MSCI Sustainability Institute

November 2024

The MSCI Sustainability Institute Net-Zero Tracker

A periodic report on progress by the world's listed companies toward curbing climate risk

This is an **interactive report**

COP29 edition
Financing climate ambition

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Introduction

Delegates from nearly 200 countries are gathering in Baku, Azerbaijan for the United Nations climate conference, known as COP29. Among their goals will be to accelerate the transition from fossil fuels in energy systems by calling on countries to enshrine economywide emissions-reduction targets that align with the goals of the Paris Agreement in national climate plans due early next year.[1]

That includes national policies designed to triple installed global capacity of renewable energy, double the rate of improvement in energy efficiency and substantially reduce methane emissions, all this decade, while phasing down unabated coal power and speeding deployment of low-emissions technologies including nuclear energy and carbon capture.

For investors, fast-tracking the energy transition means identifying opportunities, navigating climate-related physical and transition risks, and aligning their investments with global climate goals while financing real decarbonization. It also means using measures that can help them assess the pace of progress.

This edition of the MSCI Sustainability Institute Net-Zero Tracker examines climate progress in the economy based on a series of such indicators. The report:

- Assesses the pace of climate progress by listed companies in 16 industrialized and emerging-market nations.[2]
- Zeroes in on the landscape for climate finance and the challenges for private investors of funding the climate transition in developing countries.[3]
- Details the alignment of the world's listed companies with global climate goals as measured by MSCI's Implied Temperature Rise (ITR) metric, a forward-looking climate impact metric.

The report also looks at the latest data on corporate climate targets and emissions disclosure, counts down the estimated time until listed companies use up their remaining budget for constraining warming within the bounds of the Paris Agreement and summarizes the latest quarterly data on the supply, demand and price of carbon credits.

COP29 arrives toward the end of a year nearly certain to be the hottest on record and the first to top warming above 1.5°C (2.7°F).[4] Investors in every region say that the risks of severe weather events are rising and that global action to date is insufficient to stave off the costliest warming.[5] The COP arrives during a year in which investors have cited challenges to financing decarbonization, including the slow pace of decarbonization in the real economy, as reasons to walk back climate commitments. It also arrives as delegates in Baku prepare to wrangle over how to achieve what Simon Stiell, head of the United Nations Framework Convention on Climate Change, has termed "a quantum leap" in funding for the energy transition in developing countries along with investments in climate adaptation and resilience.[6]

Challenges notwithstanding, capital continues to run toward opportunity. Our analysis shows that investments in renewables by private-capital groups have outperformed investments in oil and gas in each of the past eight years, and that transition funds are quickly becoming part of the climate fund landscape. Integrity in

the voluntary carbon market is improving. Two-thirds of the USD 3 trillion set to be invested in energy globally this year will be invested in low-carbon technologies, according to the International Energy Agency.[7] Investors vary in their views on the net-zero transition but increasingly are aligning their investments with the reality of an economy that is transitioning.

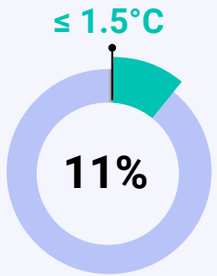
Key findings

National climate plans due next year offer governments an opportunity to incentivize corporate climate ambition.

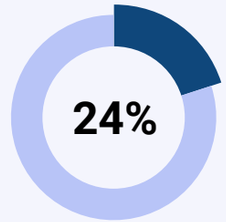
- Listed companies are on track to put 11 gigatons (Gt) of Scope 1 GHG emissions into the atmosphere this year or nearly 20% of global greenhouse gas (GHG) emissions.[8]
- The pace of decarbonization by listed companies in the biggest developed economies is expected to slow overall between now and 2030. Emissions of listed companies in the U.S., for example, are projected to fall by 1.8% annually over the period 2023 to 2030 based on their latest climate targets, after falling 3.7% per year in the six years ending in 2022.
- The picture differs in the largest emerging economies. The emissions of listed companies in China are projected to rise 1.2% annually between 2023 and 2030, provided that companies meet their climate targets, after increasing 6.9% per year between 2016 and 2022.
- The emissions of listed companies in India are not expected to grow at all if companies meet their climate commitments but to fall by 1.2% annually between 2023 and 2030 after rising 9.1% per year in the six years following the Paris Agreement.
- The carbon efficiency of companies in the emissions-heavy oil and gas, power, coal, steel and cement industries varies significantly, an analysis of their production-based GHG intensities shows.
- Unlisted companies' Scope 1 emissions total an estimated 7.3 Gt annually, highlighting the importance of decarbonization in private markets.

Market-based mechanisms such as carbon trading, a key focus for COP29, could advance the net-zero transition globally by improving the flow of capital from north to south.

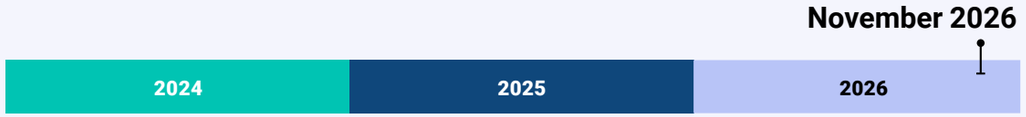
- There's plenty of climate capital being deployed but it skews overwhelmingly toward developed countries, reflecting the availability of investable opportunities and the challenge for fiduciaries of absorbing outsize investment risk.
- The lion's share of assets in climate funds are invested in developed markets, with nearly three-quarters invested in U.S.-listed companies alone, as of Sept. 30, 2024.
- Companies in the energy, industrials, materials and utilities sectors in emerging markets outside the G20 account for just 2% of capital raised in public markets since 2010.
- Though steps by governments and development finance institutions designed to reduce investment risk have succeeded in attracting private-sector climate finance, such approaches may not support the fast scaling of trillions of dollars in finance that will be needed to achieve global climate goals.



Share of listed companies that align with the goal of holding the rise in average global temperatures to 1.5°C above preindustrial levels



Share of listed companies that have set science-based climate targets



Date by which the world's listed companies are expected to burn through their remaining 1.5°C carbon budget

The world's listed companies are on course for a rise of 2.8°C (5°F) above preindustrial levels in average global temperatures this century.

- The decarbonization pathways of 11% of listed companies align with projected warming of 1.5°C (2.7°F), as of Aug. 31, 2024, based on MSCI's ITR metric, while 27% of companies align with warming between 1.5°C and a 2°C (3.6°F) temperature rise.
- 62% of listed companies align with warming greater than 2°C, including nearly one-quarter (24%) of companies whose trajectories would exceed 3.2°C (5.76°F).
- Listed companies are likely to burn through their share of the global carbon budget for keeping the rise in global temperatures below 1.5°C by November 2026.

The number of companies that have set science-based climate targets is ticking up, but the overall share remains low.

- Nearly one-quarter (24%) of listed companies have set a decarbonization target that aims to reduce their financially relevant GHG emissions to net-zero by 2050 in line with a science-based pathway, as of Sept. 30, 2024, an increase of two percentage points from a year earlier.
- 41% of companies have set a target that aspires to reduce emissions to net-zero (though not necessarily in line with climate science), up one percentage point over the same period. Overall, 58% of listed companies have published a climate commitment, up two percentage points from a year ago.

The delay in climate disclosure for U.S.-listed companies shows.

- Nearly-three quarters (73%) of companies listed outside the U.S. disclosed their Scope 1 and/or Scope 2 emissions, as of Oct. 31, 2024, compared with just under half (49%) of listed companies in the U.S.
- Overall, nearly half (47%) of companies globally disclosed at least some of their upstream Scope 3 emissions, as of Aug. 31, 2024, up eight percentage points from a year earlier, while 28% disclosed at least some of their downstream Scope 3 emissions, up six percentage points over the same period.

Tracking the voluntary carbon market

- Monthly volume-weighted average spot prices for carbon credits across all project types fell to USD 4.8 per ton of carbon dioxide equivalent (CO_2e) in the three months ended Sept. 30, 2024, down 18% from the second quarter and roughly flat with their level in the same quarter a year ago.
- Issuances of carbon credits in the third quarter of 2024 totaled 78 million ton (Mt) of CO_2e, up 20% from the same period a year earlier.
- The number of carbon credits retired during the third quarter totaled 35 Mt of CO_2e, up slightly from the same period last year.

Tracking companies' emissions across countries and industries

A key focus for COP29 will be the role of finance in turning ambition into action by both governments and the private sector.[9] Leaders of business and finance have called on governments to map out national climate plans that incentivize investment.[10] Investors have pointed to the challenges of managing a transition-focused portfolio in the absence of policy that supports it.

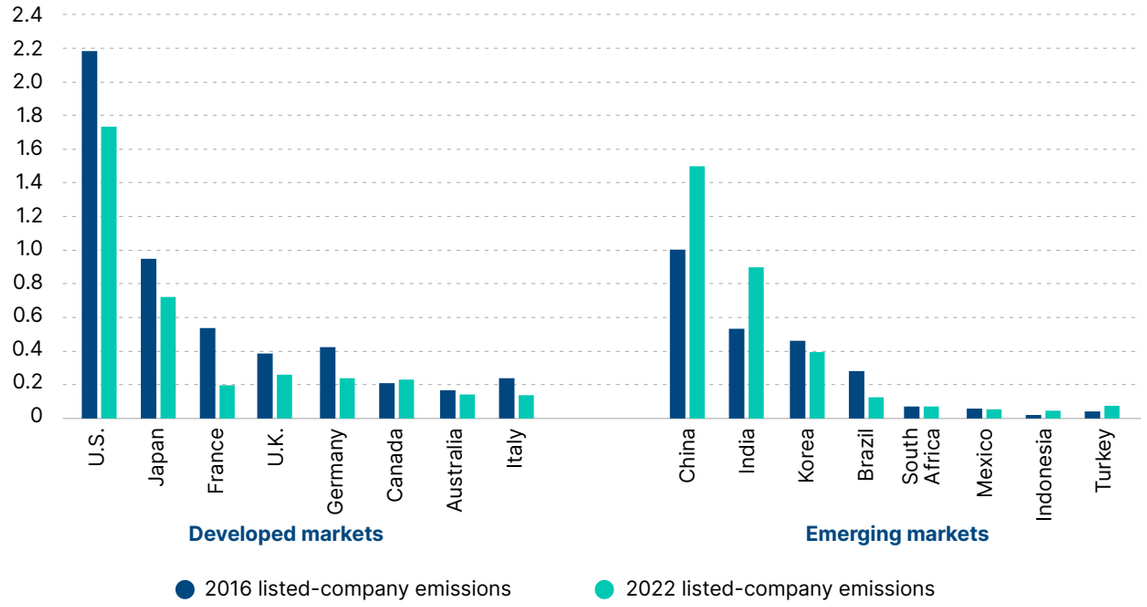
Listed companies account for nearly one-fifth of GHG emissions globally. That gives governments an opportunity, to a greater or lesser degree, to reduce emissions by incentivizing investment in low-carbon energy while unblocking the ability of companies domiciled in their country to deliver on net-zero commitments.

The section that follows examines progress by companies in reducing emissions across economies, industries and regions. Note that we are referring here to the total Scope 1 emissions of listed companies domiciled in each county, not the share of their emissions in those countries.

Comparing decarbonization of listed companies by country

Direct (Scope 1) GHG emissions from listed companies in 11 G20 countries declined in the six years following the Paris Agreement, while emissions of companies in five rose over the same period (Exhibit 1).[11] Though most of the reduction occurred with developed-markets companies and most of the increases occurred with emerging-markets companies, there were exceptions in both groups. Emissions of companies based in Canada (a developed market) ticked up over the period, while those based in the emerging-market economies of Brazil, Mexico, South Africa and South Korea declined. Overall, Scope 1 emissions from the listed companies grew by nearly 18% between 2016 and 2022, surpassing an 8% rise in global GHG emissions over the same time frame.

Exhibit 1: Change in emissions of listed companies by G20 country, 2016-2022 (Scope 1 emissions, gigatons)



Source: MSCI ESG Research, data as of Sept. 30, 2024, based on common constituents of the MSCI ACWI IMI in December 2016 and December 2022. Classification of emerging and developed markets are based on MSCI's Market Classification Framework.

Looking ahead

The pace of decarbonization by listed companies in the largest developed markets is expected to slow between now and 2030 (Exhibit 2). Emissions of listed companies in the U.S., for example, are projected to fall by 1.8% annually over the period 2023 to 2030 based on their latest climate targets, after falling 3.7% per year in the six years ending in 2022. The emissions of listed companies in Japan and Germany are projected to fall by 3.1% and 2.3% annually, respectively, between 2023 and 2030, after falling by 4.4% and 9.1% per year, respectively, in the six years following the Paris Agreement.

The picture differs in the largest emerging economies. The emissions of listed companies in China are projected to rise 1.2% annually between 2023 and 2030, provided that companies meet their climate targets, after increasing 6.9% per year between 2016 and 2022. The emissions of listed companies in Indonesia are projected to rise 1.1% from 2022 to 2030 based on companies' climate targets, after growing 17% per year in the six years that ended in 2022. The emissions of listed companies in India are not expected to grow at all if companies meet their climate commitments but to fall by 1.2% annually between 2023 and 2030 after rising 9.1% per year in the six years following the Paris Agreement.

The COP29 presidency has said it aims to raise ambitions to drive down GHG emissions globally as reflected in national climate plans that countries are due to file next year.[12] Delegates at COP29 are expected to call on countries to include in their climate plans absolute emissions reductions that cover every sector.[13] National climate plans that detail decarbonization required in such critical sectors as power, industry and transportation could be critical in spurring action by companies and investors.[14]

Exhibit 2: Projected pace of decarbonization by listed companies in G20 countries

Country	Developed (DM) or emerging market (EM)	Listed-company Scope 1 emissions 2022 (Gt, CO2e)*	Annual change (%) in listed company absolute Scope 1 emissions, six years ended December 2022	Projected annual change (%) in listed-company absolute Scope 1 emissions (2023-2030)
U.S.	DM	1.73	-3.7%	-1.8%
China	EM	1.50	6.9%	1.2%
Japan	DM	0.72	-4.4%	-3.1%
India	EM	0.90	9.1%	-1.2%
Korea	EM	0.40	-2.5%	-5.2%
France	DM	0.19	-15.6%	-6.0%
U.K.	DM	0.26	-6.4%	-6.8%
Germany	DM	0.24	-9.1%	-2.3%
Brazil	EM	0.12	-12.7%	-0.4%
Canada	DM	0.23	1.3%	-1.8%
Australia	DM	0.14	-2.8%	-3.8%
Italy	DM	0.14	-8.8%	-6.1%
South Africa	EM	0.07	-0.2%	-4.7%
Mexico	EM	0.05	-1.5%	-1.9%
Indonesia	EM	0.05	17.0%	1.1%
Turkey	EM	0.07	10.1%	-0.2%

Source: MSCI ESG Research, data as of Sept. 30, 2024, based on common constituents of the MSCI ACWI IMI in December 2016 and December 2022

Continental drift

Decarbonization by listed companies varies significantly by region.[15] Companies based in North America and Europe reduced their share of global direct (Scope 1) GHG emissions by two and six percentage points, respectively, over the six years ending in 2022 (Exhibit 3). The share of GHG emissions from companies in the Asia-Pacific region increased by eight percentage points over the same period.[16]

Most of the growth in emissions from listed companies has come from those in emerging markets (Exhibit 4). The share of global listed-company emissions attributed to companies in the emerging markets of APAC rose by 10 percentage points in the six years ended 2022. The increase was driven by increases in emissions from companies in Indonesia, India and China, where listed-company emissions grew by an average of 17%, 9% and 7% per year, respectively, in the corresponding six-year period.[17]

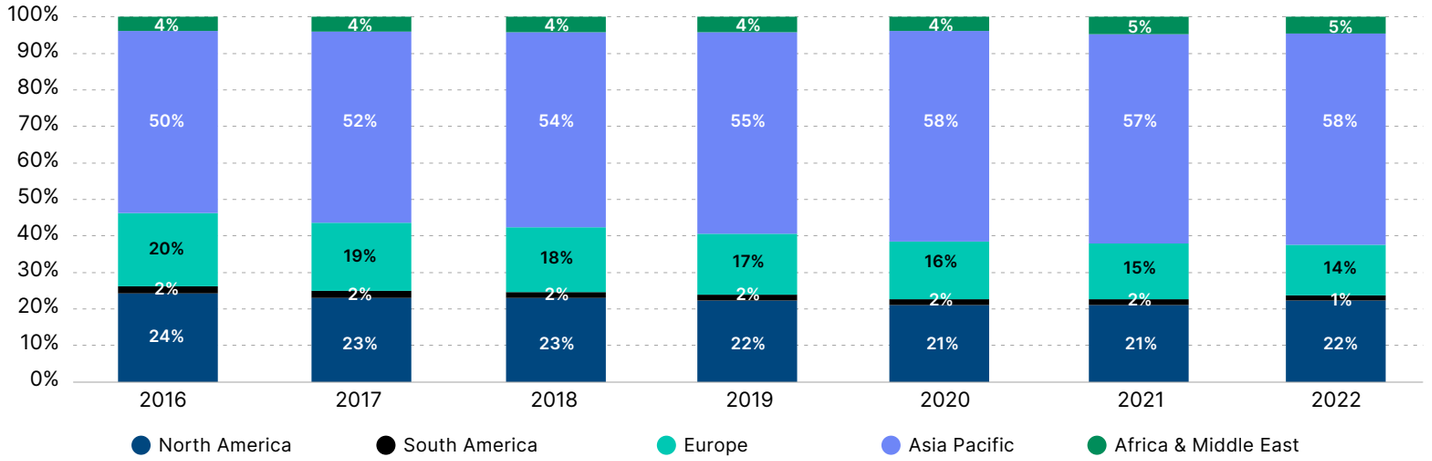
The changes reflect differences in energy demand and supply. While overall demand for energy fell by 0.5% per year over the past decade in advanced economies, it rose in emerging markets by 2.6% annually.[18] Fossil fuels underpin development of emerging-market countries, which dominate the global share of primary energy consumption.[19] The APAC region accounts for nearly 80% of global coal-fired power generation and virtually all of the planned expansion of coal-fired power plants globally.[20]

Differences in policy and regulation matter in influencing the direction of decarbonization as well.[21] The European Union in particular has increased the amount of electricity produced from renewables, prioritized emissions trading that puts a price on carbon and promulgated a series of regulations that, taken together, have driven companies in the region to decarbonize more quickly compared with companies elsewhere.

Net-zero alignment in emissions-intensive industries

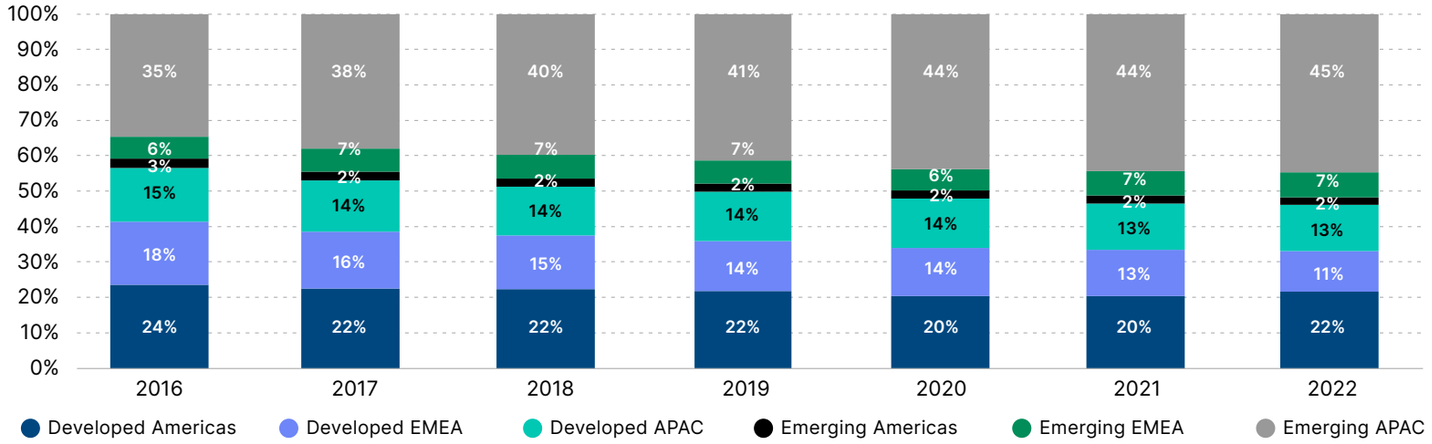
Next, we examine the distance to net-zero for listed companies in five emissions-heavy industries — power, oil and gas, coal, steel and cement. Rather than using traditional financial metrics that tie to revenues, such as carbon emissions intensity. We use a measure that more closely ties to these specific industries' core economic activity: their unit of production.

Exhibit 3: Change in relative share of listed-company Scope 1 emissions by region (2016-2022)



MSCI ESG Research, data as of Sept. 30, 2024, based on common constituents of the MSCI ACWI IMI in December 2016 and December 2022.

Exhibit 4: Change in listed-company Scope 1 emissions by market classification (2016-2022)



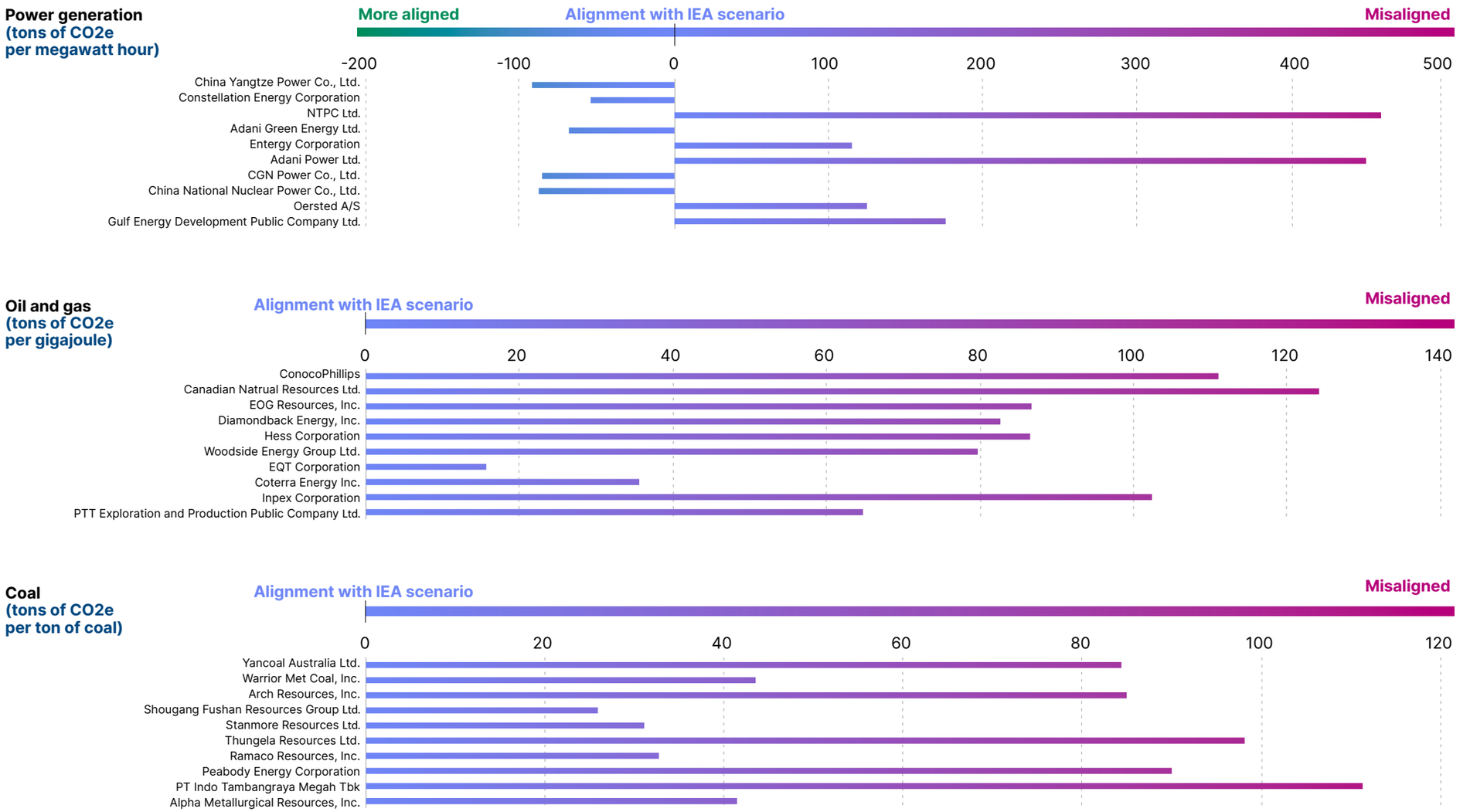
Soruce: MSCI ESG Research, data as of Sept. 30, 2024, based on common constituents of the MSCI ACWI IMI in December 2016 and December 2022.

Production-based emissions intensities divide companies' GHG emissions by their annual output whether measured in megawatt hours of electricity generated, energy from extracted oil and gas, or tons of steel or cement produced. While financial metrics allow for comparisons of companies across sectors, they can be influenced by factors such as fluctuations in the currency market or inflation that are unrelated to actual physical production. Production-based intensities, in contrast, provide a window into net-zero alignment by facilitating comparison of companies in the same industry based on their carbon efficiency.[22]

In its Net-Zero by 2050 scenario, the International Energy Agency (IEA) describes a pathway for each sector to reach net-zero emissions by 2050 while constraining global warming to 1.5°C above preindustrial levels. The charts in Exhibit 5 compare the biggest companies in each industry (by market capitalization) that derive at least three-quarters of their revenue from within that industry based on the difference between their production intensity and 2030 intensity pathway developed by the IEA.[23] The percentage shows the level of alignment with the IEA's net-zero pathway.

Note that the analysis of power generation covers those that produce power regardless of the energy source they use. Companies that produce power from fossil fuels will have higher production-based emissions intensity than those that produce power from nuclear, hydroelectric or other renewables.

Exhibit 5: Production-based GHG intensities (% distance to 2030 target of IEA scenario, companies listed in descending order of market capitalization)

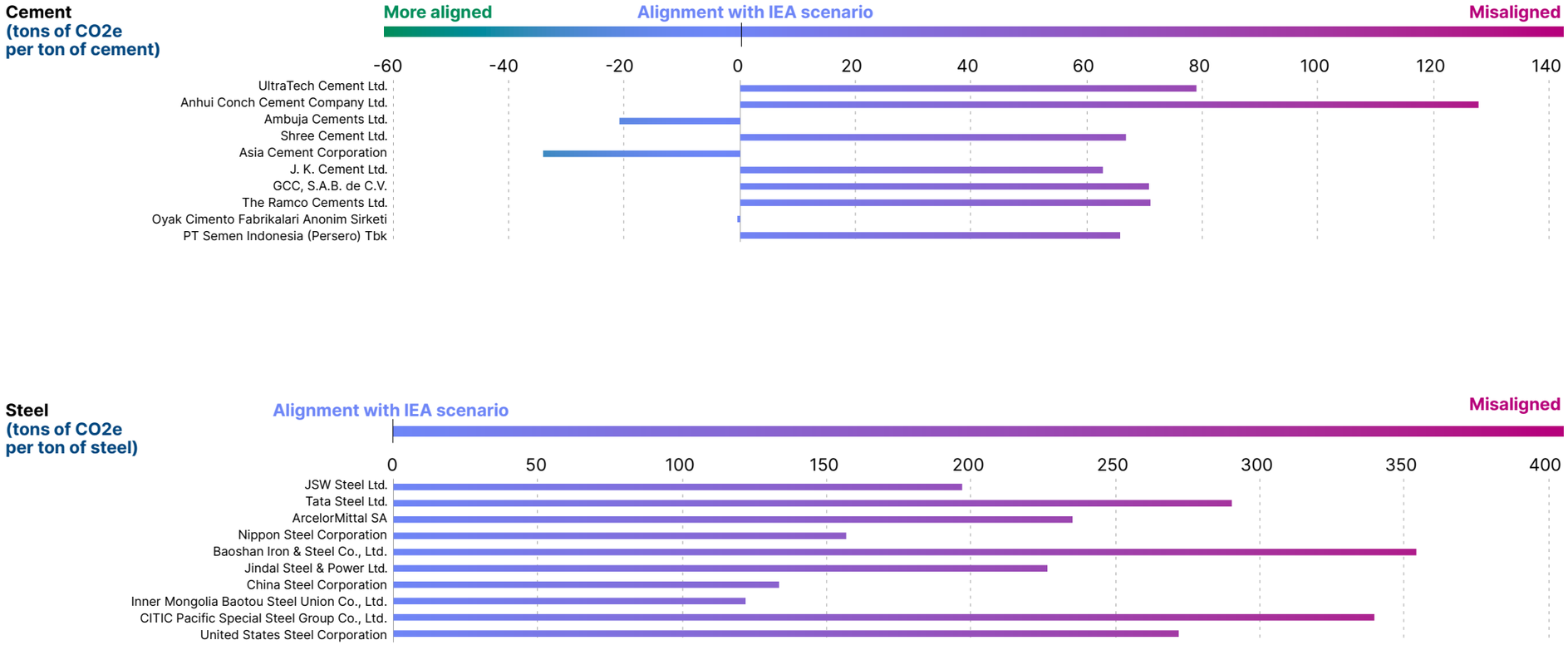


Source: MSCI ESG Research, data as of Aug. 31, 2024

The production-based emissions intensities of oil and gas companies varies based mainly on three factors. The share of revenue from gas compared with oil (companies that produce gas tend, on average, to be less carbon intensive than those that produce oil). Second, for companies that produce oil, intensity reflects the source of the oil. Oil extracted from oil sands, for example, tends to be more emissions intensive than conventional oil because it takes more energy to extract oil from oil sands.[24] The volume of production matters as well. In general, the more barrels you produce, the more efficient you are. Hence, oil producers in the Gulf region tend, on average, to be less emissions intensive (and hence more carbon efficient) compared with producers in North America because they produce more oil with less energy for every well drilled into the ground.

Production-based emissions intensities can provide insight into a key reality of the net-zero transition. A barrel of oil produces the same amount of GHG emissions wherever it's burned. On the supply side, the challenge therefore lies in how efficiently a company can produce it. The same holds true for a cargo of coal or a ton of cement. In a world that chooses to continue relying on fossil fuels for energy, society benefits relatively by choosing those produced most carbon efficiently.

Exhibit 5: Production-based GHG intensities (% distance to 2030 target of IEA scenario, companies listed in descending order of market capitalization)



Source: MSCI ESG Research, data as of Aug. 31, 2024

Tracking progress of companies in private markets

The universe of unlisted companies is larger than the universe of public companies. Private markets make up a growing share of institutional investments in every region. Unlisted companies not only put GHG emissions into the atmosphere but also play a pivotal role in driving development of clean-energy technologies and decarbonization.[25]

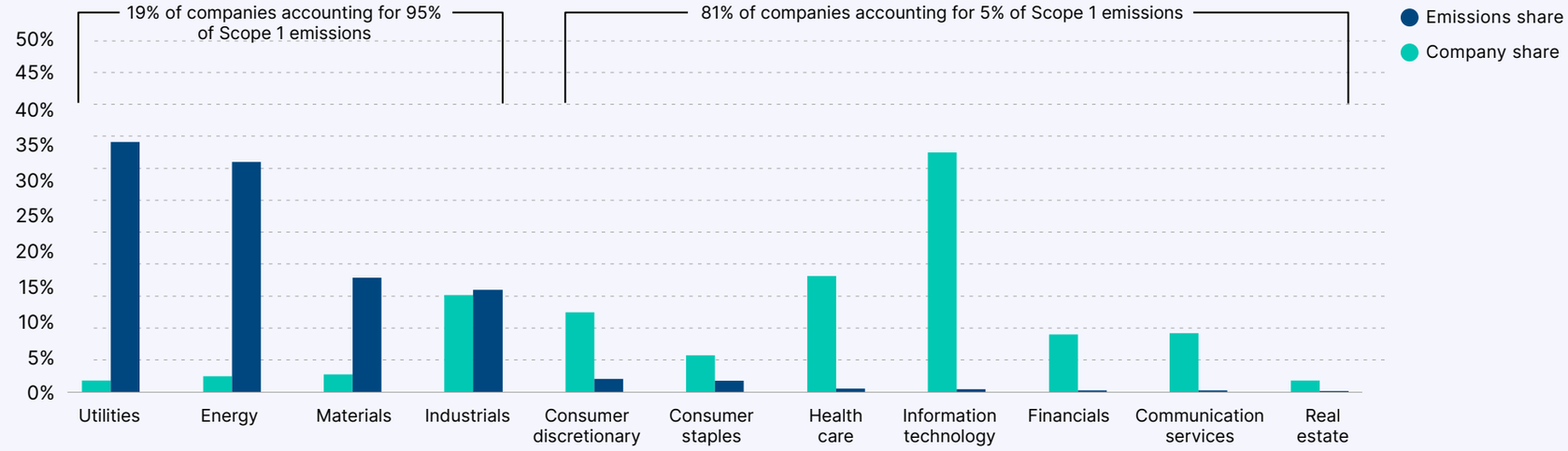
Estimating the share of global GHG emissions from unlisted companies presents a challenge through the lack of disclosure. Most unlisted companies have no obligation to report their carbon emissions or other climate-related financial information.[26] Hence, estimating emissions in the private-capital markets relies mostly on modeled data.[27]

MSCI has compiled both estimated and reported carbon-intensity data for roughly 65,000 companies globally that private-capital funds have invested in as of June 30, 2024.[28] We estimate the aggregate Scope 1 GHG emissions for these companies to be about 7.3 billion tons of CO2e annually.[29] The 7.3 billion tons of GHG emissions represents nearly two-thirds (64%) of the annual emissions associated with listed companies, highlighting both the importance of decarbonization in private markets and a critical area of engagement for climate-focused investors in the race to net-zero.[30]

A view of these unlisted companies by sector further illuminates their contribution to GHG emissions (Exhibit 6). Though only 2% of the companies are in the utilities sector, they contribute about 34% of the estimated 7.3 billion tons of emissions annually.

The remainder of the emissions come from companies in the energy, materials and industrials sectors, which contribute 31%, 16% and 14%, respectively, to the total. Although the companies in those four sectors contribute the overwhelming share of emissions (95%), the companies themselves represent about one-fifth of companies in that investment universe, highlighting just how emissions-heavy they are.[31]

Exhibit 6: Scope 1 emissions of portfolio companies in private markets



Source: MSCI ESG Research and MSCI Private Capital, data as of June 30, 2024

Follow the money: The landscape for climate finance

COP29 is expected to highlight the role of the private sector in helping to fund the trillions of dollars that developing countries will need for shifting to clean energy and adapting to a warmer world.[32] Investment in climate mitigation in developing countries outside China would need to increase between eight- and sixteen-fold by 2030 to support sustainable development and growth while achieving climate goals.[33] The scale of investment required, however, does not correspond with the investable opportunity. We view the challenge through the following lenses.

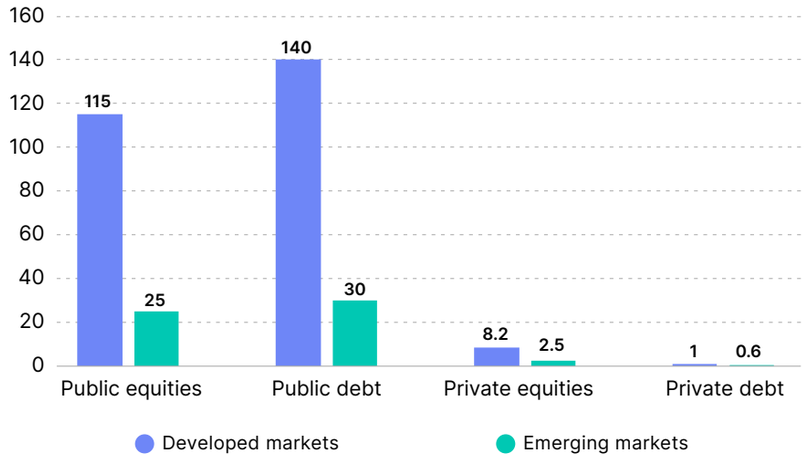
Investable markets globally

The lion's share of investment in clean energy is concentrated in the U.S., Europe and China, with emerging markets outside of China accounting for just 15% of global clean-energy spending.[34] Capital markets mirror this disparity. The value of public equities in developed-market economies totaled USD 115 trillion as of July 2024, nearly five times the value of public equities in emerging-market countries (Exhibit 7). The value of public debt in public markets totals about USD 140 trillion, again nearly five times that of emerging markets. Private markets follow a similar pattern. The value of private equity in developed markets is more than triple the value of private equity in emerging-market countries, while the value of private debt is nearly double.

Climate investment funds

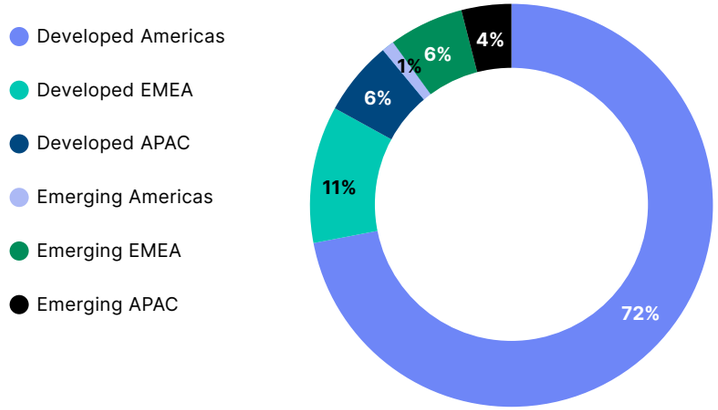
Publicly traded investment vehicles, such as mutal funds and exchange-traded funds, manage about USD 70 trillion globally, as of Sept. 30, 2024.[35] Climate funds, which employ a wide range of strategies, from decarbonizing portfolios to investing in climate solutions and technologies aimed at combating climate change, cover USD 540 billion of that total, as of Sept. 30, 2024. These funds have experienced significant growth in recent years, with assets growing by 18% in 2023 alone.[36] Climate funds represent about one-fifth of the global market for sustainable funds.[37]

Exhibit 7: Size of investable markets (USD trillion)



Source: MSCI ESG Research and the Securities Industry and Financial Markets Association, as of July 31, 2024

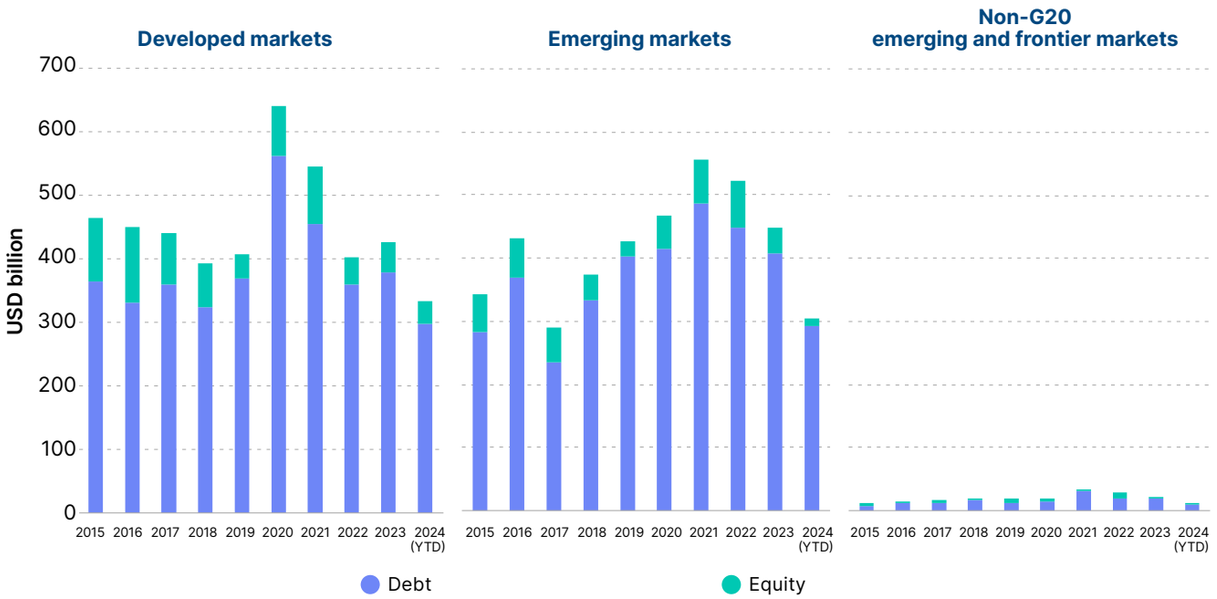
Exhibit 8: Climate funds by region



Source: MSCI ESG Research, data as of Sept. 30, 2024. Comprises 1,628 climate investment funds as identified by their name and prospectus, including climate-related words and phrases such as climate, net-zero, low-carbon, sustainable, environment, renewable, solar, wind, green, cleantech, clean energy and low carbon, among others.

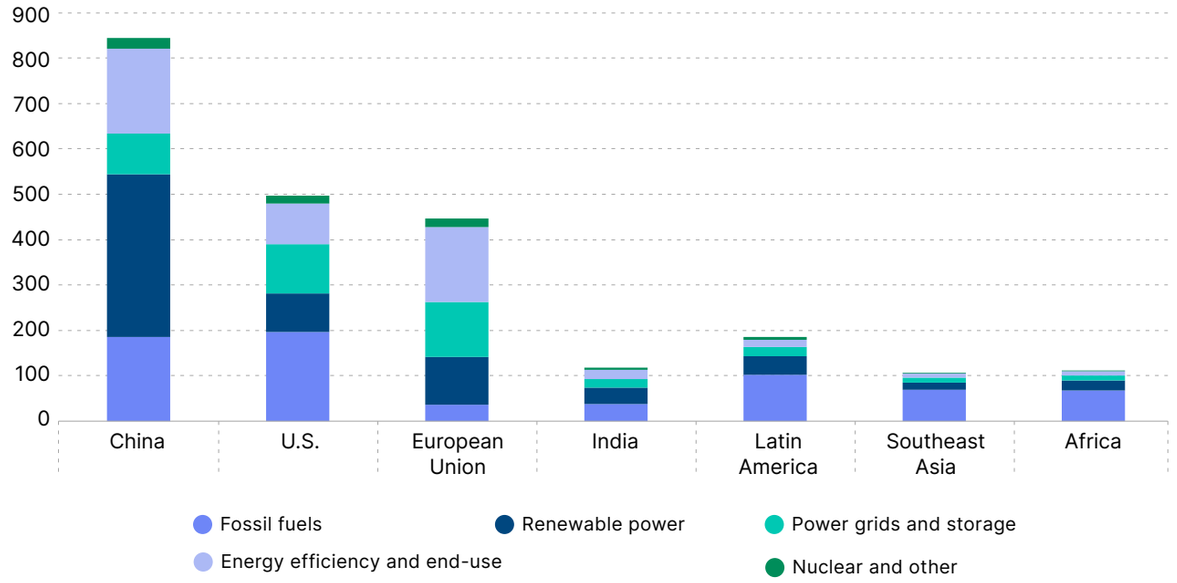
Despite the rapid growth of climate-focused investment strategies and the well-documented need for greater capital flows to developing economies, the majority of assets in climate funds remain concentrated in developed markets, with U.S. companies alone capturing nearly three-quarters (72%) of the total investment (Exhibit 8). Emerging markets, in contrast, collectively accounted for just over 10% of assets, with underserved regions such as Africa attracting less than 2%.

Exhibit 9: Capital raises in energy, utilities, industrials and materials sectors by market type



Source: MSCI ESG Research, based on data from Refinitiv Eikon as of Sept. 30, 2024

Exhibit 10: Annual investment in clean energy by country and region (billions USD)



Source: International Energy Agency, data as of May 30, 2024

Capital raises

Capital raising has followed a similar trend. Since 2015, nearly half (48%) of funds raised through debt and equity in public markets by companies in the energy, utilities, industrials and materials sectors went to emerging markets (Exhibit 9).[38] The majority of this capital flowed to China and India. A significant disparity persists within emerging markets themselves, especially when looking beyond the G20. Only 2% of the capital raised in these emissions-intensive sectors during that period came from companies based in Africa (which comprises 54 countries) or in Asian frontier markets such as Bangladesh, Pakistan and Vietnam.

Mobilizing climate capital for emerging markets

Tripling renewable capacity globally — a key goal agreed to by countries last year — would require quadrupling of investment in clean energy this decade in developing countries outside of China.[39] Data on the next page highlights the challenges in attracting institutional owners and managers of assets and banks to help close the gap.

The impediments to attracting private-sector finance in emerging and developing markets are not confined to climate-related investments and have been targeted by development finance organizations for decades. The barriers — which include a higher cost of capital, lower creditworthiness of counterparties, high vulnerability of projects to political volatility and a dearth of financial infrastructure — can compound the difficulty for institutional investors to achieve attractive and stable returns (Exhibit 10).[40]

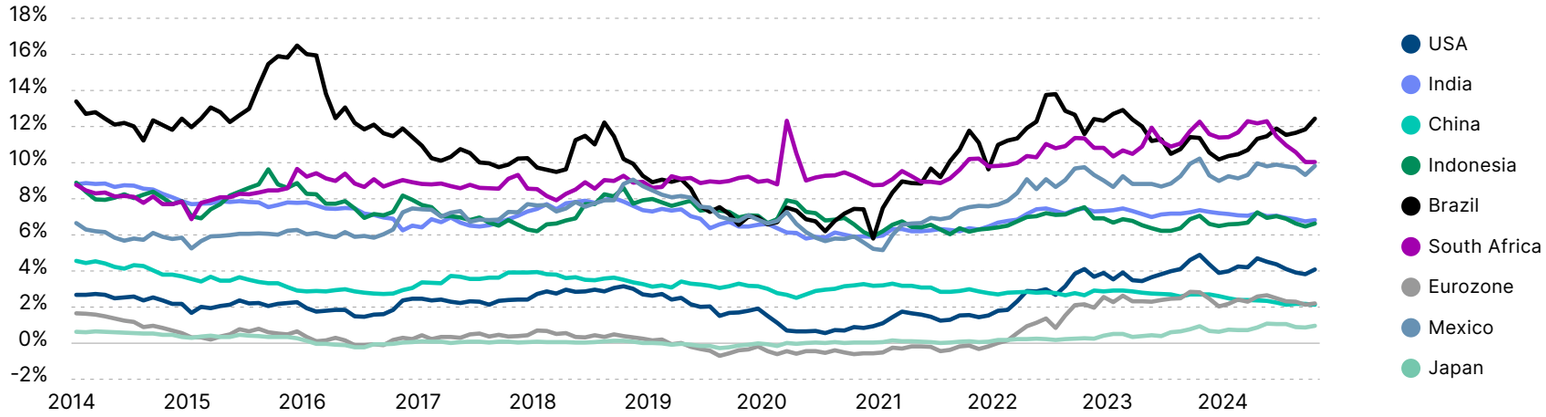
The data here highlights some of the challenges to attracting private-sector finance, as background to inform the conversation at COP29 and beyond about innovative approaches to come.

Cost of capital

Fiduciary investors who invest in low-carbon investments in developing countries often seek a return that justifies the higher cost of capital in those countries. The average cost of borrowing money in developed markets such as the U.S. and Europe has typically ranged from around 5% to 8% over the past decade, depending on the specific market and industry. That compares with borrowing costs that range between 8% and 15% in emerging markets and can exceed 15% in frontier markets.[41]

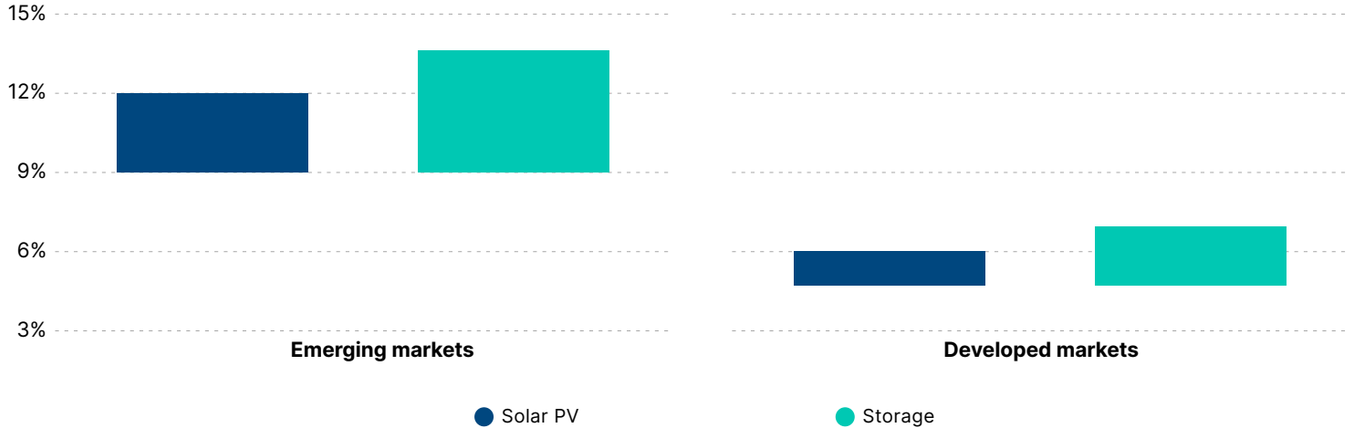
The cost of borrowing largely reflects a country's macroeconomic policies. In many emerging and frontier markets, high domestic interest rates — driven by elevated inflation — create significant barriers to investment and make financing more expensive.[42] Interest rates on long-term government bonds, a key benchmark for borrowing costs, have been notably higher and more volatile in emerging markets (Exhibit 11). Borrowing costs translate to project- and sector-specific risks and raise the cost of capital. Solar PV and storage projects, for example, can cost twice as much in emerging markets as they do in developed economies (Exhibit 12).[43]

Exhibit 11: Yields on 10-year government bonds



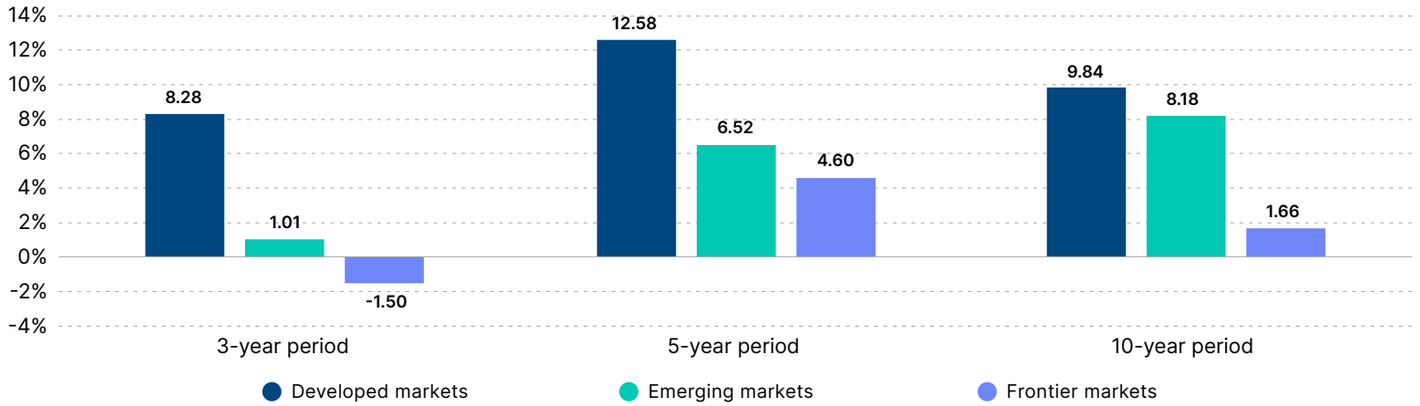
Source: MSCI ESG Research, data as of Sept. 30, 2024

Exhibit 12: Comparing the cost of solar PV and storage



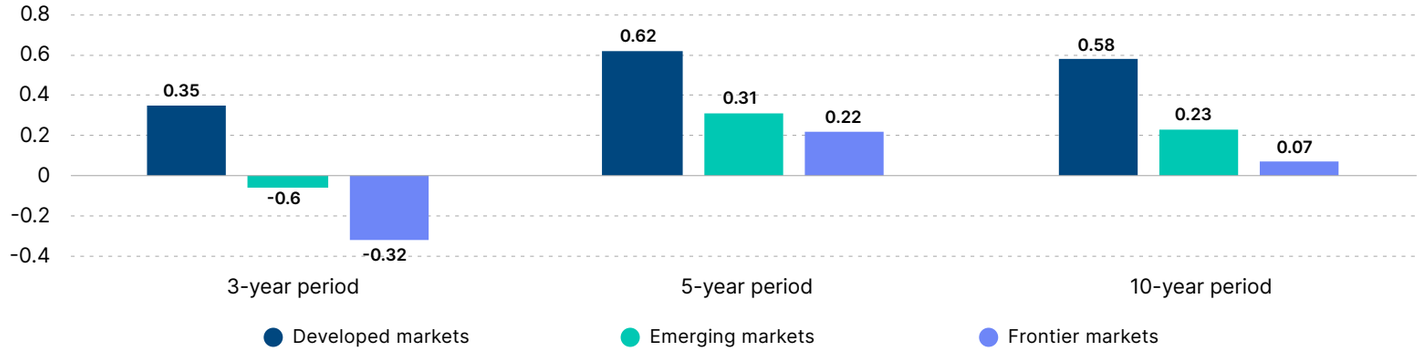
Source: International Energy Agency, data as of Sept. 30, 2024

Exhibit 13: Annualized return for listed companies



Source: MSCI ESG Research, data as of Sept. 30, 2024. Regions represented by the MSCI World Investable Market Index, the MSCI Emerging Markets Index, and the MSCI Frontier Markets Investable Market Index.

Exhibit 14: Comparing risk and reward (Sharpe ratio)



Source: MSCI ESG Research, data as of Sept. 30, 2024. Regions represented by the MSCI World Investable Market Index, the MSCI Emerging Markets Index, and the MSCI Frontier Markets Investable Market Index.

Returns

Investments in developed markets have enjoyed higher risk-adjusted returns compared with investments in emerging and frontier markets in recent decades. (Exhibit 13). Taking equity markets for example, the investable universe of stocks in developed-markets returned 9.84% over 10 years that ended Sept. 30, 2024, compared with 8.18% for emerging markets and 1.66% for frontier markets. Investments in developed markets also entail less risk to achieve the same reward (reflected in superior Sharpe ratios, a measure of the trade-off between the two) than investments in emerging and frontier markets, highlighting their appeal for global investors (Exhibit 14).

Approaches to date

A significant portion of private investment for clean energy and adaption in developing countries comes through mechanisms put in place by multilateral development banks, development finance institutions and other quasi-public agencies designed to enhance the bankability of projects.[44] Policy and regulation that provide certainty to investors plays a role as well.

Examples of successes abound. Brazil has expanded renewable capacity in recent years through a combination of power-market reforms and steps by its development bank to reduce investment risks.[45] Pakistan and Egypt have both leveraged incentives provided by multilateral development banks to finance renewables and clean technologies.[46] The China Pakistan Economic Corridor suggests that strong bilateral relationships can help to attract foreign investment for the clean-energy transition.[47]

Despite their success in attracting private investments to projects that advance global climate goals, such mechanisms often demand one deal at a time and a high degree of tailoring that prevent the scaling required to achieve climate goals. Projects involving blended finance totaled nearly USD 24 billion last year (with climate blended finance increasing to USD 18.3 billion from USD 8 billion a year earlier), a fraction of global private equity and debt markets (which represent roughly USD 13 trillion) and an even smaller share of publicly traded capital markets, which represent more than USD 200 trillion.[48]

Note that the true share of private-sector investment capital available for climate investment in developing countries may be less than the global total of capital held by private investors, who differ in their ability to finance climate projects in developing countries. Because stewards of public pensions and sovereign wealth funds have a fiduciary obligation to maximize opportunities to deliver strong risk-adjusted returns for beneficiaries and to limit liabilities, the ability of such funds to enter some emerging and frontier markets — even when governments and development finance institutions take steps to mitigate project risk — is limited. Impact-focused investors and endowments may be better suited to allocated to innovative projects and instruments, incur greater risks and, if necessary, accept lower returns to help catalyze investments in these regions.[49]

Approaches to come

Policymakers may find that market-based mechanisms can scale the flow of capital more quickly, alongside approaches such as blended finance. Carbon trading may offer one such alternative for attracting private capital to advance climate action. The Paris Agreement anticipates as much, with its provisions that would both authorize country-to-country trading of carbon credits and establish a new international carbon market for governments and companies alike to trade carbon credits — both of which are slated to be key topics for negotiation at COP29.[50] Carbon trading at scale can also begin to establish a uniform price for carbon that can speed decarbonization while strengthening the ability of low-income countries to benefit from debt-free investment, which can help them lower emissions and reinforce climate resilience.

A growing number of countries are attracting capital for clean energy through carbon projects.[51] The Energy Transition Accelerator, which is designed to attract private investment in clean energy in developing countries through the sale of high-quality carbon credits tied to verified reductions in power-sector emissions, has attracted interest from a range of multinational companies.[52] The Coal to Clean Credit Initiative was launched in December 2023 by the Rockefeller Foundation and the Global Energy Alliance for People and Planet with the aim of using carbon credits to finance the replacement of coal-fired power plants with renewable energy in emerging economies.[53] The integrity of carbon projects — a prerequisite for the viability of carbon-credit trading — has faced challenges but is improving, driven by industry efforts and greater transparency (Exhibit 15).[54]

Policy that incentivizes investment by creating predictability for providers of private capital matters as well. It includes policy that creates economic conditions and governance, which contribute to an enabling environment for business. Governments might also leverage national climate plans due next year to lay the groundwork for attracting private-sector investment. That includes detailing their country's whole-of-economy decarbonization blueprints with sector-specific pathways and policy support designed to deliver them. Such forward-looking information can equip private-sector investors and companies with a roadmap as to where companies that operate in those countries may be headed. Just as investors purport to favor companies that detail their climate-related goals and transition plans, countries that publish such information provide transparency that can inform decision making by capital allocators as they adjust their strategies to deliver on their climate commitments.[55]

Exhibit 15: Percentage of retired credits by MSCI Carbon Project rating

Project rating	H1 2022	H1 2024	% change
AAA	0%	0%	-
AA	2%	4%	+2%
A	4%	8%	+4%
BBB	13%	23%	+10%
BB	21%	23%	+2%
B	32%	28%	-4%
CCC	29%	15%	-14%

Source: MSCI Carbon Markets, as of Sept. 30, 2024

Assessing progress: Listed companies

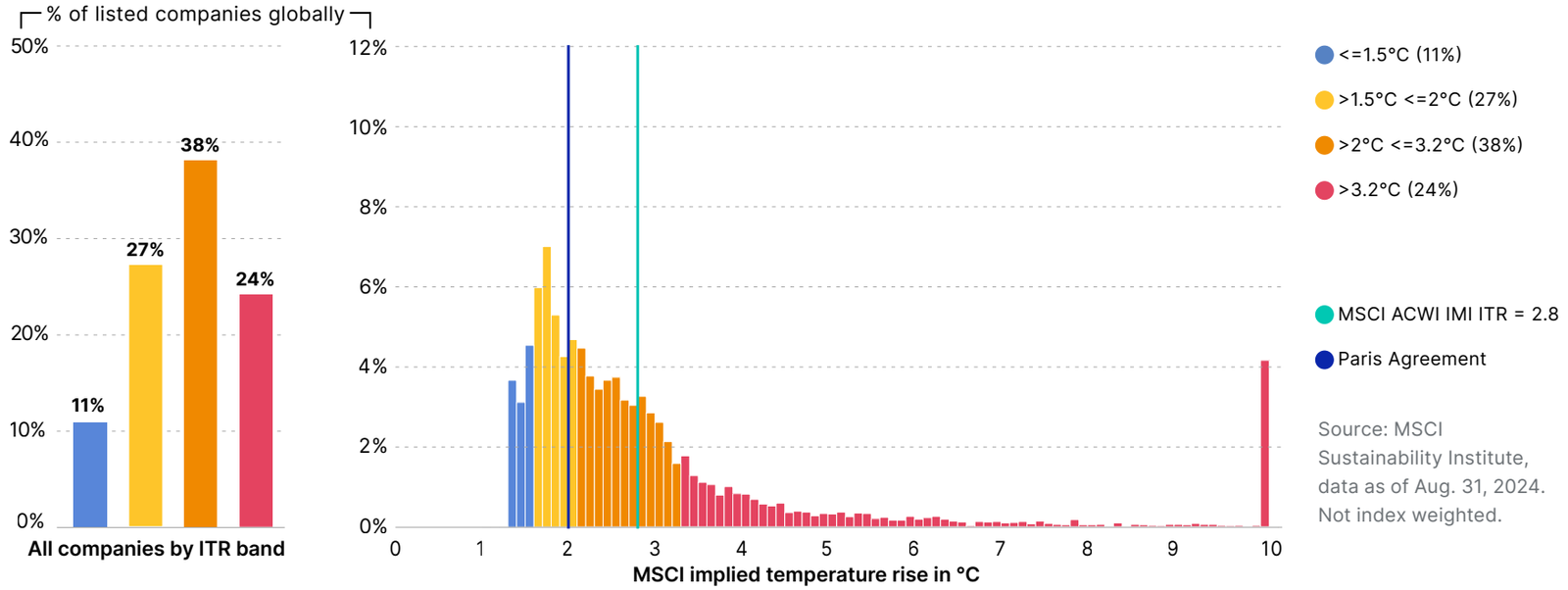
Listed companies' GHG emissions and projected decarbonization trajectories would align with warming of 2.8°C (5.0°F) above preindustrial levels if the whole economy had the same carbon-budget overshoot or undershoot as the companies in question, based on MSCI's ITR metric, using data as of Aug. 31. 2024 (Exhibit 16).[56]

Eleven percent of listed companies aligned with projected warming of 1.5°C, as of Aug. 31, 2024, based on MSCI's ITR metric, while an additional 27% aligned with warming between 1.5°C and 2°C (3.6°F).

Sixty-two percent of listed companies are on an emissions trajectory that would breach the 2°C threshold, including nearly one-quarter (24%) of companies whose trajectories would exceed 3.2°C (5.76°F).

Companies' decarbonization trajectories vary across regions and market classifications (Exhibit 17). Companies in the developed economies of Europe, the Middle East and Africa are situated most closely to the Paris-aligned pathway, while the pathways of companies domiciled in the region's emerging markets have, in aggregate, yet to decarbonize or commit to decarbonizing in line with global goals. The decarbonization trajectories of companies in the industrialized economies of each region tend to align more closely with global climate goals than those of companies in emerging markets.

Exhibit 16: Projected warming of the world's listed companies (Implied Temperature Rise in °C)

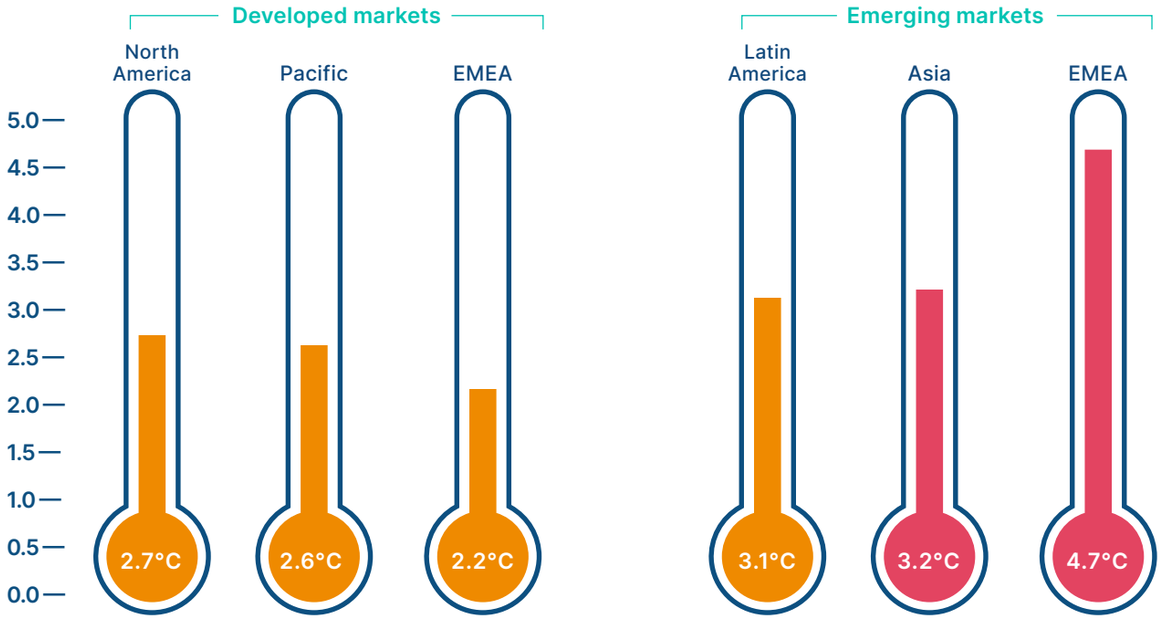


Source: MSCI Sustainability Institute, data as of Aug. 31, 2024. Not index weighted.

A technical note on weights and aggregation. Note that the ITR of listed companies' presented in Exhibit 16 shows alignment with global climate goals based on the companies' current and estimated decarbonization pathways without adjusting their emissions (and hence their projected climate impact) to reflect their weight in the MSCI ACWI Investable Market Index (IMI), which comprises the universe of companies examined in this report.[57]

Were we to weight the ITR based on the weighting of companies in the MSCI ACWI IMI, their aggregate ITR would be 2.6°C. That's because the index methodology weights companies according to their market value. The most valuable companies tend to be technology companies at present, which are less emissions intensive than companies in sectors such as energy or materials.[58] In short, the ITR of listed companies reported here (2.8°C) indicates the contribution of such companies to global warming based on their actual emissions without regard for the market value of individual firms.[59]

Exhibit 17: Projected warming of the world's listed companies by region (Implied Temperature Rise in °C)



Source: MSCI Sustainability Institute, data as of Aug. 31, 2024. Not index weighted.

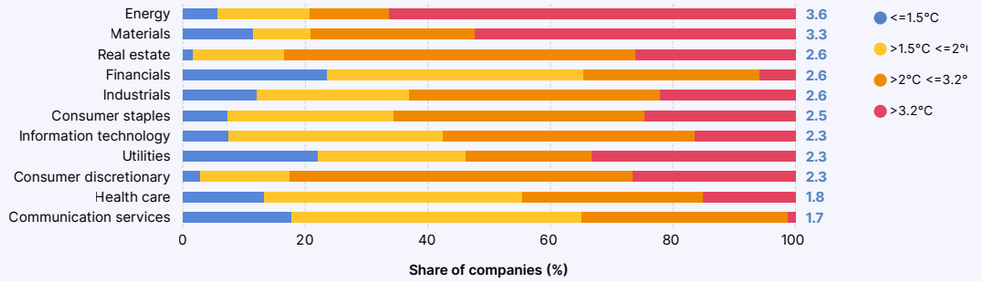
Assessing progress: Sectors and industries

Every sector and industry group contains companies whose emissions trajectories align with global climate goals (Exhibits 18 and 19). The contribution of emissions-intensive sectors such as energy, materials and industrials to global warming highlights the importance for investors and financial institutions of identifying companies in those sectors that are taking action to reduce their emissions in line with interim net-zero targets and investing in climate solutions.

Companies within eight industry groups aligned, on average, with keeping future warming within 2°C of preindustrial levels, as of Aug. 31, 2024.[60] Misaligned industry groups range from the biggest emitters of greenhouse gases, such as companies in the energy and materials sectors, to those with large value-chain emissions, such as manufacturers of automobiles and apparel as well as hotels, resorts and leisure industries.

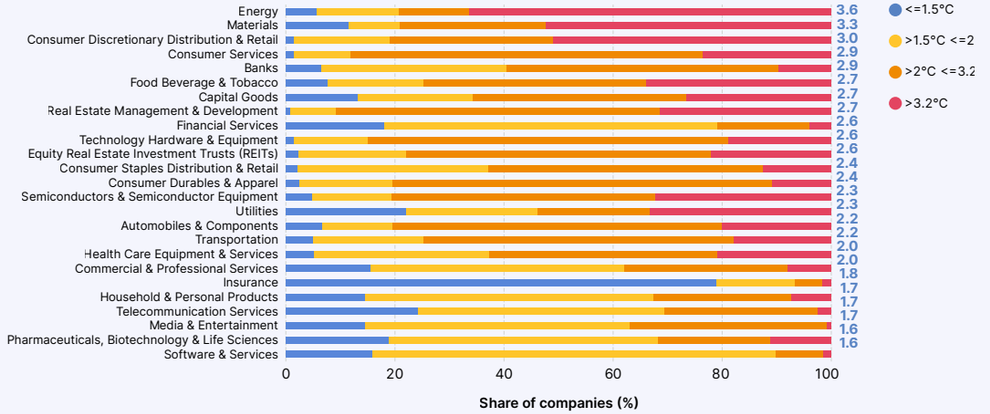
This section is interactive. Click on a chart to enlarge it. Click again to close.

Exhibit 18: Projected warming of the world's listed companies by GICS® sector (Implied Temperature Rise in °C)



Source: MSCI Sustainability Institute, data as of Aug. 31, 2024. Not index weighted.

Exhibit 19: Projected warming of the world's listed companies by industry group (Implied Temperature Rise in °C)



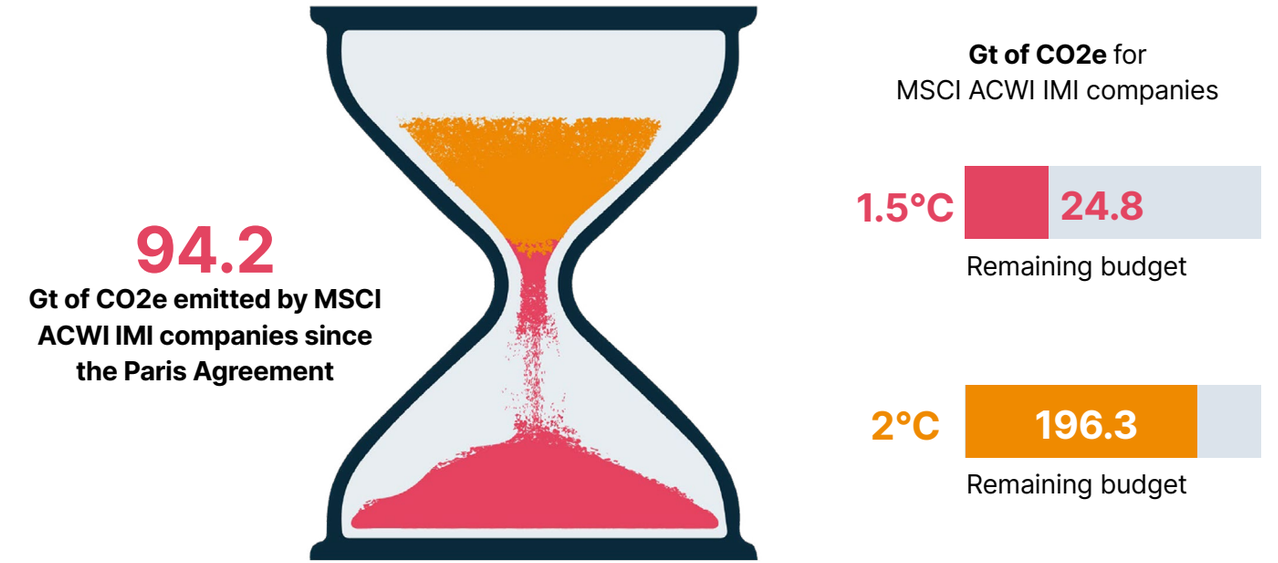
Source: MSCI Sustainability Institute, data as of Aug. 31, 2024. Not index weighted.

1.5°C slipping away?

Listed companies would deplete their share of the global carbon-emissions budget for limiting temperature rise to 1.5°C by November 2026, based on their Scope 1 emissions as of Aug. 31, 2024 (Exhibit 20).[61]

- To limit warming to 1.5°C, companies would need to collectively cap future Scope 1 emissions at 24.8 Gt of CO2e emissions by 2050. On their current trajectory, companies would deplete their remaining emissions budget in 2 years and 3 months from Aug. 31, 2024.
- To limit warming to 2°C, listed companies would need to collectively cap future Scope 1 emissions at 196.3 Gt of CO2e by 2050. On their current trajectory, companies would deplete their remaining emissions budget in 17 years and 10 months from Aug. 31, 2024.

Exhibit 20: Burning through the carbon budget



Source: MSCI ESG Research, data as of Aug. 31, 2024

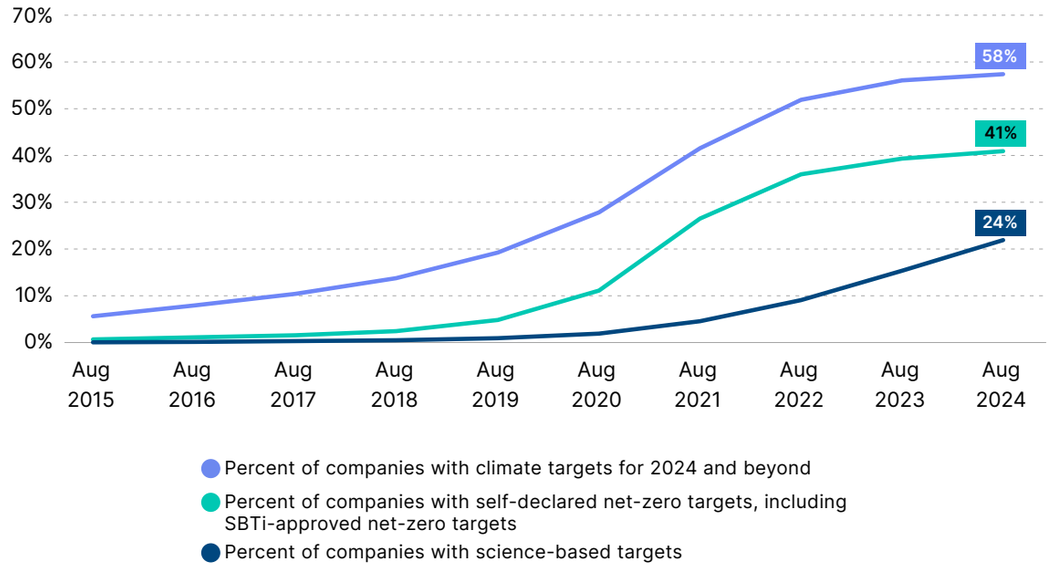
The hourglass and countdown clock show annual total Scope 1 emissions of MSCI ACWI IMI constituents (not index weighted) based on listed companies' reported emissions data and MSCI estimates as of Aug 31, 2024. Emissions for 2023 that companies haven't yet reported are based solely on MSCI estimates, given a lag in company reporting. The remaining future emissions budget to achieve 1.5°C and 2°C warming scenarios are calculated based on bottom-up estimates (sum of remaining emissions budget of all MSCI ACWI IMI constituents) as of Aug. 31, 2024.

More companies are setting science-based climate targets

Nearly one-quarter (24%) of listed companies have published an SBTi-approved or committed target as of Sept. 30, 2024 — that is, one that would reduce all of their financially relevant GHG emissions to net-zero in line with the corporate net-zero standard developed by the Science Based Targets initiative (SBTi), an arbiter of corporate climate targets. That's an increase of two percentage points from a year earlier.

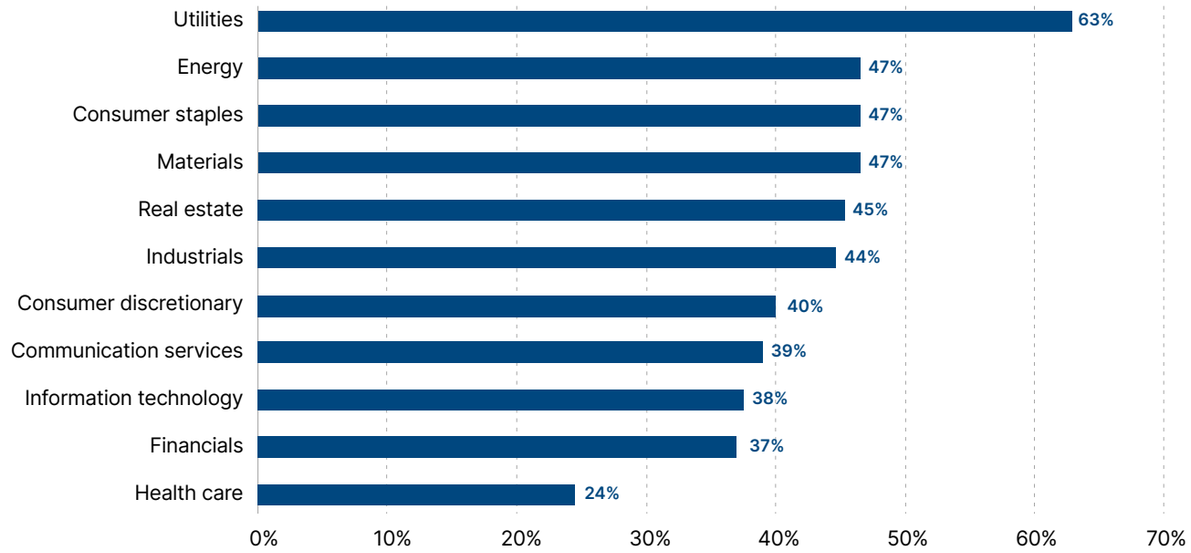
Forty-one percent of companies have set a target that aspires to reduce emissions to net-zero (though not necessarily in line with climate science), up one percentage point since Sept. 30, 2023. Overall, 58% of listed companies have published a climate commitment, up two percentage points from a year ago (Exhibit 21).

Exhibit 21: Share of listed companies with climate targets by target type



Source: MSCI ESG Research, data as of Sept. 30, 2024

Exhibit 22: Percentage of companies with self-declared net-zero targets by GICS® sector



Source: MSCI ESG Research, data as of Sept. 30, 2024

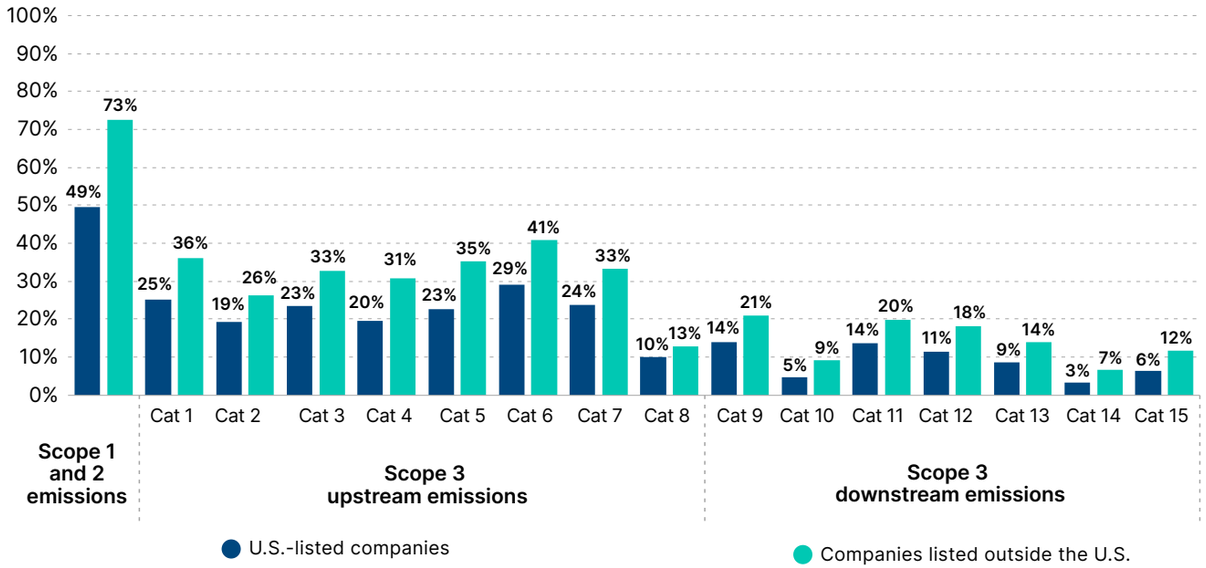
Emissions reporting

Uncertainly about the outlook for mandatory climate disclosure may be impacting disclosure rates of U.S.-listed companies.[62] About half (49%) of U.S.-listed companies have disclosed their Scope 1 and 2 emissions as of Oct. 21, 2024, compared with nearly three-quarters (73%) of companies listed elsewhere (Exhibit 23).[63]

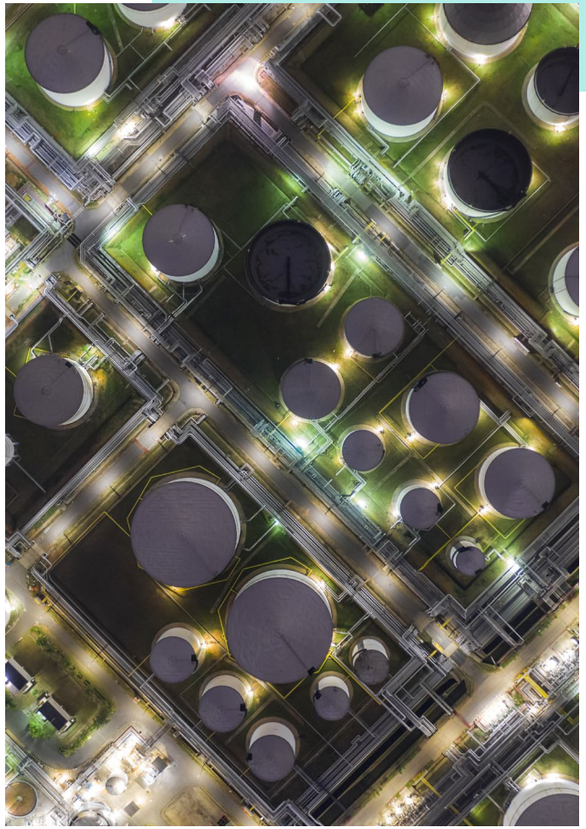
U.S.-listed companies lag their peers outside the U.S. across all Scope 3 categories. About one-third (32%) of U.S.-listed companies have disclosed at least some of their Scope 3 emissions, compared with 45% of companies listed outside the U.S. There is wide variation, however, between country disclosure. While 81% of large-cap companies in Japan disclosed some Scope 3 emissions (alongside their Scope 1 and 2) as of Feb. 1, 2024, less than 10% of large-cap listed companies in China did so as of the same date.[64]

Overall, 39% of listed companies globally disclosed at least some of their upstream Scope 3 emissions, as of Aug. 31, 2024, up eight percentage points from a year earlier, while 28% disclosed at least some of their downstream Scope 3 emissions, up six percentage points over the same period.

Exhibit 23: U.S.-listed companies lag listed companies elsewhere in disclosing their carbon footprints (% of companies)



Source: MSCI ESG Research and CDP data as of Oct. 21, 2024. Emissions data is the most recent emissions data collected by MSCI and may, in some cases, correspond with data published by companies either this year or last, depending on the dates of fiscal years ended in 2022 and 2023, respectively. For information on Scope 3 categories, see "Corporate Value Chain (Scope 3) Standard," Greenhouse Gas Protocol, available at https://ghgprotocol.org



Comparing global and listed-company GHG emissions

Scope 1 emissions of the world's listed companies represent nearly one-fifth of global GHG emissions, as of Aug. 31, 2024 (Exhibit 24). For warming to remain within 1.5°C, global GHG emissions would need to fall 42% (from 2019 levels) by 2030.[65]

* Global emissions through the end of 2023 are based on annual UN Environment Programme reports. Please note that the UN Environment Programme restates its tally of global GHG emissions on a periodic basis.

** Estimate by MSCI ESG Research for 2024 reflects companies' projected annual Scope 1 emissions based on company reporting and decarbonization targets, including an assessment of specificity of the target and the company's track record toward achieving its targets. We assume that the emissions of companies that have yet to set a decarbonization target will rise 1% annually.

Exhibit 24: Historical global greenhouse gas emissions (Gt CO2e)

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024 (estimated)
Global GHG emissions*	51.7	51.8	51.9	53.5	55.3	59.1	54.6	55.9	56.3	57.1	-
MSCI ACWI IMI Scope 1**	10.4	10.2	9.6	10.2	11.4	11.4	10.4	11.6	11.3	11.1	11.0

Source: MSCI ESG Research, data as of Aug. 31, 2024

The 10 listed companies with the largest absolute carbon footprints

Exhibit 25

Company	Country	Total carbon emissions (million tons of CO2e)*	Scope 1 emissions (million tons of CO2e)	Scope 2 emissions (million tons of CO2e)	Scope 3 emissions (million tons of CO2e)
Saudi Arabian Oil Company	Saudi Arabia	2,434.1	157.8	13.6	2262.7
Coal India Ltd.	India	1,338.4	24.0	7.5	1306.9
PetroChina Company Ltd.	China	1,287.3	119.7	40.9	1126.7
Exxon Mobile Corporation	U.S.	1,166.3	109.0	7.0	1050.3
China Petroleum & Chemical Corporation	China	1,002.4	137.7	24.1	840.6
Chevron Corporation	U.S.	887.2	53.0	4.0	830.2
Shell PLC	U.K.	790.8	82.0	8.0	700.8
China Shenhua Energy Company Ltd.	China	759.0	172.4	4.0	582.6
BP P.L.C.	U.K.	678.6	31.1	2.0	645.5
SAIC Motor Corporation Ltd.	China	632.8	1.7	3.0	628.1

Source: MSCI ESG Research, data as of Aug. 31, 2024

* Sum of reported or estimated Scope 1 and 2 emissions plus Scope 3 emissions estimates. If a company does not report its Scope 1 and 2 carbon emissions data, MSCI ESG Research estimates each scope separately based on either the company's previously reported emissions data or, if none, the carbon emissions intensity of the company's production or industry segments. We estimate Scope 3 emissions for all companies in our coverage based on company-specific information that considers both the revenue intensity of emissions and production data in line with the Greenhouse Gas Protocol framework. For more information, please see "MSCI Climate Change Metrics Methodology and Definition" and "Scope 3 Carbon Emissions Estimation Methodology," MSCI ESG Research.

Tracking the carbon credit market

In the next four exhibits, we provide a snapshot of key indicators of the carbon credit market: Issuances of carbon credits by project type (an indicator of supply), retirements (an indicator of demand) and price, as of Sept. 30, 2024. See the "Key Terms" section for definitions of carbon credit types.

Supply. Registered projects issued 78 million ton (Mt) of CO2e of carbon credits in the third quarter of 2024, up from 65 Mt in the same quarter last year and 66 Mt from the second quarter, which was particularly quiet for nature-based issuances (Exhibit 26). Issuances year-to-date are now down just 2% from the same period in 2023.

Though the quality of credits in the market remains a challenge, market sentiment turned more positive during the third quarter as progress continued to be made on putting in place initiatives to improve quality. In particular, the Integrity Council for the Voluntary Carbon Market rejected all renewable energy methodologies from its Core Carbon Principles, indicating it will take a tough line on setting its integrity benchmark. (Read more about this major development here.)

Exhibit 26: Quarterly issuances of voluntary carbon credits by project type (MtCO2e)

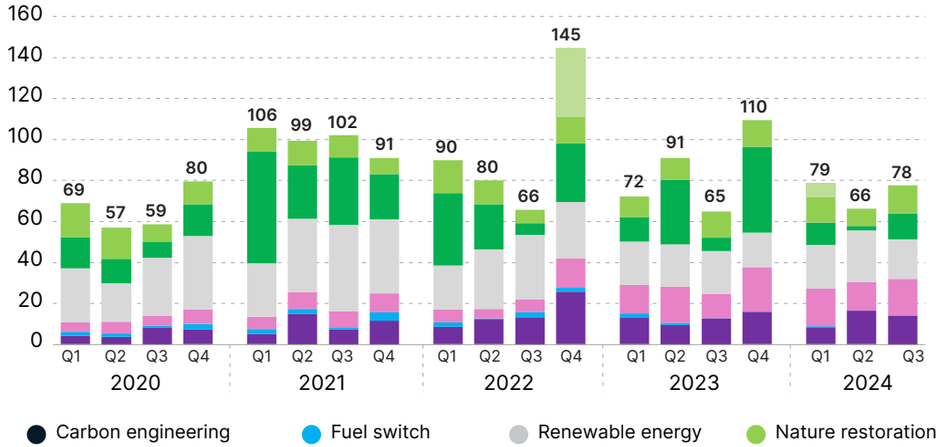
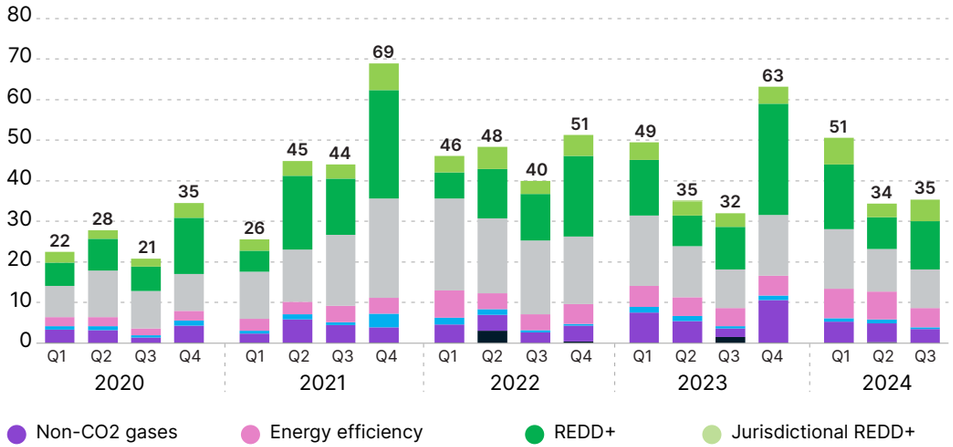


Exhibit 27: Quarterly retirements of voluntary carbon credits by project type (MtCO2e)

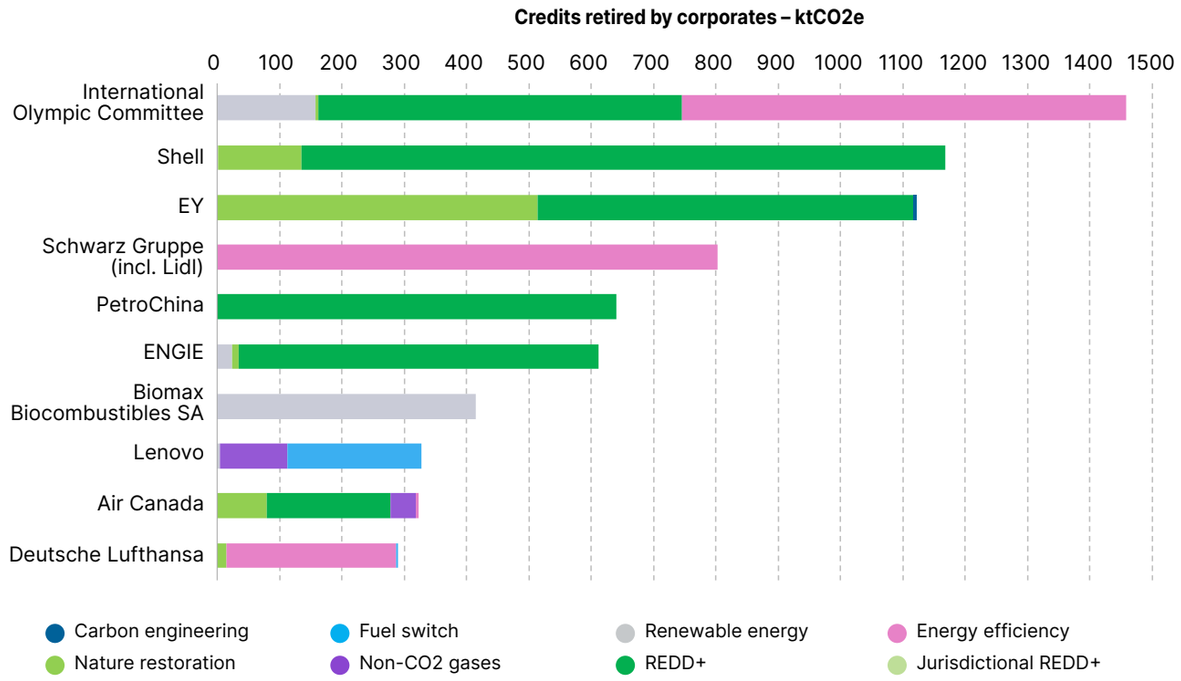


Registries included: Verra, Gold Standard, ACR, CAR, CDM (NDC eligible), Climate Forward, ART Trees, Puro Earth, EcoRegistry, BioCarbon, GCC and ACCU; Source: MSCI Carbon Markets, data as of Sept. 30, 2024. Note that the scale, as depicted by the y-axis, differs between the two exhibits.

MSCI also launched new Carbon Project Ratings in September that rate the integrity of over 4,000 projects across six key criteria. Overall, fewer than 10% of the projects analyzed are rated in the AAA-A band. There are, however, some positive signs of a trend toward increasing integrity. See all the findings from our report on the state of integrity here.

Demand. Companies retired 35 MtCO2e of carbon credits during the third quarter, similar to the second quarter volume and up slightly from the third quarter of 2023 (Exhibit 27). As a result, retirements are now up 3% year to date versus the same period last year. The largest three disclosed corporate retirees in the second quarter were the International Olympic Committee, Shell and EY (Exhibit 28).

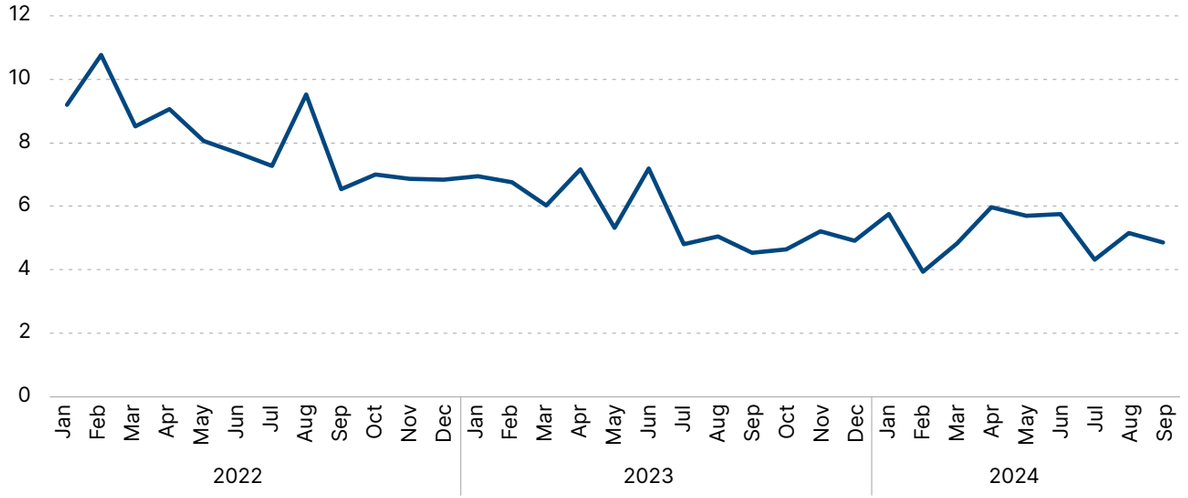
Exhibit 28: Top 10 disclosed retirees, Q3 2024



Registries included: Verra, Gold Standard, ACR, CAR, CDM (NDC eligible), Climate Forward, ART Trees, Puro Earth, EcoRegistry, BioCarbon, GCC and ACCU. Source: MSCI Carbon Markets, data as of Sept. 30, 2024

Price. Volume-weighted average spot prices for carbon credits across all project types stood at USD 4.8 per ton of CO2e in the third quarter, an 18% decrease on the second quarter and roughly flat with their level in the same quarter a year ago. Prices fell by similar percentages across most project types with the exception of renewable energy credits, which actually increased by 25% last quarter, albeit from a very low base. There continues to be a significant premium placed on nature-restoration credits, particularly those that are traded on a forward basis.

Exhibit 29: Monthly average spot credit price, all project types (USD/tCO2e)



Registries included: Verra and Gold Standard. Source: MSCI Carbon Markets, data as of Sept. 30, 2024

Conclusion

Among the top priorities for COP29 is a new goal for international climate finance designed to transfer trillions of dollars to developing countries for moving their economies to low-carbon energy and adapting to the impacts of a warming world. Negotiators will be looking to leverage private-sector institutional owners and managers of assets in that effort.[66]

Some institutional investors, however, struggle to reconcile climate investments in developing countries with their obligation to maximize risk-adjusted returns. The cost of capital and higher risks as well as the customization demanded by projects that use public, developmental finance or philanthropic capital to crowd in institutional private capital all can limit large-scale flows. Carbon trading, which is expected to be a key focus for negotiators in Baku, may offer an additional avenue through a market-based mechanism that can help to scale the flow of private capital for clean energy and climate resilience globally.

Ambition promises to be a priority for COP29 as well. Negotiators are expected to call on countries to detail in national climate plans due next year for the net-zero pathways for every sector of their economy. Policymakers have an opportunity to influence those pathways with policies that incentivize climate action by listed companies, which globally contribute nearly one-fifth of global GHG emissions. Decarbonization by listed companies based in the biggest developed economies is expected to slow during the remainder of this decade. And while their counterparts in the biggest emerging economies, including China and India, are on track to quicken the pace of decarbonization during the same period, companies globally are likely to use up their share of the remaining carbon budget for limiting warming to 1.5°C degrees above preindustrial levels by November 2026.

Time is of the essence. The negotiations in Baku could say a lot about society's resolve to produce the action that is urgently needed.

"Capital and ambition will be needed in quantities that far exceed those pledged to date if society is to stave off the effects of a warming world that science shows are becoming more extreme."

Key terms

Bioenergy Carbon Capture and Storage (BECCS): A technique for producing energy from burning plant materials and other biomass to generate energy and then capturing the resulting CO2 emissions.

Carbon budget: The amount of greenhouse gas that society can release into the atmosphere before breaching key temperature thresholds.

Carbon credit: A unit representing the avoidance or removal of 1 ton of CO2e, created by an activity or set of activities in relation to a counterfactual baseline that considers what emissions would be but for the activity or activities.

Carbon dioxide equivalent (C02e): Greenhouse gas emissions with the same global warming potential as 1 metric ton of carbon.

Carbon emissions revenue intensity: Greenhouse gas emissions in metric tons that a company emits to generate every USD 1 million of revenue.

Carbon engineering: Carbon credit projects that remove and store carbon dioxide emissions from the atmosphere and into materials that do not create or increase biomass carbon stocks.

Energy efficiency: Carbon credit projects that reduce CO2 emissions by decreasing the energy needed by equipment (either domestic or industrial), energy systems, and single power generation units.

Financed emissions: Greenhouse gas emissions associated with investments, loans and insurance.

Fuel switch: Carbon credit projects that change the energy source within an energy system or its individual beneficiaries (such as power plants and vehicles) without adding or removing any installed capacity.

GICS®: The global industry classification standard jointly developed by MSCI Inc. and S&P Global Market Intelligence. The GICS structure comprises 11 sectors, 24 industry groups, 69 industries and 158 sub-industries.

Gigaton (Gt): 1 billion tons (of emissions).

Implied Temperature Rise: A forward-looking climate impact metric that estimates the increase in average global temperature that would occur this century if the economy were to overshoot or undershoot the global carbon budget by the same amount as the company or investment portfolio in question.

Jurisdictional REDD+: Projects that reduce carbon dioxide emissions through the avoidance of deforestation on a national or subnational scale.

Landfill gas credits: Carbon credits that promote the flaring or use of gas from landfills for energy production.

Megaton (Mt): 1 million tons (of emissions).

MSCI ACWI Investable Market Index: Captures large-, mid- and small-cap listed companies across 23 developed-market and 27 emerging-market countries. With 8,847 constituents, the index covers approximately 99% of the global equity investment opportunity set, as of June 28, 2024.

Nature restoration: Carbon credit projects that increase GHG sequestration into the biosphere by restoring living biomass and soils toward their pre-disturbance state. Includes most emissions "removals" alongside carbon engineering.

Non-CO2 gases: Carbon credit projects that primarily reduce greenhouse gas emissions other than carbon-dioxide (notably methane), including landfills, waste treatment systems and fugitive emissions.

Ozone depleting substance credits: Carbon credits associated with the destruction of ozone-depleting substances that would have otherwise been released into the atmosphere.

REDD+ (Reducing emissions from deforestation in developing countries plus): Carbon credit projects that reduce carbon dioxide emissions through the avoidance of deforestation, either planned or unplanned.

Remaining emissions budget: A company's future GHG emissions budget, in tons of CO2e, for limiting warming this century to 1.5°C or 2°C above preindustrial levels.

Renewable energy: The installation of new power-generation capacity that uses carbon-free energy sources.

Science Based Targets initiative: A nonprofit organization established by CDP, the U.N. Global Compact, the World Resources Institute, the U.N. and the World Wildlife Foundation to assess corporate climate targets.

Scope 1 emissions: Companies' direct greenhouse gas emissions in tons of CO2e.

Scope 2 emissions: Companies' greenhouse gas emissions from electricity use in tons of C02e.

Scope 3 emissions: Companies' indirect greenhouse gas emissions in tons of CO2e from their upstream supply chain, emissions inherent in products and services or emissions from portfolio companies.

Target comprehensiveness: Percentage of companies' Scopes 1, 2 and 3 emissions covered by emissions reporting or target setting.

Appendix

Classification of markets in this report

The classification of markets in this report follows MSCI's Market Classification Framework, which is designed to reflect the views and practices of the international investment community by striking a balance between a country's economic development and the accessibility of its market. The framework comprises three criteria: economic development, size and liquidity requirements, and market accessibility. For more information, visit https://www.msci.com/our-solutions/indexes/market-classification.

*The West African Economic and Monetary Union (WAEMU) consists of the following countries: Benin, Burkina Faso, Guinea-Bissau, Ivory Coast, Mali, Niger, Senegal, and Togo. Currently the MSCI WAEMU Indexes include only securities classified in Benin, Burkina Faso, Ivory Coast, Niger and Senegal.

MSCI Market Classification Framework (as of June 2024)

Developed Markets			Emerging Markets			Frontier Markets		
Americas	EMEA	APAC	Americas	EMEA	APAC	Americas	EMEA	APAC
Canada	Austria	Australia	Brazil	Czech Republic	China	—	Bahrain	Bangladesh
USA	Belgium	Hong Kong	Chile	Egypt	India		Benin*	Pakistan
	Denmark	Japan	Colombia	Greece	Indonesia		Burkina Faso*	Sri Lanka
	Finland	New Zealand	Mexico	Hungary	Korea		Croatia	Vietnam
	France	Singapore	Peru	Kuwait	Malaysia		Estonia	
	Germany			Poland	Philippines		Guinea-Bissau*	
	Ireland			Qatar	Taiwan		Iceland	
	Israel			Saudi Arabia	Thailand		Ivory Coast*	
	Italy			South Africa			Jordan	
	Netherlands			Turkey			Kazakhstan	
	Norway			UAE			Kenya	
	Portugal						Latvia	
	Spain						Lithuania	
	Sweden						Mali*	
	Switzerland						Mauritius	
	UK						Morocco	
							Niger*	
							Oman	
							Romania	
							Senegal*	
							Serbia	
							Slovenia	
							Togo*	
							Tunisia	

Standalone Markets[1]		
Americas	EMEA[2]	APAC[3]
Argentina	Bosnia and Herzegovina	—
Jamaica	Botswana	
Panama	Bulgaria	
Trinidad and Tobago	Lebanon	
	Malta	
	Nigeria	
	Palestine	
	Ukraine	
	Zimbabwe	

Endnotes

1 "June Climate Meetings Take Modest Steps Forward; Steep Mountain Still to Climb Ahead of COP29," United Nations Framework Convention on Climate Change (UNFCCC), June 13, 2024. The Paris Agreement aims to limit global warming to well below 2°C (3.6°F) from preindustrial times while pursuing efforts to stay below 1.5°C (2.7°F). The agreement obligates countries to communicate their climate plans every five years.

2 Listed companies are represented by the MSCI ACWI Investable Market Index (IMI), which captures large-, mid- and small-cap listed companies across 23 developed markets and 24 emerging market countries. With 8,799 constituents, the index covers approximately 99% of the global equity investment opportunity set, as of Sept. 30, 2024.

3 See Appendix for classification of countries cited in this report.

4 "2024 virtually certain to be the warmest year and first year above 1.5°C," EU Copernicus Climate Change Service, Nov. 7, 2024

5 "Investors envision a 2.8°C future, with escalating risks of severe weather," MSCI Sustainability Institute, Oct. 31, 2024

6 "Two Years to Save the World: Simon Stiell at Chatham House," UNFCCC, April 10, 2024

7 "World Energy Investment 2024," International Energy Agency, June 2024

8 Emissions as reported by companies or estimated by MSCI where not reported. Though listed companies contribute to emissions from both energy and industry, governments, land use, waste and other sources contribute to global GHG emissions as well. "Emissions Gap Report 2024," UN Environment Programme, 2024.

9 "Framework for Action," COP29 Presidency

10 "Alliance of CEO Climate Leaders," Open letter, October 2024

11 The agreement entered into force in November 2016. Our analysis is based on [4,458] companies in the MSCI ACWI IMI that are based in G20-member countries and that were also constituents of the index at the end of both December 2016 and December 2021. That means the analysis is based on the same set of companies during this period. This approach to prioritize a direct comparison led to removal of Argentina, Russia and Saudi Arabia from the analysis. We also excluded the EU given the focus here on individual countries.

12 See "Paris Agreement Implementation and Compliance Committee gears up to help countries meet key deadlines," United Nations Framework Convention on Climate Change," June 10, 2024

13 "Simon Stiell Closing Speech: Don't Leave the Hardest Work to the Eleventh Hour," UNFCCC, June 13, 2024

14 "Emissions Gap Report, 2024," UN Environment Programme, October 2024

15 Data in this section covers companies in the following countries: Australia, Austria, Bahamas, Belgium, Brazil, Canada, Chile, China, Colombia, Costa Rica, Czech Republic, Denmark, Egypt, Finland, France, Germany, Greece, Hong Kong, Hungary, India, Indonesia, Ireland, Israel, Italy, Japan, Kuwait, Luxembourg, Malaysia, Mexico, Netherlands, New Zealand, Norway, Peru, Philippines, Poland, Portugal, Puerto Rico, Qatar, Saudi Arabia, Singapore, South Africa, South Korea, Spain, Sweden, Switzerland, Taiwan, Thailand, Turkey, United Arab Emirates, the U.K. and the U.S.

16 Classification of emerging and developed markets are based on MSCI's Market Classification framework, available at msci.com

17 The increases represent the compound annual growth rate (CAGR) of emissions of listed companies in those countries between the period 2016 and 2022.

18 "Statistical Review of World Energy, 73rd Edition," Energy Institute, 2024

19 "Statistical Review of World Energy, 73rd Edition, Energy Institute, 2024

20 "Simulating a Managed Phaseout of Coal-Fired Power Plants in the Asia-Pacific Region," MSCI Sustainability Institute, November 2023

21 See Annex B.6 of IEA's latest World Energy Outlook for a summary of climate policy actions taken by governments. "World Energy Outlook 2024," International Energy Agency

22 Banks often use production intensities to differentiate among borrowers based on their carbon efficiency. See, for example, "Managing our Transition to a Sustainable Future: 2023 Task Force on Climate-related Financial Disclosures Report," Bank of America, p. 31.

23 See, "Net Zero Emissions by 2050 Scenario (NZE)," International Energy Agency. Our analysis encompasses production intensity for GHG emissions across all emissions scopes.

24 Oilsands crude can produce 31% higher emissions from the point of extraction through its lifecycle to the point of end use compared with North American crude generally. See "Oil-Climate Index," Carnegie Endowment for International Peace.

25 "World Energy Investment 2024," International Energy Agency. ("The number of specialist VC funds targeting clean energy and other climate segments continues to grow. These funds are often backed by investors that impose criteria – such as potential for deep reductions in greenhouse gas emissions – on the use of the money, and in some cases allow returns to accrue over longer timeframes.")

26 Voluntary initiatives have emerged to address this. The ESG Integrated Disclosure Project, for example, brings together lenders in the private credit industry and syndicated loan markets to solicit a global baseline of sustainability-related information from private companies. More information is available at esgidp.org.

27 See, "Pulling Back the Curtain on Emissions Reporting in Private Markets," MSCI Research, Feb. 5, 2024.

28 Carbon intensity refers to tons of GHG emissions per USD million of revenue. Carbon estimates available for companies. This dataset may include public companies that received investments from private funds or private companies that went public and have not been exited yet.

29 The 7.3 billion tons CO_2e is the total emissions of the portfolio companies, not financed emissions. Across the roughly 65,000 companies with reported or estimated carbon intensities, 43% reported their revenues, which are needed to estimate total emissions in the absence of disclosure. While the remaining 57% of companies did not report their revenue, we estimated their emissions based on our estimates for the companies that did, after controlling for subindustries and differences in average carbon intensities.

30 Listed companies here refers to companies as represented by the MSCI ACWI IMI, the index of the world's listed companies that represents listed companies in this report. See note 2.

31 Note that these four sectors also contribute about 96% of the overall scope 1 emissions of listed companies as well. These four sectors represent 35% of the total constituents of the MSCI ACWI IMI Index, as of August 31, 2024.

32 Developing countries outside of China could need as much as USD 2.4 trillion a year by 2030 for investments in clean energy, adaptation and resilience, climate loss and damage, and conservation of nature. "A Climate Finance Framework: Decisive Action to Deliver on the Paris Agreement," Second report of the Independent High-Level Expert Group on Climate Finance," United Nations, November 2023. See also "World Energy Outlook 2024," International Energy Agency. ("Dividing lines are emerging on energy and climate, which can only be bridged if there is more help provided to poorer countries, communities and households to manage the upfront costs of change, including much greater international support.")

33 "Emissions Gap Report 2024," UN Environment Programme, October 2024.

34 "World Energy Outlook 2024," International Energy Agency, October 2024

35 MSCI ESG Research, data as of Sept. 30, 2024

36 MSCI ESG Research, data as of Sept. 30, 2024

37 MSCI ESG Research, data as of Sept. 30, 2023

38 MSCI ESG Research, based on data from Refinitiv Eikon as of Sept. 30, 2024, data as of Sept. 30, 2024

39 "World Energy Investment 2024," International Energy Agency, June 2024

40 "Emissions Gap Report, 2024," UN Environment Programme, 2024. See also "Contribution of Institutional Investors, Private Investment in Infrastructure," 2011 – H1 2017, World Bank Group ("Many institutional investors, global banks, and asset managers—who collectively manage approximately $400 trillion—are still hesitant to enter emerging markets because of real and perceived risks and a lack of sufficient bankable projects."). Rates of default in corporate loan portfolios generally reflect companies' industry, region and the wealth of the country. See "IFC Portfolio, Default Rate Analysis," International Finance Corporation, March 2024.

41 Borrowing costs for clean-energy startups in some emerging-market countries have exceeded 25%. "World Energy Investment 2024," International Energy Agency, June 2024.

42 Borrowing in foreign currency typically combines the U.S. borrowing rate with a country risk premium, reflecting the specific risks of the project's location.

43 "Reducing the Cost of Capital, World Energy Investment Special Report," International Energy Agency, February 2024

44 See generally, discussion in Section 6.3.3. of the latest U.N. Emissions Gap Report for discussion of financing climate-related investments in emerging economies outside China, "Emissions Gap Report 2024," UN Environment Programme.

45 "Development Banks and Energy Planning: Attracting Private Investment for the Energy Transition," International Renewable Energy Association, 2024.

46 See, for example, "EBRD supports first green hydrogen facility in Egypt," European Bank for Reconstruction and Development, Nov. 15, 2022, and "Rising Pakistan: Special Investment Facilitation Council," available at sifc.gov.pk/.

47 See, CPEC Secretariat, Pakistan Ministry of Planning, Development & Special Initiatives, available at cpec.gov.pk/

48 As of Sept. 30, 2024, based on data from Convergence – The Global Network for Blended Finance, the Organization for Economic Cooperation and Development, the Bank of International Settlements, and MSCI ESG Research.

49 See, for example, "The case for a lower return on investment," Financial Times, Aug. 26, 2024

50 "Key Standards for UN Carbon Market Finalized Ahead of COP29," UNFCCC, Oct. 10, 2024

51 MSCI Carbon Markets data. See also, "The World Bank Engagement Roadmap for Carbon Markets," World Bank Group, Dec. 1, 2023, and "State and Trends of Carbon Pricing," World Bank Group, 2024

52 "19 Leading Companies Signal Support for Energy Transition Accelerator," The Rockefeller Foundation, Sept. 24, 2024

53 "The Rockefeller Foundation and GEAPP To Design the World's First 'Coal-To-Clean' Credit Program in Emerging Economies," The Rockefeller Foundation, June 14, 2023

54 MSCI assess the integrity of carbon projects based on six criteria (additionality, quantification, permanence, co-benefits, legal and ethical risks, and deliver risks) and over 50 sub-criteria. "State of Integrity in the Global Carbon-Credit Market," MSCI ESG Research, Sept. 19, 2024

55 "Making NDCs investable – the investor perspective," The Institutional Investors Group on Climate Change, June 2024. See also "Emissions Gap Report 2024," UN Environment Programme ("The mobilization of private capital at scale will require robust public sector support in terms of policy frameworks, risk mitigation and creating conducive investment environments.")

56 Current warming is about 1.3°C (2.3°F) above preindustrial levels, according to EU Copernicus. See "Climate Indicators – Temperature," available at climate.copernicus.eu. For more on MSCI's Implied Temperature Rise metric, see, "Implied Temperature Rise," available at msci.com. See also, "Understanding MSCI's Climate Metrics," MSCI ESG Research, Jan. 10, 2023.

57 See note 2

58 Apple or Microsoft, the most-valuable companies in the index, had an index weight of 3.86% and 3.46%, respectively, as of Sept. 30, 2024. That weighting enables investors to allocate capital accordingly but has nothing to do with the emissions of either company. For more information on weighting of the top 10 constituents of the MSCI ACWI IMI see the latest index fact sheet, available at msci.com. See also "MSCI Index Calculation Methodology, Index Calculation Methodology for the MSCI Equity Indexes," August 2024.

59 Clients of MSCI continues to have access to an index-weighted view of Implied Temperature Rise via MSCI ONE.

60 The Implied Temperature Rise of banks, financial services and insurance industry groups covers carbon emissions from portfolio investments and commercial loans with known use of proceeds, as directed by the Greenhouse Gas Protocol, which requires that companies account for their proportional emissions of such investments. Our methodology does not currently cover emissions of investments that insurance companies hold in their general accounts, which are unavailable to investors.

61 Note that this refers to the remaining carbon emissions budget for listed companies and not to global temperatures.

62 The SEC has stayed its final rules pending judicial review. "Order Issuing Stay," Securities and Exchange Commission, April 4, 2024.

63 U.S-listed companies represented 64.24% of companies in the MSCI ACWI (the universe of companies shown in Exhibit X), as of Sept. 30, 2024, followed by Japan (5.01%), the U.K. (3.31%), China (2.94%), Canada (2.75%) and other countries (21.75%).

64 "APAC Climate Action Report," MSCI ESG Research, May 2024

65 "Emissions Gap Report, 2024," UN Environment Programme, October 2024

66 "COP29 Must be a Stand-and-Deliver COP": Simon Stiell," UNFCCC, Oct. 17, 2024

Acknowledgments

This report was prepared under the supervision of **Linda-Eling Lee**, head of the MSCI Sustainability Institute, and **Sylvain Vanston** of MSCI ESG Research and an Institute fellow for net-zero initiatives. Key contributions were from:

- **Elchin Mammadov** of MSCI ESG Research and an Institute fellow for the energy transition and **Rumi Mahmood**, Institute research director (examining decarbonization by companies across countries)
- **Abdulla Zaid** of MSCI Research (tracking private markets)
- **Antonios Panagiotopoulos**, **Kenji Watanabe** and **Feifan Huang** of MSCI ESG Research (production-based emissions intensities and climate performance metrics, respectively)
- **Umar Ashfaq**, Institute research director, and **Helen Droz**, **Tanguy Séné** and **Seokhee Moon** of MSCI's Climate Risk Center (assessing climate progress by listed companies)
- **Jamie Saunders** of MSCI Carbon Markets (tracking the carbon credit market)

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