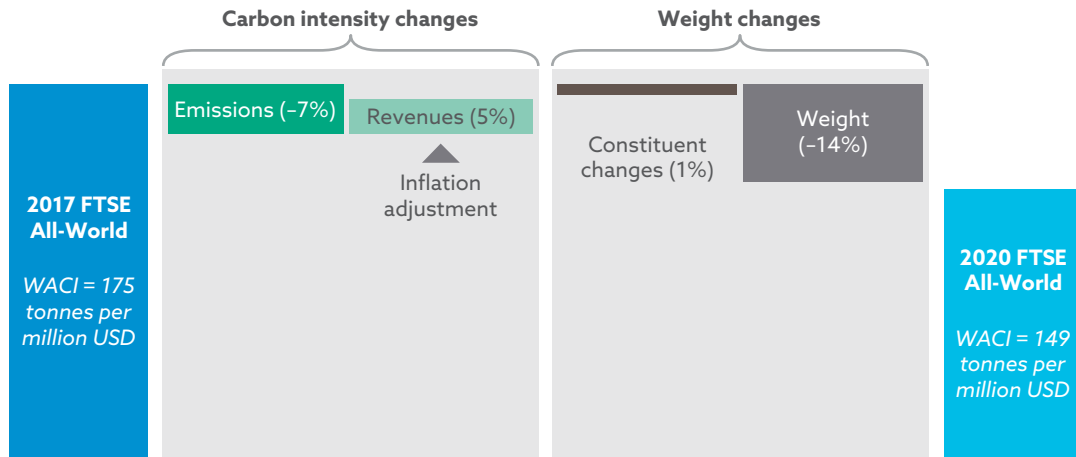
Note: Based on end-of-reporting-period exchange rate.

In addition, portfolio decarbonization can be a result of “transactions” (such as acquiring low-emission assets and divesting high-emitting assets) and “action” (engagement efforts contributing to the decarbonization of portfolio companies). Horan et al. (2022) suggested using attribution analysis to assess the impact of asset allocation and security selection on portfolio ESG performance. Simmons et al. (2022) further dissected changes in the WACI of the FTSE All-World Index from 2017 to 2020, revealing that the reduction in the weighting of carbon-intensive industries is the most significant contributor (see **Exhibit 13**).

Investors’ preferences may differ, yet it remains crucial to ensure that financial products align with their intended investment objectives, whether focused on achieving low emissions or contributing to the broader goal of reducing global emissions.

To summarize, we believe reporting/comparing portfolio companies’ decarbonization progress is equally important as reporting portfolio emissions, because it helps investors understand the environmental impact of different investment approaches and make informed decisions. Therefore, we recommend the following:

Exhibit 13. Disaggregating Portfolio WACI Changes, 2017–2020



Source: Simmons et al. (2022).

- Decarbonization progress should be reported together with emissions as headline numbers (i.e., year-on-year change of WACI together with WACI).
- Corporations should report carbon intensity adjusted for inflation and exchange rates, and accordingly, portfolio managers should report the adjusted portfolio WACI.
- Multiple metrics should be used for carbon exposure reporting to reveal the environmental impact (e.g., Δ Carbon intensity per output, Δ Total emissions; see Exhibit 12), particularly for sustainable funds and impact investments with the reduction of global emissions as an objective.
- Attribution analysis is necessary to break down the impact by weighting change and portfolio companies' aggregated decarbonization efforts to ensure investors that the decarbonization outcomes are achieved according to investment objectives.

The Joint Committee of the European Supervisory Authorities (2023) proposed amendments to the Sustainable Finance Disclosure Regulation (SFDR), including the introduction of a new disclosure requirement regarding decarbonization targets. The paper proposes to require a narrative description in precontractual documents about how the target will be achieved, indicating whether the target is

- a commitment to reduce the financed emissions of the product, through divestment/capital reallocation, and/or
- a commitment that the investee companies will deliver emission reductions over the duration of the investment, either based on the investee companies' transition plan or by engaging with investee companies to contribute to their decarbonization.

The changes proposed here are complementary to the European Supervisory Authorities' proposed amendments and will provide important information for decision making. With that said, both emissions and decarbonization tell us the financial products' performance at a point in time or over a period of time, but they are not forward looking and cannot tell us the benefits of enabling activities.

4.1.2. Avoided Emissions

Avoided emissions refer to "emissions being avoided as they displace the emissions that would have otherwise occurred without the project's implementation" (Partnership for Carbon Accounting Financials 2022). Avoided emissions are recognized by the TCFD as a climate-related goal for all sectors and occur outside of the product's life cycle (therefore, they are also known as Scope 4 emissions).

The calculation of avoided emissions can be either precise or scalable, depending on the purpose. For instance, Schroders and GIC codeveloped a framework that is scalable, and it is used to screen thousands of companies (Howard, Tang, Low, Teo, and Wong 2021). Schroders identifies 19 material, economical and/or potentially scalable carbon avoiding activities, matches them with FactSet revenue segments, shortlists companies from a broad investment universe, and derives avoided emissions at a company level.

Avoided emissions assessment is applicable to both transitional and enabling activities/climate solutions, but no universal framework or calculation method exists. A study by Cleantech Scandinavia on 15 different frameworks found a high potential for variation in results (Carrión 2021). Calculations often rely on life-cycle assessment or related concepts and are sensitive to such choices as baseline, geography (global or national), and market effects (changes in consumer behavior, market penetration, and market share estimates). Thus, to interpret avoided emissions properly, it is vital to know the assumptions behind the outputs, and caution is required when making comparisons.

One interviewee in our study acknowledged the lack of comparability as a drawback when individual asset managers develop and/or use proprietary assessment frameworks. However, the interviewee noted that as long as they are approached with caution, proprietary assessment frameworks can still be beneficial because they enable the interpretation of data in a consistent manner, which is valuable for making informed investment decisions within the organization. With the goal of creating a global standard for assessing avoided emissions, a consortium of financial institutions, spearheaded by Mirova and Robeco, is working on developing a standardized database of avoided emissions factors. This initiative aims to enhance the transparency and comparability of calculating emissions avoided by activities financed by financial institutions. The consortium plans to release the database in Q4 2024, making it accessible to all stakeholders involved in calculating avoided emissions (Robeco 2024). The project's second phase aims to construct a database enabling the estimation of

avoided emissions for the top 1,500 listed companies by market capitalization. Subsequent stages will expand the coverage to include smaller companies, private enterprises, and green bonds (Mirova and Robeco 2023).

Avoided emissions help transition storytelling, particularly for the contribution of enabling activities, and can be forward looking. However, users need to be cautious because comparing portfolio avoided emissions managed by different asset managers can be considered apples-to-oranges comparisons until financial institutions adopt a global standard to resolve the comparability issue. TCFD could consider accelerating the adoption of a global standard by recommending the use of standardized avoided emissions factors in its guidance on exposure metrics.

4.1.3. Low-Carbon Investment

In the EU, revenues, CAPEX, and operating expenses are all relevant KPIs to measure taxonomy-aligned sustainable investments for SFDR disclosure, and while revenues and operating expenses provide a historical snapshot, CAPEX is a precursor to improvements in sustainability trajectory. In addition to CAPEX, CDP (formerly the Carbon Disclosure Project, a global environmental disclosure system for over 740 investors and over 23,000 corporations and governmental bodies) also asks corporations in high-emitting sectors in the EU that use the CDP Climate Change disclosure platform to provide their research and development (R&D) investment in low-carbon solutions. R&D is an indication of future earning capacity and resiliency to climate-related issues of a corporation's core businesses.

For the purposes of our report, low-carbon investment includes a corporation's CAPEX and R&D investment in transitional and enabling activities. We believe that disclosing low-carbon investment is crucial for empowering investors to make well-informed decisions in transition finance and to monitor corporations' progress in executing their transition plans. The current challenge lies in the absence of a widely agreed-on transition taxonomy to define such activities outside the EU, compounded by the lack of mandatory reporting requirements. Because many countries/regions are in the process of developing their transition taxonomies, we suggest that regulators encourage disclosure of low-carbon investment to enhance transparency and cultivate a conducive environment for transition finance.

4.2. Labeling to Improve Awareness and Clarity

In the United Kingdom in November 2023, the FCA released the Sustainability Disclosure Requirements (SDR) and labeling regime (FCA 2023b). These labels aim to provide investors with a clear understanding of the sustainability characteristics associated with various financial products, fostering transparency and trust in the market for sustainable investments. In the FCA's labeling system, four categories are delineated:

- Sustainability Improvers: financial products that are improving their sustainability credentials and, therefore, align well with transition finance
- Sustainability Impact: products that demonstrate additionality in contributing to the sustainability of the real economy and align with impact investing strategies
- Sustainability Focus: products labeled with a sustainable focus that can use, for instance, the EU Taxonomy as a benchmark to demonstrate how assets meet a credible standard of sustainability (see Guy 2023; an investment fund with low-emission assets is likely classified under this class)
- Sustainability Mixed Goals: products with a combination of the sustainability objectives for the other labels (with disclosure of the proportion of assets invested in accordance)

The investment labeling and disclosure regime applies to UK funds, and FCA will consult on the extension of the regime to portfolio management undertaken for UK retail clients, overseas funds marketed in the United Kingdom, and pension products in Q1 2024.

The Sustainability Improvers label recognizes that stewardship initiatives to improve the environmental or social sustainability profiles of portfolio companies contribute to the sustainability of the real economy. When applied to transition finance products, this label not only establishes a proper identity but also acknowledges the pivotal role played by transition finance in achieving net-zero goals. Additionally, it serves to alleviate potential miscommunication along the long chain of gatekeepers (see Section 3.1).

The UK Sustainable Investment and Finance Association agreed that the labeling system will enhance transparency for investors, but it urged for more clarity on appropriate metrics for the Sustainable Improvers label. Without such clarity, there is a risk of it becoming a generic label, potentially leading some funds to exaggerate the impact of their engagement activities (Dodds 2023). Our interviewees acknowledged that it may not be flawless initially but believe in the necessity of establishing a separate transition finance asset class.

In general, the FCA's labeling system is based on a product's purpose. It is different from the EU SFDR classification system, which is a disclosure system under which an ESG/sustainable fund is classified as follows:

- Article 6: funds without a sustainability scope
- Article 8: funds that promote environmental or social characteristics
- Article 9: funds that have sustainable investment as their objective

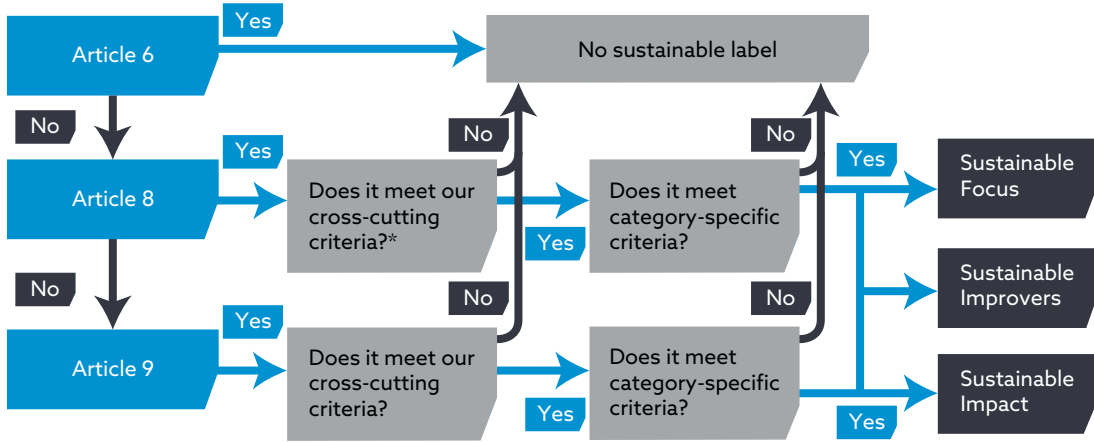
Each type of fund under the EU system requires a different level of disclosure. In the United States, the approach proposed by the Securities and Exchange Commission (2022), as outlined in the Enhanced Disclosures by Certain Investment Advisers and Investment Companies about Environmental, Social, and Governance Investment Practices, is also based on disclosures, with ESG/sustainable funds classified as follows:

- Integration Funds: funds that integrate ESG factors alongside non-ESG factors in investment decisions
- ESG-Focused Funds: funds for which ESG factors are a significant or main consideration
- Impact Funds: a subset of ESG-Focused Funds that seek to achieve a particular ESG impact

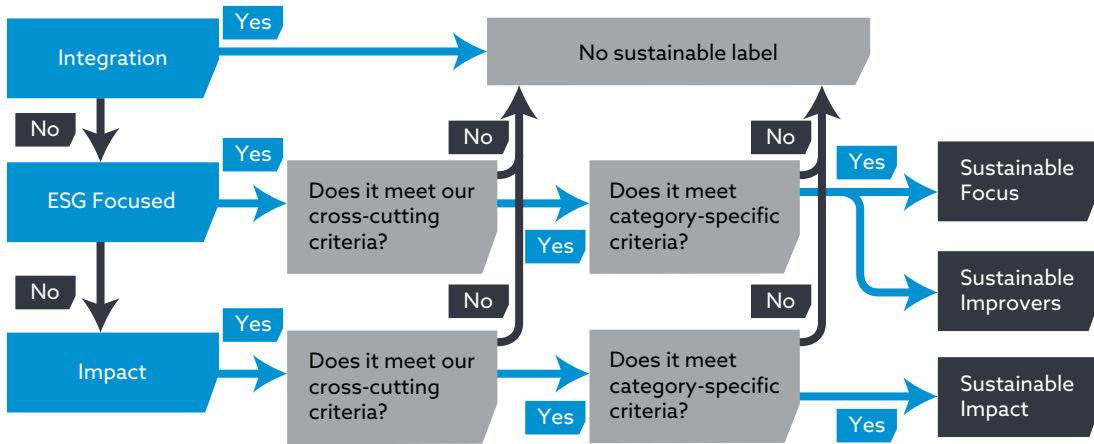
Neither the EU nor the US regulatory bodies currently have plans to label funds. The FCA conducted a high-level mapping of the three approaches to illustrate their interoperability (see **Exhibit 14**). However, because the starting point of the three jurisdictions is different (labeling versus disclosure), more work must be done to ensure interoperability and avoid market fragmentation (Guy 2023). Note that in the EU, irrespective of the EC's intention, the SFDR is often used by the market as a product labeling system. In September 2023, the EC published a consultation on SFDR, revealing the EC's consideration to establish a new product categorization system, and the change could bring the EU SFDR and UK SDR closer (Sidley 2023).

Exhibit 14. How to Map SFDR and SEC Fund Classification with the UK FCA’s Investment Labels

Is your product?



Is your product?



*Article 8 funds will need to “level up” to meet the FCA’s criteria by specifying a sustainability objective. It is unlikely that an Article 8 fund would meet the criteria for sustainable impact.

Source: FCA (2022).

5. CREDIBLE AND FEASIBLE TRANSITION PLANS FOR FORWARD-LOOKING INVESTING

In this section, we discuss the necessary elements of transition plans that will allow investors to make informed, forward-looking investment decisions.

5.1. Feasible and Credible Transition Plan

Both corporations and investment managers provide disclosures of historical emissions and decarbonization trends. These disclosures, however, are insufficient for making informed forward-looking investment decisions. Investors and financiers in the transition finance sector rely on the forward-looking transition plans of borrowers and investees. Unfortunately, a significant portion of high-emitting corporations have not disclosed their transition plans, as highlighted in Section 2.2. The ESMA (2023) progress report on greenwashing identifies issuers' commitments to future ESG performance, especially net-zero pledges and "so-called transition plans," as high-risk areas for greenwashing (refer to Section 2.1.2). In short, there is skepticism surrounding both the quantity and quality of transition plans.

Despite this skepticism, some progress is taking place—notably, with the International Sustainability Standards Board's climate-related standard IFRS S2 *Climate-related Disclosures* and the UK TPT framework, both of which were finalized in 2023. IFRS S2 requires disclosure of

any climate-related transition plan the entity has, including information about key assumptions used in developing its transition plan, and dependencies on which the entity's transition plan relies; and how the entity plans to achieve any climate-related targets. (International Sustainability Standards Board 2023)

The TPT framework incorporates IFRS S2 and lays out specific requirements for disclosure of financial planning:

An entity shall, to the extent the financial effects of its transition plan are separately identifiable, disclose information about the effects of its transition plan on its financial position, financial performance and cash flows over the short-, medium-, and long-term, including information about how it is resourcing or plans to resource its activities in order to achieve the strategic ambition of its transition plan. (Transition Plan Taskforce 2023)

Together, they provide clarity on what constitutes a credible transition plan. Nonetheless, the wider challenge of addressing the deficiency identified by Ninety One (2022) in credible and “feasible” transition plans remains unresolved (see Section 3.2).

What constitutes a feasible transition plan? According to IFRS S2 and the TPT framework, entities need to disclose decarbonization targets together with the projection of financial effects, and there should be economic feasibility to support projection of the reported financial effects. We believe incorporating analysis of economic feasibility into transition plan disclosure will directly address investors’ concerns and boost confidence in the decarbonization targets being well thought out and realistic instead of empty promises.

5.2. Transition Capacity and Economic Feasibility Analysis

In 2021, CPP Investments, the organization that invests Canada Pension Plan (CPP) funds, proposed a Projected Abatement Capacity (PAC) assessment for the projection of a corporation’s transition capacity and economic feasibility (CPP Investments Insights Institute 2022), which forms part of the recommendations CPP Investments provided to the US Securities and Exchange Commission to enhance and standardize climate-related disclosures (CPP Investments 2022). The idea is similar to the regulator’s oil and gas reserve reporting requirements, under which undeveloped reserves are categorized as proven, probable, or possible according to the likelihood of commercial recovery using reliable technologies.

The PAC assessment would provide investors with

- a standardized probability instead of wide ranges of outcomes;
- the nonoptimized scenario under the “proven” category, where decarbonization is technologically and economically feasible and might actually happen; and
- the technology trajectories, depending on policy levers under the “probable” category, whereby decarbonization will become feasible at different carbon prices (as a proxy for all policy levers).

Exhibit 15 shows an illustrative example of a PAC assessment.

The PAC assessment requires a corporation to do the following:

- Assess current emissions to build a baseline.
- Identify actions that can cost-effectively cut emissions with currently available and proven technologies and derive the amount of emissions reduction from the baseline, which would be “proven PAC.” It includes

Exhibit 15. Illustrative Example of PAC

	Scope 1	Scope 2	Scope 3	Total	Illustration				
					Scope 1	Scope 2	Scope 3	Total	
GHGs (t CO₂e)	G	G₁	G₂	G₃	G_t	1,500	800	2,500	4,800
Efficiency	E	E ₁	E ₂	E ₃	E _t	400	100	1,100	1,600
Investment (demand)	ID	ID ₁	ID ₂	ID ₃	ID _t	200	50	100	350
Investment (supply)	IS	—	IS ₂	IS ₃	IS _t	—	50	100	150
Renewables	R	R ₁	R ₂	R ₃	R _t	100	200	1,000	1,300
Current (proven) PAC	C	C₁	C₂	C₃	C_t	700	400	2,300	3,400
Percentage of total		C₁/G₁	C₂/G₂	C₃/G₃	C_t/G_t	47%	50%	92%	71%
Economic @ USD100/t CO ₂ e	Ec@100	Ec ₁₀₀₋₁	Ec ₁₀₀₋₂	Ec ₁₀₀₋₃	Ec _{100-t}	50	200	—	250
Economic @ USD150/t CO ₂ e	Ec@150	Ec ₁₅₀₋₁	Ec ₁₅₀₋₂	Ec ₁₅₀₋₃	Ec _{150-t}	200	200	100	500
Economic @ internal shadow price	Ec@Int	Ec _{Int-1}	Ec _{Int-2}	Ec _{Int-3}	Ec _{Int-t}	200	—	—	200
Long-term (probable) PAC	L	L₁	L₂	L₃	L_t	450	400	100	950
Percentage of total		L₁/G₁	L₂/G₂	L₃/G₃	L_t/G_t	30%	50%	4%	20%
Closure/abandonment	A	A ₁	A ₂	A ₃	A _t	150	—	100	250
Transformative technology	T	T ₁	T ₂	T ₃	T _t	150	—	—	150
Offsets via removal credits	O	O ₁	O ₂	O ₃	O _t	50	—	—	50
Uneconomic PAC	U	U₁	U₂	U₃	U_t	350	—	100	450
Percentage of total		U₁/G₁	U₂/G₂	U₃/G₃	U_t/G_t	23%	13%	4%	9%

Source: CPP Investments Insights Institute (2022).

emissions reduction requiring (1) no additional investment, under "efficiency"; (2) investment for reduction of energy consumption, under "investment (demand)"; (3) investment for increasing supply of green energy, under "investment (supply)"; and (4) switching to renewable energy, under "renewables."

- Identify activities and strategies that can reduce emissions in the future with solutions that would become economic at predetermined future carbon prices (e.g., USD100 and 150/t CO₂e), and derive the amount of emissions reduction therefrom, which would be "probable PAC." An optional company-specific internal carbon price can also be considered.
- For the residual emissions that are uneconomic to abate (under "uneconomic PAC"), consider potential options, such as closures and carbon offsets.

The PAC assessment is based on net present value, and emissions are deemed economic to abate if total revenues over the lifetime of the investment exceed total costs (CAPEX and cash operating expenses). Exhibit 15 provides an illustrative example of the assessment in a standard template. It tells us that the company is 91% "savable," out of which 58% requires additional capital outlay, and investors can drive positive outcomes. The assessment also helps readers visualize the probability to achieve net zero through novel technologies under different carbon price scenarios.

Illustration 2 examines an effort to organize published target data and action plans from listed companies into the PAC assessment template. However, incomplete disclosures hinder the completion of a full assessment.

Illustration 2. Evaluation of Transition Capacity

An attempt was made to organize published target data and an action plan from a listed steel company (**Exhibit 16**) and a listed cement company (**Exhibit 17**) in a format similar to the PAC assessment, assuming all planned actions are value accretive. As shown in Exhibit 16, the steel company disclosed that green hydrogen will become commercially viable at USD0.7/kg in the United States, and based on EY estimates, the US IRA will bring the production cost of green hydrogen to USD0.5–USD1.5/kg (Bansal 2023). As such, part of the steel company's "probable PAC" could be upgraded to "proven PAC" by 2030.

Exhibit 16. PAC Profile of a Listed Steel Company (for illustration only)

	Decarbonization Strategy	Actions/Enabling Conditions	Intensity Reduction (from 2018 baseline)				
			t CO ₂ e/t steel		2019–2030	2031–2050	Total
			2019–2030	2031–2050			
Efficiency	Increased scrap use	Innovative DRI-EAF projects; smart carbon + gas injection projects; new projects in NAFTA; roll out in operating countries	0.48	0.80			
Investment (demand)	Steelmaking transformation						
Investment (supply)	Energy transformation						
Renewable	Sourcing clean electricity		0.04	0.12			
Proven PAC			0.52	0.92	25%	45%	70%
	Green hydrogen	@ <USD1/kg (Europe) and <USD0.7/kg (US)		0.52			
	Bioenergy and CCUS	Country by country					
Probable PAC				0.52		25%	25%
	Offsetting residual emissions			0.10			
Uneconomic PAC				0.10			5%

Source: CFA Institute analysis based on company reports.

Note: Scope 1 and 2 only.

In practical terms, because there are no standardized disclosure requirements for corporations’ decarbonization plans, the plans often are depicted through visual illustrations, using graphics or images. However, specific numerical data and a detailed timeline typically are not explicitly provided. For instance, the steel company for this illustration provided its decarbonization targets by action in the medium term (e.g., sourcing clean electricity to reduce carbon intensity by 0.04t CO₂e/t steel by 2030), but the cement company provided only a long-term target (e.g., efficiency gains in concrete to contribute to a 10% emissions reduction by 2050). Unfortunately, existing disclosures did not allow a full assessment.

Exhibit 17. PAC Profile of a Listed Cement Company (for illustration only)

	Pathway	Intensity Reduction (from 2018 baseline)				
		kg CO ₂ /g cementitious		2019-2030	2031-2050	Total
		2019-2030	2031-2050			
Efficiency	Efficiency gains in design + construction	21	77	3%	13%	
	Efficiency gains in concrete	25	37	4%	6%	
Investment (demand)	Less clinker in cement	31	31	5%	5%	
	Less CO ₂ in clinker (alternative raw materials)	31	31	5%	5%	
	Waste recovery					
Investment (supply)	Decarbonization of electricity	19	35	4%	6%	
Renewable	CCUS, other technologies					
Proven PAC		126		21%	33%	55%
	CCUS, other technologies		246		40%	
Probable PAC			246		40%	40%
Uneconomic PAC						5%

Source: CFA Institute analysis based on company reports.

Note: Scope 1 and 2 only.

Despite the challenges in completing a full PAC assessment, the previous exercise does the following:

- It illustrates that substantial value-accretive abatements through efficiency improvements can be proven and engagement can drive change for more rapid decarbonization.
- Coupled with industry research, it allows research analysts to develop the enabling scenarios for feasibility analysis of probable PAC. For instance, based on a Mission Possible Partnership report (Material Economics and

Energy Transitions Commission 2021), a carbon price of up to USD120/t CO₂e⁹ is needed to make low-carbon technologies economic.

- It provides a basis for asset managers to engage with corporations and policymakers—for example, to accelerate efficiency improvements by available and proven technologies and lobbying for green premiums (e.g., public procurement, life-cycle emission regulations on steel users) to turn “probable PAC” to “proven PAC.”
- It informs investment decisions and allows in-depth engagement at the operational/technological levels if like-for-like comparisons in the same sector are available.

In addition, the assessment is readily applicable to due diligence of private equity investments and helps corporations develop and review their transition plans. An interviewee noted that corporations and investors frequently give more attention to the uncertainties associated with novel technological developments than to the potential for technologically and financially feasible efficiency improvements. As a result, both corporations and investors hesitate to progress because of this overstatement of perceived risks. A PAC assessment serves as a valuable tool to alleviate this apprehension and provide clarity.

CPP Investments has applied the PAC assessment on 12 of its private market portfolio companies (Fronza 2023), illustrating that it is a practicable exercise for issuers irrespective of size and resources. On this point, one interviewee highlighted that willingness to report goes hand in hand with capability. For high-emitting companies that need transition finance support, it may be in their best interest to make their transition plan credible and convincing (therefore, create willingness), and adopting the concept of transition capacity and economic feasibility might be practicable and helpful to develop capacity in this high-demand area.

Even though it was designed for corporations’ reporting, investors and analysts can apply the concept to evaluation of “savable” companies to inform investment decisions and engagement.

5.3. Decarbonization Targets in Executive Remuneration

The recent trend of tying executives’ remuneration and incentives to sustainability performance helps assure asset managers of corporations’ commitment to achieve their sustainability targets. A study conducted by PwC and London Business School (2023) revealed that 78% of the STOXX Europe 50 constituents have incorporated executive pay ties with decarbonization targets. According to Spierings (2022), among S&P 500 Index companies, executive compensation is most commonly linked to human capital

⁹Assuming 2.3t CO₂e/t steel.

management goals (64%), with environmental goals being the least frequently connected ESG metrics. However, there is an upward trend, with 19% of S&P 500 companies tying executive pay to decarbonization targets in 2021, a substantial increase from the 10% reported in 2020.

Linking executive pay with sustainability targets provides a new definition of job performance under a triple bottom line framework (social, environmental, financial), but whether it helps meet investor expectations and ultimately helps achieve net zero remains unknown (Spierings, 2022). We recognize this as progress nevertheless because the mechanism bolsters credentials of decarbonization targets in transition plans and helps raise the confidence level of the “savable-ness” of a portfolio company. Asset managers can also make use of shareholder say-on-pay votes to advocate for more assurance.

6. ADDITIONAL GOVERNMENT SUPPORT TO DERISK TRANSITION FINANCE

One major hurdle of transition finance development is the prevailing perception that transition solutions lack commercial viability (particularly technological risks). Furthermore, the decarbonization of high-emitting sectors could involve early retirement of assets, introducing financial risks associated with potential stranding (stranded asset risk). Beyond financial risks, transition finance investing is susceptible to performance risk, as asset managers must substantiate that the environmental outcomes justify the incremental opportunity cost of capital, if any. In addition to these challenges, the lack of awareness and clarity surrounding transition finance exposes it to the risk of greenwashing.

Several interviewees noted that although stewardship efforts of financial institutions and other market forces (e.g., demand for green steel and cement) will drive corporations to advance toward decarbonization targets, the movement toward corporations meeting decarbonization targets is gradual. Consequently, the investable universe for transition finance remains constrained. To address this issue, several countries/regions are developing taxonomies, aiming to enhance clarity by establishing common terminology for economic activities eligible for transition finance. In previous sections, we delved into the advancements in establishing labeling systems and disclosure requirements for transition plans, contributing to increased awareness and clarity in transition finance and enhancing the quality of information for investment decision making. These changes collectively work toward mitigating the risk of greenwashing. Next, we will explore additional government support measures that could further reduce the risks associated with transition finance (see **Exhibit 18**).

Exhibit 18. Exploring Government Support to Alleviate Risks Associated with Transition Finance

	Financial (capital loss)		Nonfinancial (damaged reputation, regulatory action)	
	Technological Risk	Stranded Asset Risk	Greenwashing Risk	Performance Risk
Government support	<ul style="list-style-type: none"> Grants and loans, tax credits Green public procurement Blended finance facilities (Sections 6.1–6.3) 	<ul style="list-style-type: none"> Reverse auctions Climate bad banks (Sections 6.4 and 6.5) 	<ul style="list-style-type: none"> Taxonomies (Section 2.1.1) Transition finance product labeling (Section 4.2) Transition plan disclosure (Section 5) 	

6.1. Grants, Loans, and Tax Credits

The US IRA earmarks USD369 billion for climate and energy investments. For high-emitting industries, it lowers the costs of hydrogen and carbon capture through (1) the introduction of a new 10-year clean hydrogen production tax credit up to USD3/kg and (2) increasing tax credits for eligible CCUS to USD85/t CO₂e from USD50/t CO₂e and carbon capture and utilization (CCU) to USD60/t CO₂e from USD35/t CO₂e. This initiative gives new impetus to turn probable PAC to proven PAC (Section 5.2). BCG (2022) estimates that as a result, green steelmaking in the United States could be over 40% less expensive than in Germany in 2030.

One year after the passage of the IRA, studies indicate that it is insufficient to derisk investments in hydrogen and carbon capture technologies and mobilize private finance:

- A study from the Oxford Institute for Energy Studies (Goddard 2023) evaluates the impact of the new tax credit provisions in the framework of the IRA to the CCUS investment landscape in the United States and finds that the new policy incentives fail to derisk CCUS projects for private finance. The study suggests (1) an extension of the crediting period to 30 years from 12 years or alternative measures to lengthen the predictable revenue-generation period, (2) an investment tax credit made available to industrial CCS and removal to reduce capital costs, (3) using loans and loan guarantees to support specific policy objectives for industrial CCS deployment and technology R&D, and (4) amendments to strategic documents to provide a clear market signal that CCU is a long-term priority for transition of high-emitting sectors.
- In a BloombergNEF (2023b) report, a policy scenario is built to quantify the IRA impacts, which are found to be insufficient to meet the United States' NDC commitment, partly because industrial decarbonization remains limited; hydrogen and CCUS will not become economical until the 2040s, after the phaseout of tax credits (by 2033). For decarbonization of the high-emitting sectors, the report also suggests Congress should consider allowing eligible projects (hydrogen, CCUS, and biofuels) to claim tax credits beyond the 12 years currently allowed. Additionally, demand-side incentives, such as initial off-take, should be considered. The report's other suggestions include (1) adding "sticks" to complement the IRA "carrots," such as pricing emissions and mandating emission-control technologies; (2) maximizing the impact of the USD57 billion in loans, grants, loan guarantees, and other pools of flexible funding (out of the total USD357 billion bill) by targeting the investment gap not filled by federal programs (e.g., commercialization of new technologies, such as electrolytic steel and bioplastics); and (3) accelerating the infrastructure buildout to support CCS development (e.g., speed up carbon pipeline and storage facility approvals).

6.2. Green Public Procurement

One interviewee emphasized that making returns noticeable is crucial to attracting more investment into transition finance. Therefore, leveraging green public procurement (GPP) can serve as an incentive to stimulate the development of green products and services. Public procurement of goods and services accounts for approximately 15% of GDP in the EU, with the construction and transport sectors each accounting for about 12% of public procurement’s GHG emissions. In the United States, the IRA funding will support the Federal Buy Clean Initiative, which prioritizes purchases of US-made, low-carbon construction materials in federal procurement and federally funded projects. However, in the EU, recognized as a green pioneer, GPP is labeled as a “neglected tool” because of a lack of focus and motivation; the EU institutions themselves exhibit the lowest adoption of GPP compared to member states (see Lewis, Kaaret, Morales, Piirsalu, and Axelsson 2023; Sapir, Schraepen, and Tagliapietra 2022; Badell and Rosell 2021).

China and India, two of the world’s top four emitting countries/regions, exhibit significant potential to bolster decarbonization initiatives through GPP, particularly considering that public procurement constitutes 30%–35% of their respective GDPs (refer to **Exhibit 19**).

Exhibit 19. Characteristics of GPP in the Top Four Emitting Countries/Regions

	China	US	India	EU
GPP-specific legislation	Partially	Yes	No	Yes
Applicability	Partially mandatory	Mandatory	Voluntary	Voluntary
Defined goals	No	Yes	No	Yes
Monitoring	Monitoring framework under development	Yes	Information not available	No
Public disclosure	Information not available	Yes, in development	Information not available	No, general procurement info via TED*
Construction-specific GPP policy	Partially	Yes	No	Yes
Public procurement/GDP	35%	10%	30%	15%

*Tenders Electronic Daily.

Source: Morales, Skinner, Hemingway, Axelsson, and Piirsalu (2023).

6.3. Blended Finance Facilities

As mentioned in Section 2.1.3, enabling the scaling of blended finance is crucial for transition of developing markets. For private sector investment in blended finance, challenges include the following (Kozloski, Chau, Han, Desai, Yau, Dhanani, Hill, Newman-Martin, Bashian, Woods, and Shandal 2022):

- Lack of scaled investment vehicles: Meaningful aggregators are rare, and many blended finance initiatives are too small to attract engagement from institutional investors. This situation results in multiple investors competing for positions in a limited number of sizable deals.
- Costly and slow deal structuring: Impact measurement, verification, and technical assistance can be expensive, and the bespoke structuring involved in blended finance arrangements is often time consuming. Achieving a diversified investor base necessitates a system that makes deal structuring more replicable.

To address these challenges, the Network for Greening the Financial System (NGFS), a coalition of 125 central banks and 90 financial regulators, published a technical document that served as a handbook for blended finance at COP28. This handbook explores key mechanisms for scaling blended finance, which include

- pooling of investors at the fund or facility level and taking a portfolio rather than individual project approach and
- standardization of documentation to streamline due diligence and project preparation processes and to lower origination costs (Network for Greening the Financial System 2023; Menon 2023).

Indeed, the latest generation of blended finance facilities, exemplified by Finance in Motion (see Section 2.1.3), function as aggregators equipped with comprehensive technical assistance. This assistance spans various aspects, such as structuring, investor relations, impact monitoring, verification, and reporting. Additionally, there are specialized blended finance incubators and accelerators designed to foster innovation. The Global Innovation Lab for Climate Finance, founded in 2014 by the UK, German, and US governments, identifies, develops, and launches innovative finance instruments to mobilize private climate-related investment in developing markets. As of the end of 2021, the lab's portfolio of 55 climate finance solutions had attracted over USD3 billion in sustainable investments.¹⁰ One of the projects endorsed by the Global Innovation Lab for Climate Finance is the Financing Steel Decarbonization initiative. This initiative combines technical assistance, diverse sources of blended finance, and implementation-stage funding support to prepare, invest in, and derisk decarbonization technology projects for low-carbon steelmaking while concurrently cultivating the broader industrial ecosystem. The initiative is poised to conduct a pilot program in India and, in October 2022,

¹⁰Go to www.climatefinancelab.org/how-it-works/.

formalized a memorandum of understanding with JSW Steel (one of the largest steelmakers in India). This partnership aims to promote innovative financing and technological solutions for the decarbonization of the Indian steel industry.

The NGFS handbook can serve as a catalyst, fostering the emergence of additional blended finance facilities akin to Finance in Motion and the Financing Steel Decarbonization initiative. On the demand side, insights from our interviewees in the blended finance sector highlight that a significant portion of private sector investments originate from impact investors, which include international financial institutions with specific mandates for impact investing. As discussed in Section 2.3.3, the increasing capital allocation to impact investing holds the potential to bridge the funding gap in the decarbonization efforts of high-emitting sectors in developing markets.

6.4. Reverse Auction

In 2020, Germany enacted the Coal Phase-Out Act, concurrently offering financial compensation to operators of coal-fired power plants. The aim was to systematically reduce and ultimately eliminate the use of coal-powered energy. To achieve this goal, the German Federal Network Agency conducted reverse auctions, also known as coal exit auctions, for coal-fired power plant owners, intending to decommission 13 gigawatts (GW) of capacity. Each year, maximum prices and capacities were set for the auctions, with prices naturally falling below the maximum if oversubscribed. The seventh and final auction was completed in August 2023. Despite the energy crisis backdrop, the program expedited the retirement of a combined 10.7 GW of capacity, slightly below the government's 13 GW target. A study by Tiedemann and Müller-Hansen (2023) revealed that the program, which was the inaugural experiment with coal phaseout auctions in the EU, aided Germany in achieving coal phaseout at reduced costs and could potentially serve as a model for other regions' phaseout strategies.

From a derisking perspective, the German government's reverse auction initiative provides incentives for early phaseouts and enhances the liquidity of high-emitting assets by offering a pathway for the exit of stranded assets. We believe reverse auction is a tool for developed markets with ample public finance to accelerate the replacement of aged high-emitting assets with low-carbon facilities.

6.5. Climate Bad Banks

Another derisking solution is the concept of a "climate bad bank,"¹¹ designed to house assets most susceptible to stranded asset risks. Such banks allow companies to use a clean balance sheet to secure financing and focus on cleaner lines of business. The Asian Development Bank (ADB) introduced the Energy Transition

¹¹In 2021, BlackRock chief executive Larry Fink suggested energy companies should spin off their high-emitting assets into a bad bank structure and use the proceeds to expand green energy operations (Jessop 2021). An example of a bad bank is National Asset Management Agency of Ireland. It was established by the Irish government in 2009 to acquire and manage distressed property loans from five privately owned banks.

Mechanism (ETM), which aims to function as a climate bad bank with the objective of acquiring coal plants and winding them down within 15 years, significantly earlier than their typical life expectancy. The ETM operates through a public-private partnership (Glasgow Financial Alliance for Net Zero 2022), with private financiers, such as Prudential and HSBC, showing interest in the blended debt facility.

The initial negotiation demonstrates a shift from the conventional “acquire and retire” model to “refinance and accelerate retirement”:

- Goal: Accelerating the retirement of Cirebon-1, a 660 MW coal-fired plant owned by Cirebon Electric Power in West Java, 10–15 years before the end of its 40- to 50-year useful life (i.e., 2052–2062)
- Terms: A concessional loan ranging from USD250 million to USD330 million to compensate for the present value of forgone profits from the plant’s early retirement (Reuters 2022)

However, the deal has sparked controversy. According to Fair Finance Guide Japan (a civil society organization focused on sustainability themes and financial sector advocacy), (1) the project selection process lacks transparency; (2) the plant owner, Cirebon Electric Power, is capable of raising private financing and thus does not need this facility; and (3) there has been no effort for the rehabilitation and restoration of adverse environmental and social impacts caused by the construction and operation of the plant (Hatae 2023).

Contrary to the concept of a climate bad bank, ADB’s proposed transaction with Cirebon Electric Power is more aligned with a form of SLL, where early retirement serves as the SPT. The deal does not contribute to cleaning the company’s balance sheet because it has access to external financing.

In contrast, the ETM’s principles were applied by ACEN (a listed energy company) in the Philippines, which divested a six-year-old, 246 MW South Luzon coal-fired power plant through the creation of a managed transition vehicle in 2022. This special purpose vehicle, designed for a managed phaseout, will remain operational until its closure in 2040 (15 years before its 50-year useful life). It was sold to a consortium of public and private institutions, including the Philippine Government Service Insurance System as an equity owner (USD67 million) and Bank of the Philippine Islands and Rizal Commercial Banking as debt owners (USD249 million). ACEN plans to use the proceeds, net of outstanding loans, to build replacement renewables generation.

According to a report on managed phaseout (Bhat, Mann, and Murray 2023), the necessary commercial conditions for equity financing through a climate bad bank include

- transferability of assets,
- inability of owners to take on additional debt at a commercially reasonable cost, and

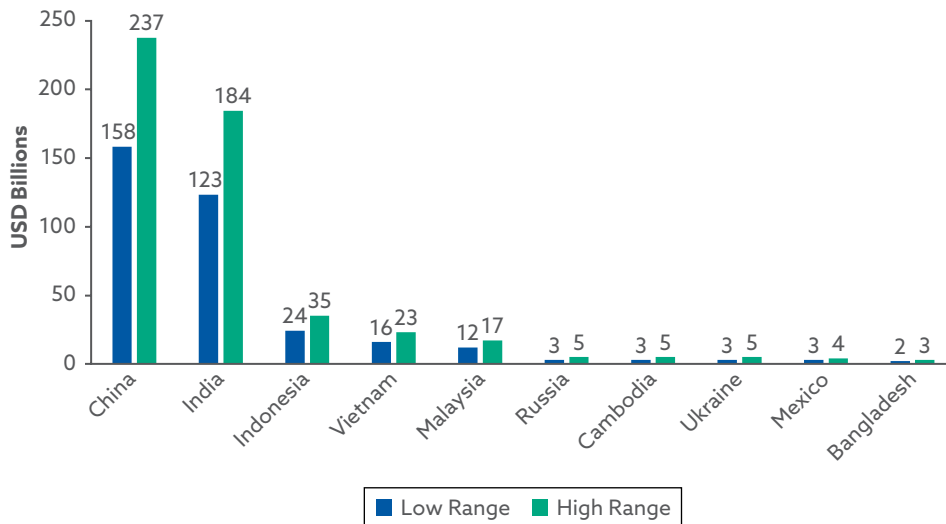
- the existence of a well-suited alternative operator for the underlying asset(s) or the new equity owner(s) possessing technical expertise for more efficient operation.

Building on insights from the ADB’s proposed deal with Cirebon Electric Power, additional commercial and noncommercial conditions can be considered:

- The proceeds will be earmarked for low-carbon investment.
- Plans should be formulated for retaining, modifying, or improving the underlying assets after closure for the benefit of local ecosystems and communities.

According to Global Energy Monitor, the global steel industry might face a potential write-off of up to USD518 billion in stranded assets, primarily because of the increasing stock of emission-intensive blast furnace capacity, including planned expansions (Swalec 2022; refer to **Exhibit 20**). Particularly in developing markets, the blast furnaces with high emissions¹² are relatively young, and the availability of scrap metal and renewable energy is insufficient to facilitate a swift transition to low-carbon production. To facilitate a well-coordinated transition, governments can consider the establishment of a climate bad bank to house assets at risk, allowing owners to cleanse their balance sheets, raise capital for low-carbon investments, and, simultaneously, provide governments with greater confidence in overseeing an orderly transition.

Exhibit 20. The Steel Industry’s Potential Write-Offs in Various Jurisdictions Could Amount to USD347 Billion to USD518 Billion



Source: Swalec (2022).

¹²The combustion of metallurgical coke as a fuel in the blast furnace results in high GHG emissions.

7. CONCLUSION

Many governments, corporations, asset owners, and asset managers claim to share a common goal: achieving net zero. However, their current strategies to decarbonize high-emitting sectors and propel transition finance often exhibit divergence, resulting in misalignments, inconsistencies, and incoherence. Some high-emitting countries/regions express a keen interest in mobilizing private sector investment for transition finance but lack established taxonomies defining eligible activities. Certain high-emitting corporations seek external financing for decarbonization but have yet to formulate comprehensive transition plans. Some governments have made net-zero commitments but do not require corporations to develop net-zero plans, hindering the cohesiveness of efforts between the public and private sectors to achieve the common goal. While sustainability investing gains traction, the funding gap for decarbonization of high-emitting assets remains substantial, and the disparity between the target setting of net-zero asset managers and the actual outcomes of decarbonization in the real economy is widening (Net-Zero Asset Owner Alliance 2022).

Transition finance involves navigating a complex landscape of economic, regulatory, environmental, and technological considerations, and a collaborative effort is crucial for its success. Investors, asset managers, corporations, and policymakers all play interconnected roles in influencing the trajectory of transition finance. This report explores actions that various stakeholders should consider, including increasing awareness of transition finance's role to achieve net zero; improving disclosures of transition plans; enhancing clarity regarding transition activities, credible transition plans, and transition finance products; and mitigating risks associated with transition finance.

We propose that asset managers use relevant metrics to improve reporting of their portfolios' real economy decarbonization impact and that regulators use labeling to provide a proper identity to and acknowledge the pivotal role played by transition finance products. Investment managers can highlight the decarbonization progress of sustainable portfolios (change in WACI), rather than solely focusing on emissions (WACI), and make portfolio decarbonization targets to enhance investors' awareness of their investment options in decarbonization or to maintain low emissions.

We propose that corporations incorporate economic feasibility into transition plan disclosure to boost investors' and financiers' confidence in their decarbonization targets being well thought out and realistic instead of empty promises. Furthermore, linking executives' remuneration and incentives to decarbonization performance provides investors with assurance regarding executives' commitment to achieving their targets.

Several countries/regions are developing taxonomies, and there have been advancements in establishing labeling systems and disclosure requirements

for transition plans. While governments urge boosting private sector investment to deliver net zero, we urge governments to expedite supportive policies to narrow the gaps and rectify the drawbacks in the enabling environment and to derisk transition finance. In this report, we discuss the inadequacy of existing fiscal policies, the potential of green public procurement, the role of blended finance facilities, and other policy interventions. Without robust government support, market forces alone cannot drive the world toward achieving decarbonization targets within the required time frame.

Exhibit 21 provides a summary of solutions discussed in this report.

Exhibit 21. Challenges Identified and Solutions Discussed in This Report

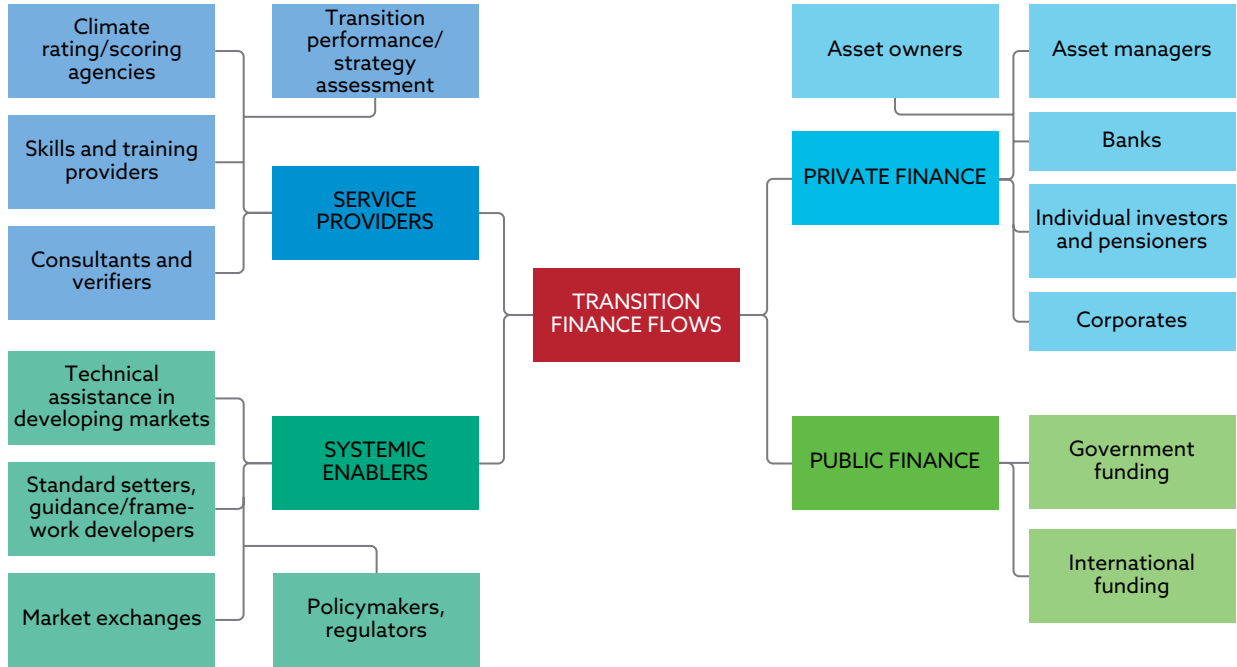
Challenges	Proposed Solutions		
	Institutional Investors	Corporations	Governments/Regulators
Lack of awareness, limited action	<ul style="list-style-type: none"> • Make portfolio decarbonization targets • Highlight both emissions (WACI) and decarbonization (change in WACI) • Use a dashboard with multiple metrics to differentiate investment strategies that promote low emissions or emission reduction 	<ul style="list-style-type: none"> • Provide inflation-adjusted and forex-change-adjusted carbon intensity/revenue so portfolio managers can adjust their portfolio WACI 	<ul style="list-style-type: none"> • Use labeling to give a proper identity to transition finance products
Lack of clarity, lack of comparability, and insufficient disclosure		<ul style="list-style-type: none"> • Provide feasible and credible transition plan, and tie executives' remuneration to decarbonization targets 	<ul style="list-style-type: none"> • Harmonize transition plan disclosure • Develop transition taxonomies • Require economic feasibility in transition plan disclosure
Inadequate government support			<ul style="list-style-type: none"> • Use of public finance (grants, loans, tax credits, and green public procurement) and blended finance facilities to mobilize private sector investment • Use reverse auctions and climate bad banks for managed phaseouts to alleviate stranded asset risks
Collaborative effort	Cultivate new skills, establish fresh priorities, and embrace a new mindset		

According to Ravi Menon (2022b), managing director of the Monetary Authority of Singapore, “To reach net zero, greening the economy is more important than growing the green economy. Green finance alone is not enough. . . . The world . . . needs transition finance.” The framing of sustainability has typically been green and clean, but to incorporate transition finance into this narrative, a significant paradigm shift is necessary: Asset managers need to pose different questions, gather different data, and use different or develop new evaluation and stewardship methodologies. Equally important is the need for corporations, regulators, and other actors in the transition finance system to cultivate new skills, establish fresh priorities, and, above all, embrace a new mindset. These collective changes are essential to drive the transformative impact of transition finance on a broader scale.

APPENDIX A. ACTOR MAPPING

Exhibit A1 provides a full mapping of actors in the transition finance system.

Exhibit A1. Actor Mapping in the Transition Finance System



Source: Based on the climate finance system framework actor mapping diagram in Oliver, Tonkonogy, Wang, and Wang (2018).

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