July 2023 update

The MSCI Net-Zero Tracker

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

Introduction

Listed companies are increasingly committing to net-zero pledges but are also putting greenhouse gases into the atmosphere at levels rivaling their pre-pandemic highs.

That's among key findings of this update to the MSCI Net-Zero Tracker, which monitors alignment of the world's listed companies with the threshold of limiting the rise in average global temperatures to 1.5 degrees Celsius (1.5°C or 2.7°F) above preindustrial levels set by the Paris Agreement.[1] The report counts down the time until the collective carbon budget for the world's listed companies is likely to be depleted and spotlights corporate leaders and laggards in climate disclosure.

This update arrives roughly four months before delegates from nearly 200 countries, leaders of business and finance, and members of civil society gather for the COP28 climate conference, which will take stock of action by both governments and the private sector to limit warming to 1.5°C (the planet has warmed by nearly 1.3°C already).[2] It comes as global investment in clean energy continues to overtake investment in fossil fuels but also as leading oil and gas companies walk back plans to lower production.[3] It follows record-breaking heat across the northern hemisphere and appears amid mounting evidence of irreversible changes to the climate driven by heat-trapping emissions from the burning of fossil fuels.[4]

The update affirms that while companies are pledging to reduce their emissions, preventing the costliest warming will require companies and investors to redouble their ambition and back climate commitments with action.

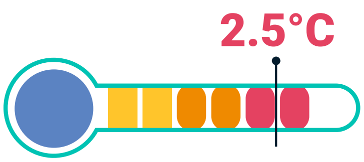
1 Listed companies represented by the MSCI ACWI Investable Market Index (MSCI ACWI IMI), which includes large-, mid- and small-cap listed companies across 23 developed market and 27 emerging market countries. With 9,181 constituents, the index covers approximately 99% of the global equity investment opportunity set, as of June 30, 2023.

2 "Global Stocktake 'Must be the Turning Point' to Limit Warming." United Nations Framework Convention on Climate Change, June 15, 2023. See also, "Human-induced warming." globalwarmingindex.org.

3 "World Energy Investment 2023." International Energy Agency, May 2023. See also, for example, "Big Oil's Green Retreat Helps Clear the Way for Everyone Else in Renewables." Bloomberg, June 19, 2023.

4 "Extreme heat in North America, Europe and China in July 2023 made much more likely by climate change." World Weather Attribution, July 25, 2023. See also "Observationally-constrained projections of an ice-free Arctic even under a low emission scenario." Nature Communications, June 6, 2023.

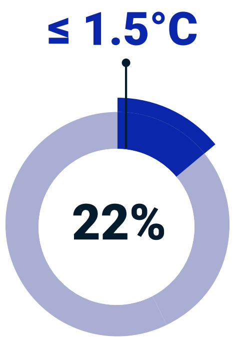
Key findings



Listed companies are on a path to warm the planet by 2.5°C above preindustrial levels this century.

Disclosure and targets edge higher

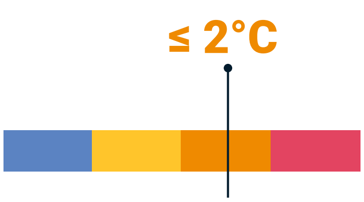
- **37% of listed companies** have disclosed at least some of their Scope 3 emissions, as of May 31, 2023, up two percentage points from two months earlier.[5]
- **Nearly half (48%) of listed companies** have set a decarbonization target, up 4 percentage points over the same period.
- **32% of listed companies** have declared a target of net-zero emissions, while 18% of listed companies have published a pledge that, if achieved, would align carbon emissions across the company's total value chain with the ambitious 1.5°C goal of the Paris Agreement, an increase of 2 and 1 percentage points, respectively, since the May edition.



Twenty two percent of listed companies align with a 1.5°C temperature rise — the threshold above which scientists say the risk of catastrophic climate hazards increases significantly.

The ambition gap narrows

- **More than half (55%) of listed companies align with warming equal to or below 2°C**, placing them at the high end of the Paris Agreement's uppermost temperature threshold.[6]
- **22% of listed companies align with a 1.5°C pathway**, the threshold above which the effects of global warming become more extreme.[7]
- **Listed companies are on a path to warm the planet 2.5°C** above preindustrial levels this century, based on an analysis of their future emissions pathways and current climate commitments.[8]
  - While that represents a drop of two-tenths of a degree since the May edition of this report, the decline mainly reflects an increase in both the number and ambition of corporate climate targets, not a fall in listed companies' absolute emissions.



More than half (55%) of listed companies align with warming less than or equal to 2°C, placing them at the high end of the Paris Agreement's uppermost temperature threshold.

A rapidly shrinking carbon budget

- **Listed companies are likely to put 11.3 gigatons (billion tons)** of carbon dioxide equivalent (CO_2e) emissions into the atmosphere this year, up about 1% from 2022, when global CO_2 emissions reached what was then an all-time high.[9]
- **At their current rate of emissions**, listed companies are expected to use up their share of the global carbon budget for keeping temperature rise below 1.5°C by Oct. 31, 2026, unchanged from our projection in May.[10]

5 "The MSCI Net-Zero Tracker." MSCI ESG Research, May 2023.

6 The Paris Agreement aims to limit the increase in global average temperature to well below 2°C above preindustrial levels while pursuing efforts to limit the temperature increase to 1.5°C. "Paris Agreement." United Nations, 2015.

7 "Synthesis Report of the IPCC Sixth Assessment Report (AR6). U.N. Intergovernmental Panel on Climate Change (IPCC), March 20, 2023.

8 Data as of May 31, 2023. The estimate reflects listed companies' Implied Temperature Rise (ITR), which estimates the increase in average temperatures this century were the economy to over- or undershoot the global carbon budget by the same amount as the companies in question. See "Understanding MSCI's Climate Metrics." MSCI ESG Research, January 2023.

9 MSCI estimate based on company emissions data where available. Where such data is unavailable, MSCI estimates MSCI ACWI IMI emissions based on data from Carbon Monitor.

10 The calculation reflects listed companies' share of the global budget for limiting the rise in average temperatures to 1.5°C, as of May 31, 2023.

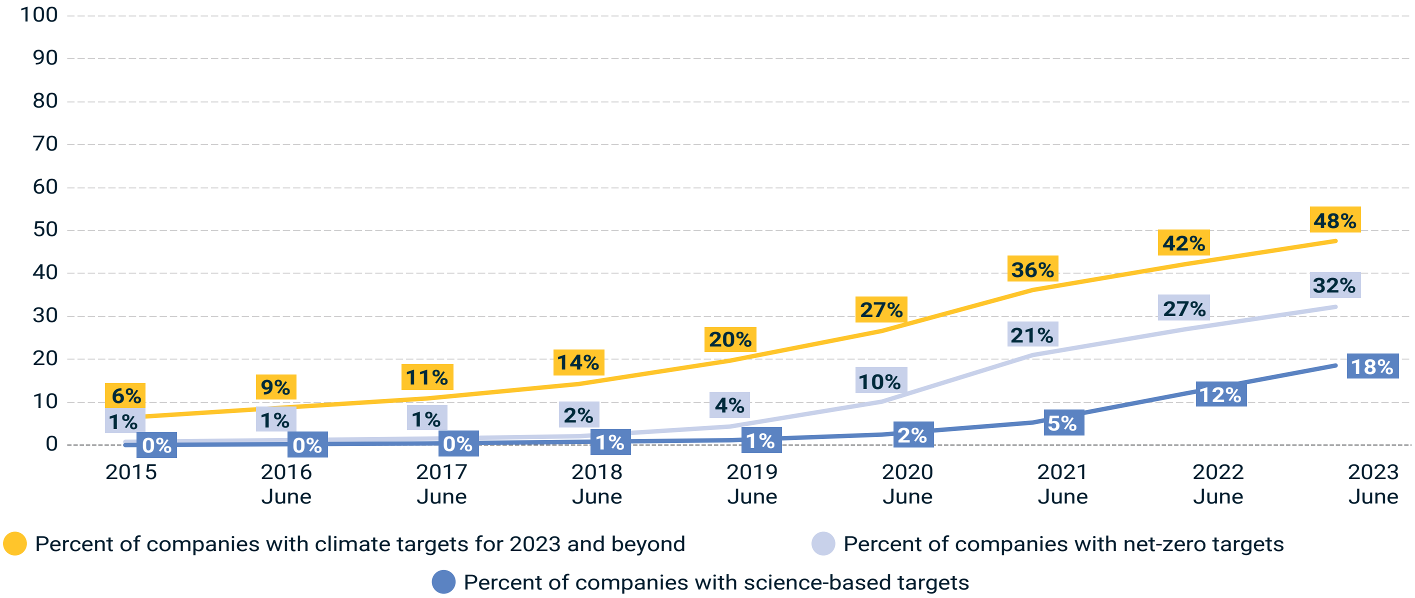
The rise in companies setting climate targets, reporting **Scope 3 emissions**, continues

The number of listed companies that set decarbonization targets and publish their carbon footprints continues to edge higher.

Forty-eight percent of listed companies had published a climate target, as of May 31, 2023, up 4 percentage points from two months earlier (Exhibit 1), though the ambition of those pledges varies. Some aim to balance carbon emissions with carbon removal. Others plan to reduce direct emissions but not those from the company's suppliers or customers. Some intend simply to boost the company's use of energy from renewable sources. Nearly one-third (32%) of listed companies have set targets that aspire to reach net-zero, as of the same date.

Eighteen percent of listed companies have committed to align their decarbonization target with the standard set by the Science Based Targets initiative (SBTi), which requires companies to set long-term targets that would reduce their residual emissions to net-zero by 2050 while aligning their reductions with a 1.5°C pathway over the near term.[11] A United Nations high-level expert group on net-zero commitments by the private sector has recommended that companies draw on third-party verification to set climate targets and reduce total value-chain emissions.[12]

Exhibit 1: The number of listed companies setting climate targets continues to tick up but ambition varies (% of MSCI ACWI IMI)

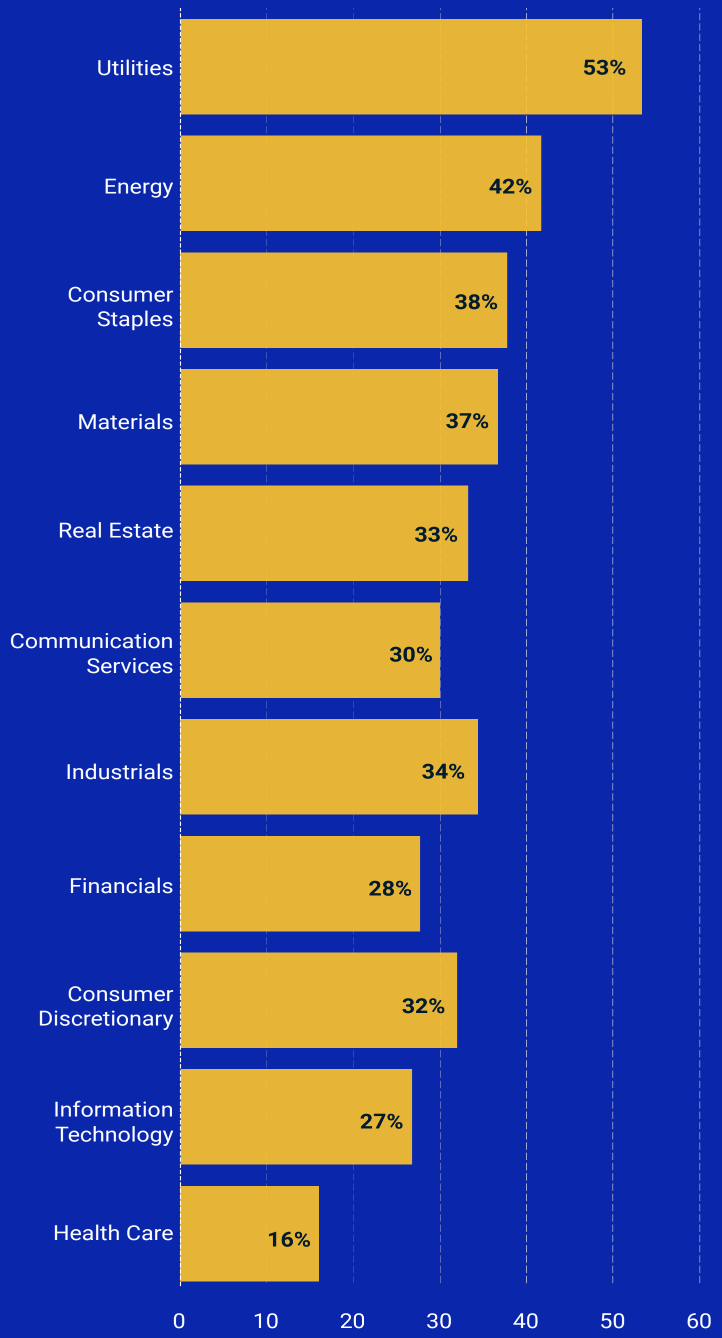


Source: MSCI ESG Research and CDP, data as of May 31, 2023

11 "SBTi Corporate Net-Zero Standard, Version 10." Science Based Targets initiative, October 2021. Data as of May 31, 2023.

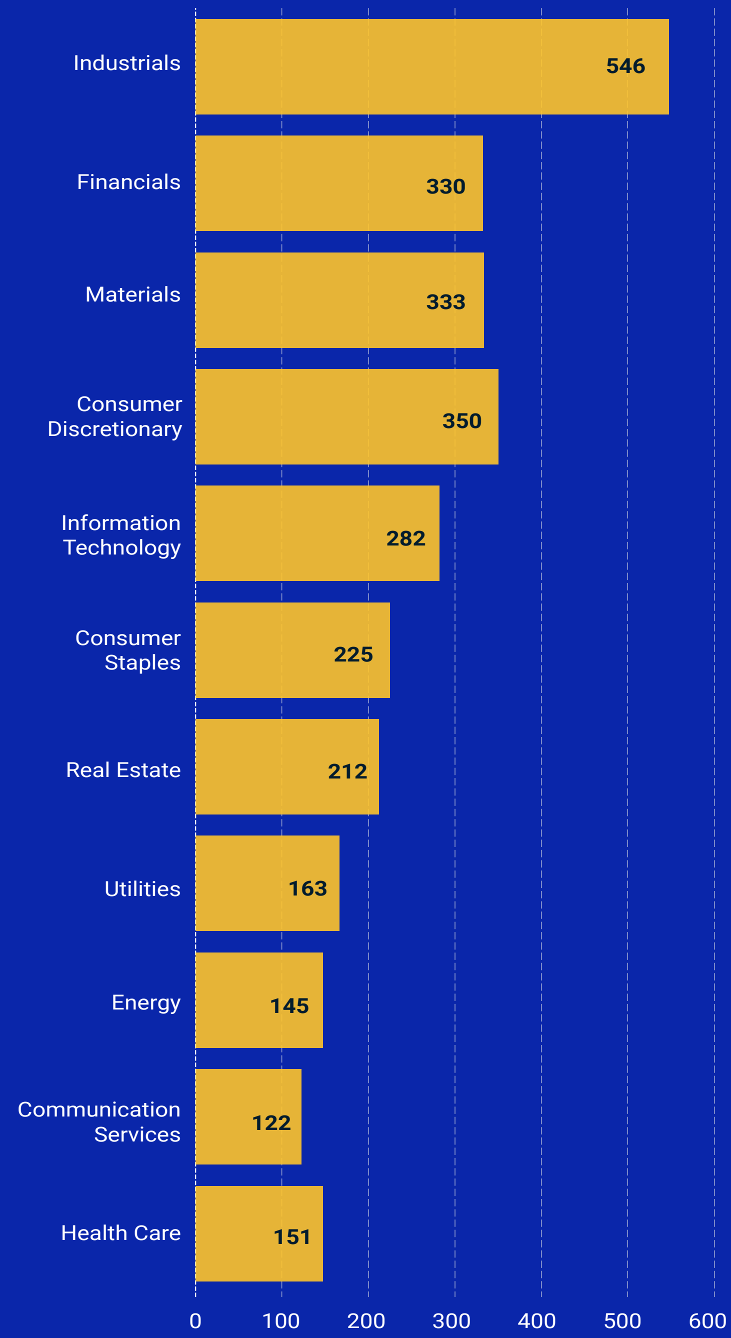
12 "Integrity Matters: Net Zero Commitments by Businesses, Financial Institutions, Cities and Regions." Report from the United Nations' High-Level Expert Group on the Net Zero Emissions Commitments of Non-State Entities, Nov. 8, 2022. The Expert Group cited SBTi, the Partnership for Carbon Accounting Financials (PCAF), The Paris Agreement Capital Transition Assessment (PACTA), the Transition Pathway Initiative (TPI), and the International Organization for Standardization (ISO) as examples of third-party verifiers. See also, "Assessing Science-Based Corporate Climate Target-Setting." MSCI ESG Research, June 9, 2023.

Exhibit 2A: Percentage of companies with self-declared net-zero targets by GICS® sector



Source: MSCI ESG Research, based on companies in the MSCI ACWI IMI, data as of May 31, 2023. Sectors from the Global Industry Classification Standard (GICS®) 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.

Exhibit 2B: Number of companies with self-declared net-zero targets by GICS® sector



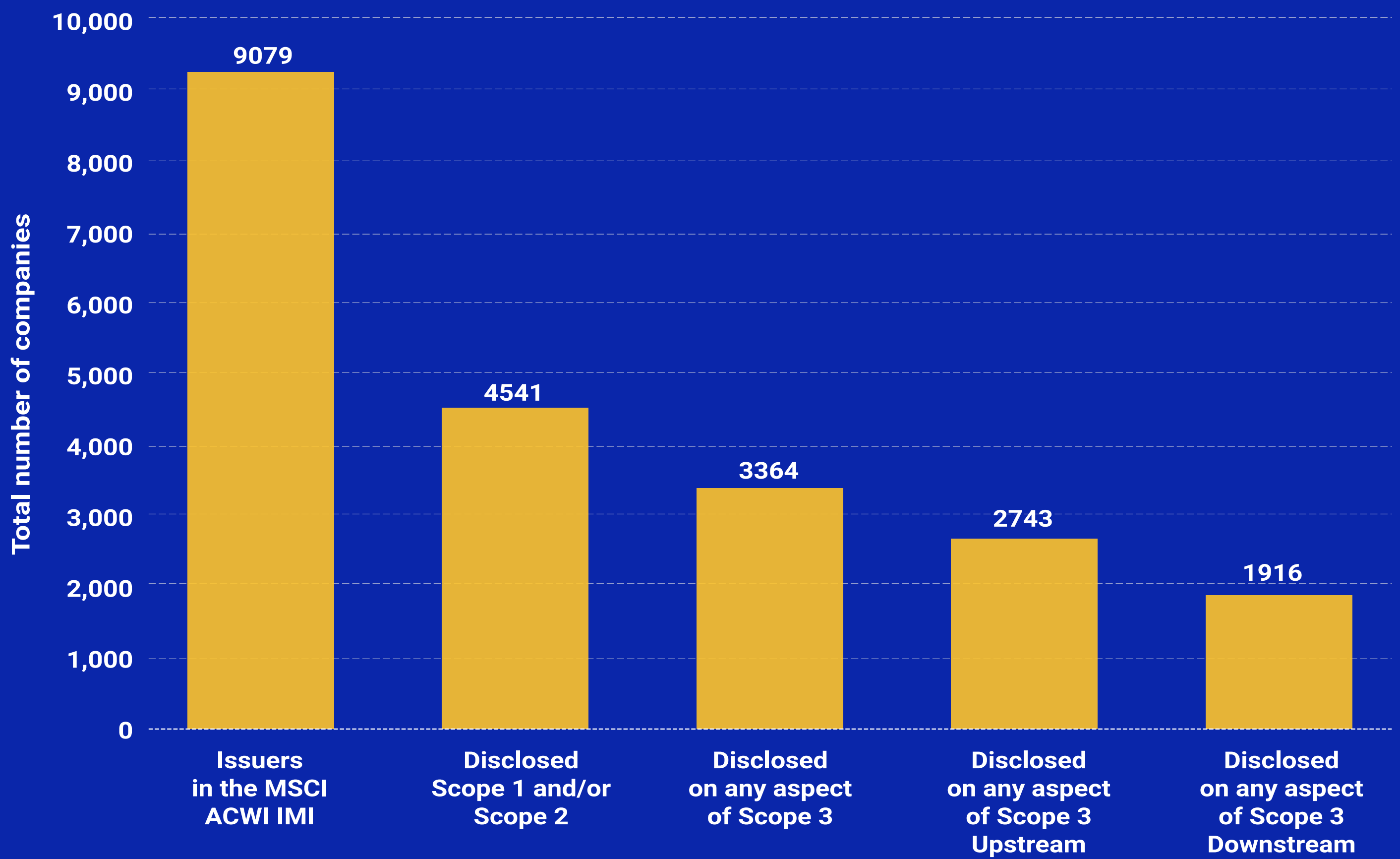
Source: MSCI ESG Research, based on companies in the MSCI ACWI IMI, data as of May 31, 2023

Reporting of Scope 3 emissions inches higher. About 37% of listed companies disclosed at least some of their Scope 3 emissions as of May 31, 2023, up 2 percentage points from March 31 (Exhibit 3).[13] The percentage of companies that reported upstream Scope 3 emissions also rose by 2 percentage points over the period, while the percentage of firms reporting downstream Scope 3 emissions rose 1 point.

The rise in disclosure marks progress; three years ago, about 18% of listed companies reported any of their Scope 3 emissions.[14] At the same time, society is running out of time to reduce emissions, which need to fall by half by 2030 to prevent the worst climate impacts.[15]

Progress in reporting Scope 3 emissions, which arise from the company's suppliers or use of its products by customers, matters because such emissions represent the largest source of emissions for all but a handful of industries and the lion's share of emissions of investment portfolios and lending books.[16] While taking inventory of Scope 3 emissions is getting easier as carbon accounting improves, reporting them remains a challenge because it requires companies to tally emissions from both upstream and downstream in the value chain. In short, Scope 3 is hard; 37% isn't enough but suggests progress.[17]

Exhibit 3: Disclosure by listed companies across emissions scopes



MSCI ESG Research, data as of May 31, 2023. The difference between the number of MSCI ACWI IMI issuers shown here and the number of index constituents as of May 31, 2023 reflects differences between index rebalancing and emissions reporting.

13 See note 5

14 "Scope 3 Carbon Emissions: Seeing the Full Picture." MSCI Research, Sept. 17, 2020.

15 See note 7

16 Ibid.

17 Clients can find MSCI ESG Research's latest Scope 3 emissions methodology in MSCI ESG Manager.

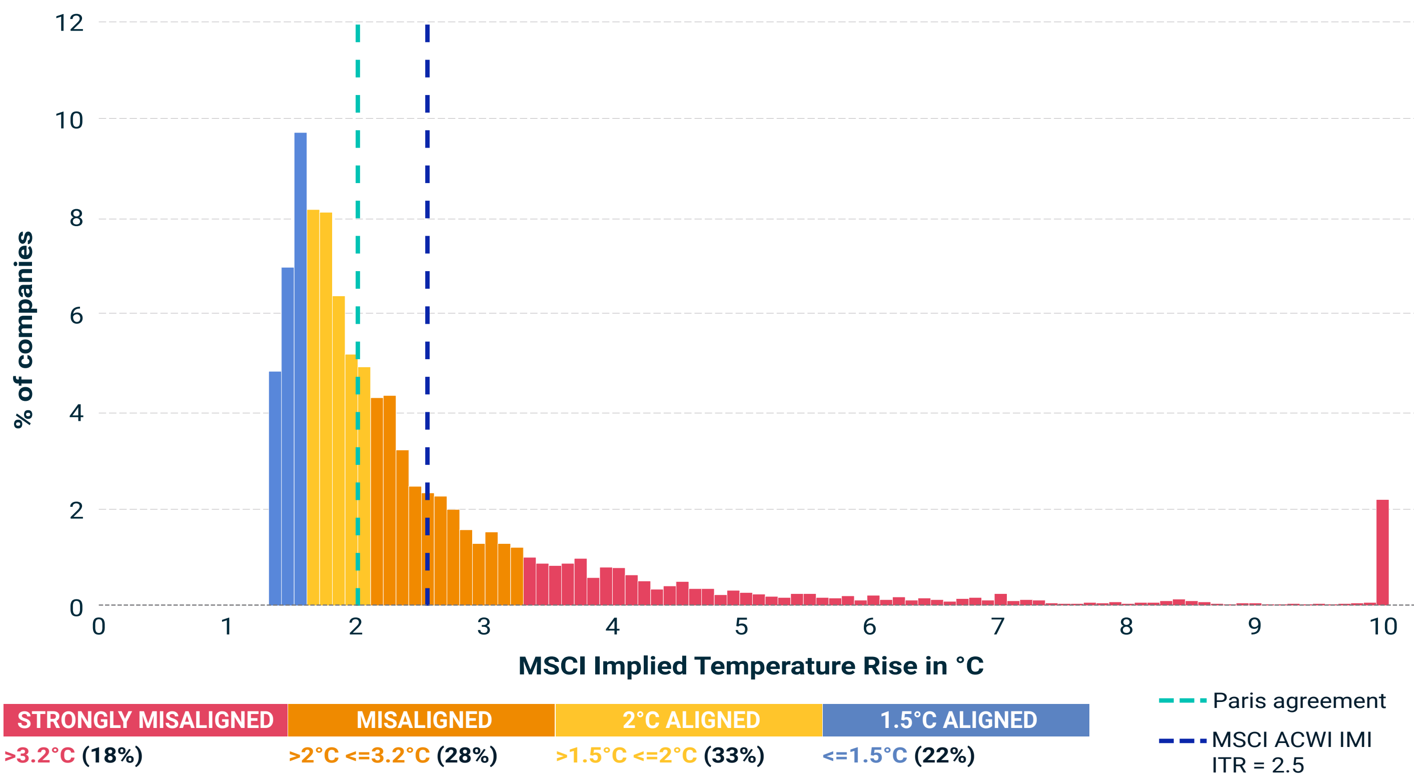
Mind the **ambition gap**

Listed companies' greenhouse gas emissions and projected emissions trajectories would align with warming of 2.5°C above preindustrial levels if the whole economy had the same carbon budget overshoot or undershoot as the companies in question.[18] While that represents a drop of two-tenths of a degree since the May edition of this report, the fall mainly reflects an increase in both the number and ambition of corporate climate targets, together with an increase in revenue-aligned carbon budgets for companies in the energy and materials sectors from revenues reported in 2022, rather than a decline in listed companies' absolute emissions.[19]

More than half (55%) of listed companies are on track to keep warming below 2°C, while 22% align with a 1.5°C temperature rise (Exhibit 4). All pathways that limit warming to either 1.5°C or 2°C this century, however, assume "rapid and deep and, in most cases, immediate greenhouse gas reductions in all sectors this decade," the IPCC affirmed in March, a reality that has yet to materialize nearly one-third of the way through the decade.[20]

Investors and other capital-markets participants have a critical role to play in narrowing that gap by using the strategic levers at their disposal to spur companies to reduce emissions in line with the Paris Agreement.[21] Investors also may wish to monitor whether their allocation of capital to companies and industries that are decarbonizing actually reduces greenhouse gas emissions, not solely in their portfolios but in the global economy.[22]

Exhibit 4: Listed companies align with warming of 2.5°C



Source: MSCI ESG Research, data as of May 31, 2023

18 Estimate is based on MSCI's Implied Temperature Rise model, which indicates how companies and investment portfolios align with global climate targets (in degrees Celsius) based on a company's current carbon emissions and projected emissions trajectory.

19 See MSCI ESG Research, "The MSCI Net-Zero Tracker," May 2023. Our Implied Temperature Rise methodology uses revenue as a proxy for a company's fair share of the Paris-aligned global carbon budget.

20 See note 7

21 For more on strategic levers, see "Net-Zero Alignment Series: Examining the path to net-zero," MSCI ESG Research.

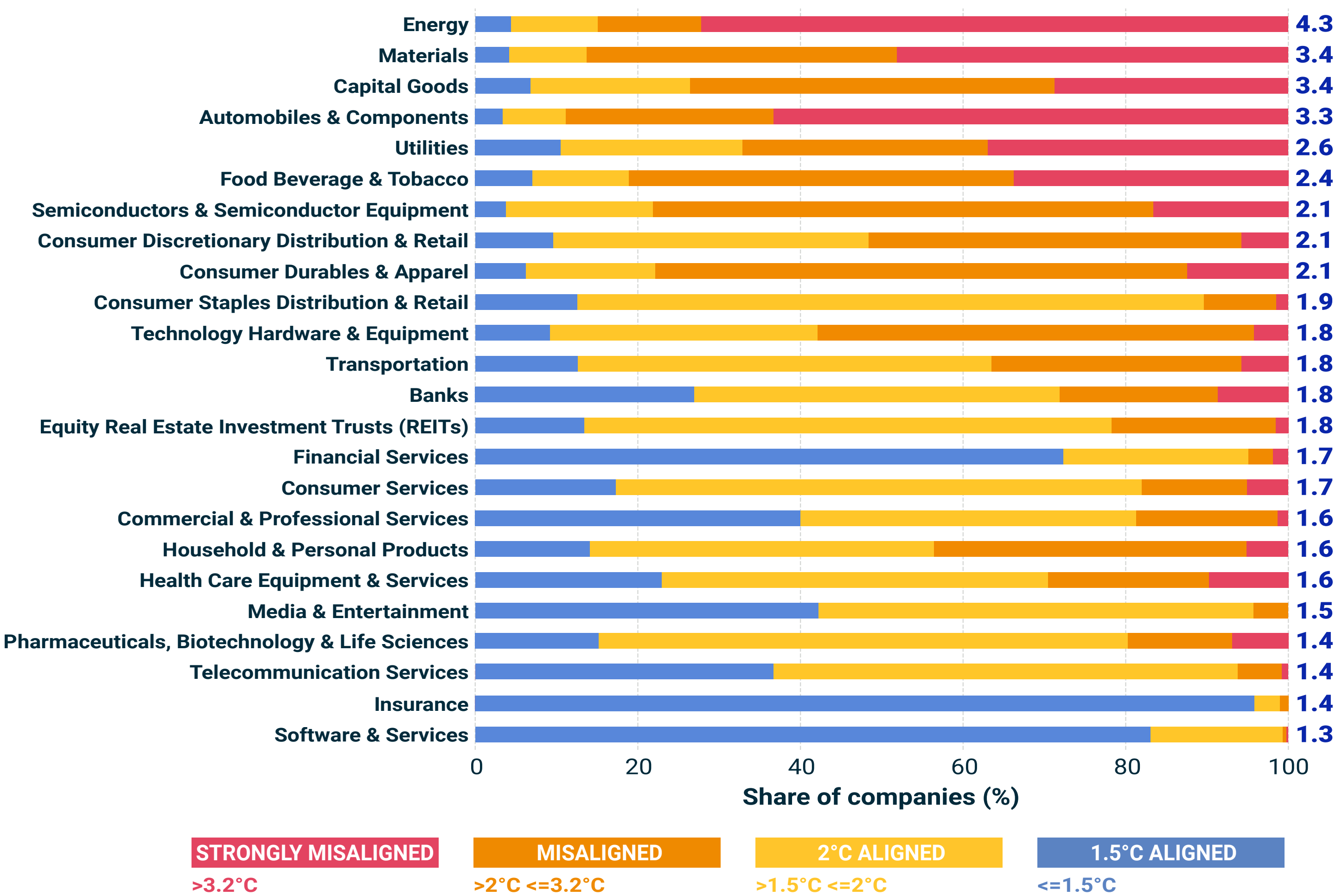
22 "A Framework for Attributing Changes in Portfolio Carbon Footprint." MSCI ESG Research, May 3, 2023.

Going where the emissions are

Companies within five of 24 industry groups align, on average, with keeping future warming at or below 1.5°C, while those in 15 industry groups align with a 2°C pathway, as of May 31, 2023 (Exhibit 5).[23] Misaligned industry groups range from the biggest emitters of greenhouse gases, such as energy and materials, to those with large value-chain-related emissions, such as automakers and companies involved in processing, packaging and distributing food.

Investors may wish to identify companies in every industry that are decarbonizing, based on their projected emissions pathway, rather than solely their current carbon footprint. That is why we use Implied Temperature Rise, a forward-looking measure, to track the progress of listed companies toward curbing climate risk, rather than carbon footprinting, which is backward-looking. Still, companies' carbon footprints show whether progress is being made. For the economy to reach net-zero by 2050, every company on track to exceed globally agreed thresholds would have to decarbonize much more quickly than precedent suggests is possible.[24]

Exhibit 5: Implied Temperature Rise by GICS® industry group



Source: MSCI ESG Research, data as of May 31, 2023. Data shows weighted averages.

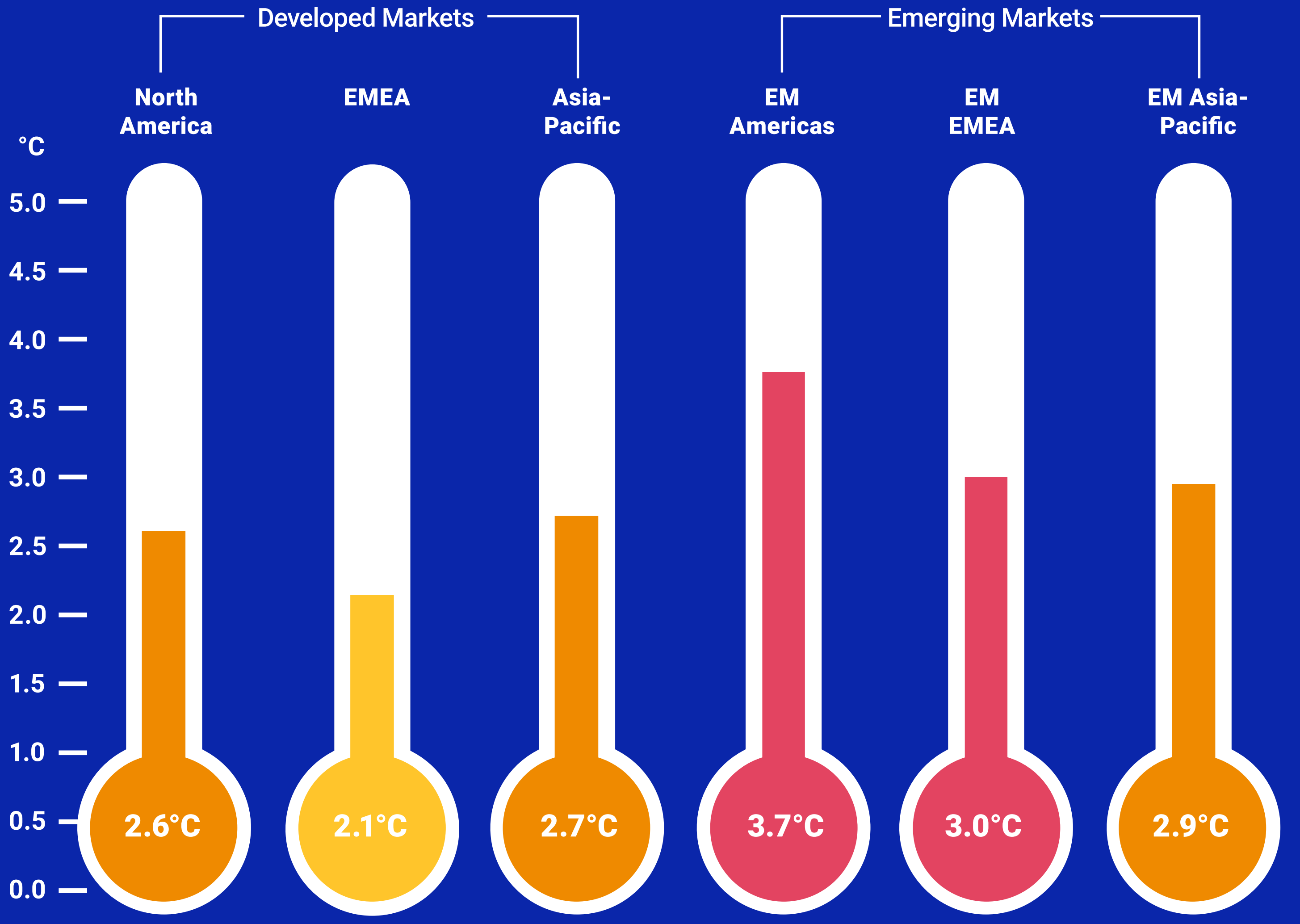
23 The Implied Temperature Rise of banks, diversified financials and insurance industry groups covers carbon emissions from portfolio investments and commercial loans with known use of proceeds, as directed by the Greenhouse Gas Protocol, which requires that companies account for their proportional emissions 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.

24 Only 3% of the world's listed companies reduced their direct or indirect carbon emissions by an average of 8% or more per year over the five years that ended in May 2020, an analysis by MSCI ESG Research found. "2021 ESG Trends to Watch." MSCI ESG Research, December 2020.

Companies in every region would **breach key climate thresholds**

The carbon emissions of listed companies in every region make it likely that the world would exceed critical climate goals, based on our analysis of indexes comprising six developed and emerging-market regions.[25] While every ton of carbon warms the planet to the same extent wherever it is produced, our methodology allocates a share of the global carbon budget to listed companies based in part on their sector and region.

Exhibit 6: Implied Temperature Rise

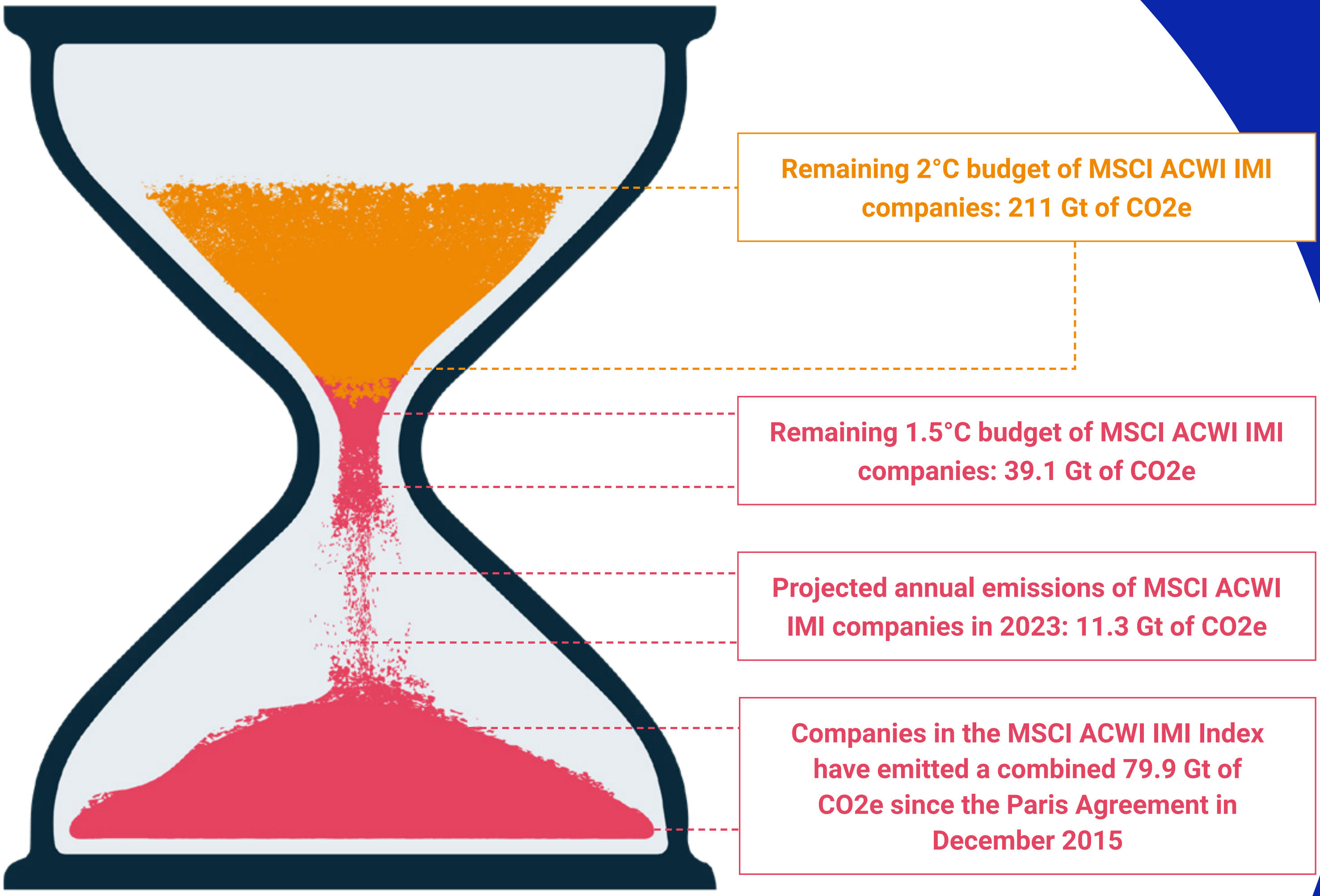


Source: MSCI ESG Research, data as of May 31, 2023, based on data in the following regional indexes: MSCI North America Investable Market Index, the MSCI Europe and Middle East Index, the MSCI Pacific Investable Market Index, the MSCI Emerging Markets Latin America Index, the MSCI Emerging Markets EMEA Investable Market Index, and the MSCI Emerging Markets Asia Index

25 For the classification of developed- and emerging-market regions, see "MSCI Market Classification Framework," June 2022.

Burning through **the budget**

Exhibit 7



Source: MSCI ESG Research, data as of May 31, 2023

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 May 31, 2023. Emissions for 2022 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 a 1.5°C and 2°C warming scenario are calculated based on bottom-up estimates (sum of remaining emissions budget of all MSCI ACWI IMI constituents) as of May 31, 2023.

Exhibit 8

41

Months left to limit warming to 1.5°C

Time remaining until listed companies deplete the emissions budget for limiting global temperature rise this century to 1.5°C above preindustrial levels

224

Months left to keep warming well below 2°C

Time remaining until listed companies deplete the emissions budget for keeping global temperature rise this century well below 2°C above preindustrial levels

Source: MSCI ESG Research, data as of May 31, 2023

Listed companies would deplete their share of the global carbon emissions budget for limiting temperature rise to 1.5°C by Oct. 31, 2026, based on their emissions as of May 31, 2023, unchanged from our estimate in the May edition of this report. While a 1.5°C-aligned pathway for listed companies remains theoretically possible, it looks increasingly unlikely that listed companies will decarbonize in time to avoid breaching that threshold.

- To limit warming to 1.5°C, listed companies would need to collectively cap future Scope 1 emissions at 39.1 gigatons of CO2e by 2050. Without any change to their current emissions of roughly 11.3 gigatons a year, listed companies would deplete their remaining emissions budget in 3 years, 5 months.
- To limit warming to 2°C, listed companies would need to collectively cap future Scope 1 emissions at 211 gigatons of CO2e by 2050. Without any change to their current emissions of 11.3 gigatons a year, listed companies would deplete their remaining emissions budget in 18 years, 8 months.

Global and listed-company Scope 1 emissions

Whether global greenhouse gas emissions are going down – and how quickly – is the measure that matters for assessing progress toward net-zero. To avoid double counting, we focus here on listed companies' direct (Scope 1) emissions (Exhibit 9).

We estimate that direct (Scope 1) emissions of the world's listed companies will represent 18.6% of global emissions this year, roughly the same as in 2022. The table below shows total Scope 1 greenhouse gas emissions (sum for all index constituents without index weighting) and total estimated global carbon emissions for companies in the MSCI ACWI IMI, as of May 31, 2023.

Exhibit 9

Historical greenhouse gas emissions [Gt C02e]	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023 (estimated)
Global greenhouse gas emissions*	51.2	51.7	51.8	51.9	53.5	55.3	59.1	55.9	59.4	60.4	60.6
MSCI ACWI IMI Scope 1**	10.9	10.4	10.2	9.6	10.2	11.4	11.4	10.4	11	11.2	11.3

Source: MSCI ESG Research. Estimation indicates the aggregate Implied Temperature Rise of companies in the MSCI ACWI IMI, as of May 31, 2023.

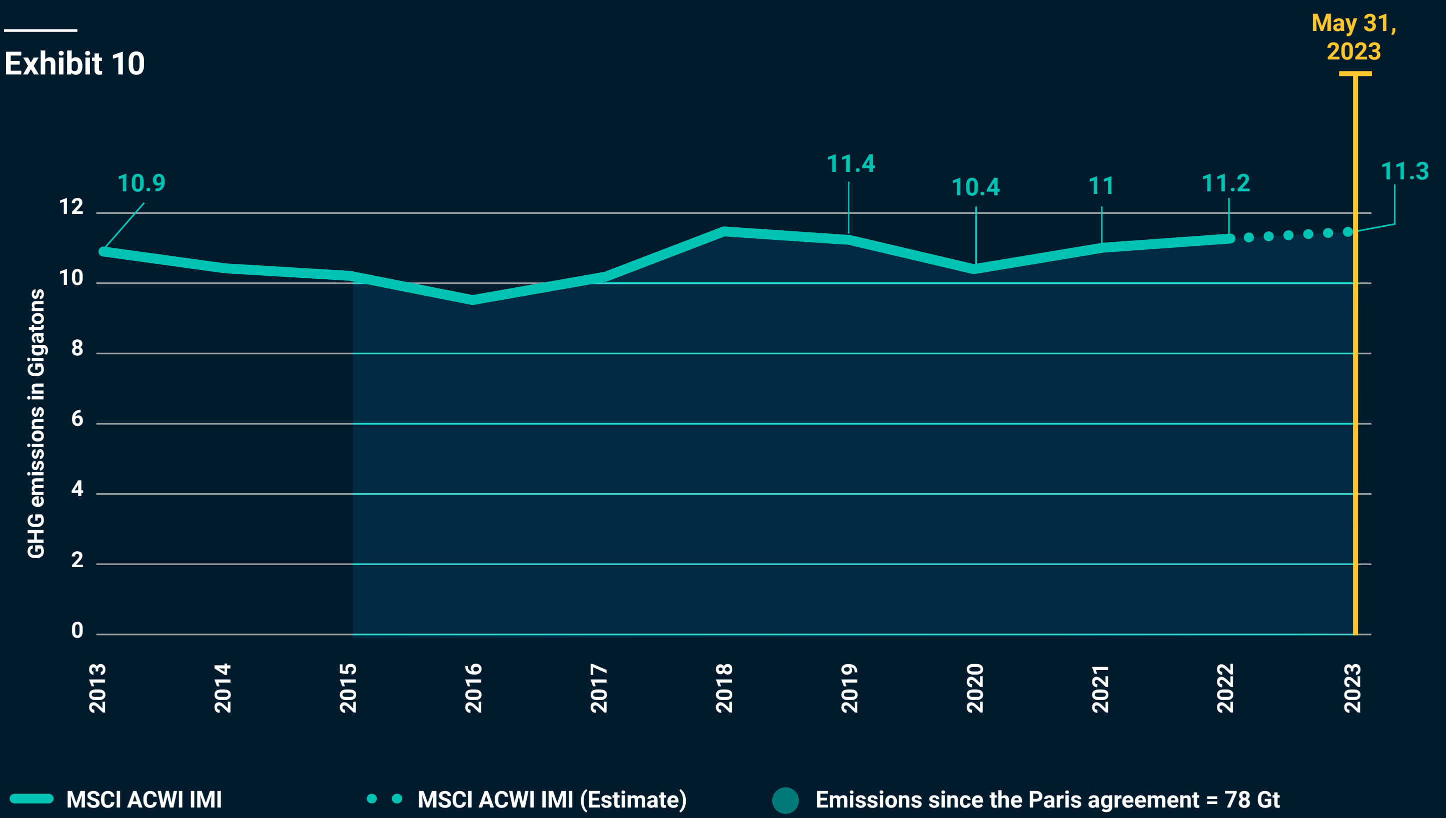
* Global emissions through the end of 2022 are based on annual UN Environment Programme reports. The estimate for 2023 reflects changes in emissions as reported by Carbon Monitor. Data reflects cumulative GHG emissions.

** MSCI ACWI IMI emissions for 2022 as reported by companies or estimated by MSCI, where not reported. Emissions for 2023 are estimated from changes in emissions as reported by Carbon Monitor.

Scope 1 greenhouse gas emissions of listed companies

Listed companies' direct carbon emissions have rebounded since the pandemic and are unlikely to decline in 2023 (Exhibit 10). Corporate emissions, however, would need to fall by nearly half this decade if society is to limit the rise in average global temperatures to 1.5°C.

Exhibit 10



Emissions reflect the addition of China to the MSCI ACWI IMI starting in 2018

Source: MSCI ESG Research, data as of May 31, 2023

Shining a light on disclosure: Leaders and laggards

There is growing momentum for companies to report their carbon footprint across all emissions scopes and categories for investors to be able assess the contribution of every company to climate change.[26] Disclosure by companies of their complete carbon footprints helps investors compare companies based on their alignment with a 1.5°C pathway, model climate-related financial risk and allocate capital accordingly with investment objectives.

The 10 listed companies with the largest carbon footprints

Ten listed companies were responsible for 5.4% of all listed-company direct (Scope 1) emissions in the 12 months that ended May 31, 2023. Exhibit 11 shows the contribution of each of those companies to the total emissions of listed companies, together with differences in their levels of transparency.

Exhibit 11

Issuer	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]	Carbon emission scope 3 reported [millions of tons of CO2e]	Reported emissions (sum) as a percentage of MSCI estimated total emissions**	Ratio of total company emissions (reported/ estimated) vs MSCI ACWI IMI total emissions****	Does the company have a self-declared net-zero target? (Y/N)
Saudi Arabian Oil Company	Saudi Arabia	2560.41	74.94	6.42	2479.05	Not Available	Estimated only***	2.3%	Y
Coal India Ltd.	India	1178.11	19.09	1.81	1157.21	Not Available	Estimated only***	1.1%	Y
Exxon Mobil Corporation	U.S.	938.01	110	7	821.01	530	69%	0.8%	Y
PetroChina Company Limited	China	873.83	121.39	38.15	714.29	Not Available	18%	0.8%	N
SAIC Motor Corporation Limited	China	731.56	1.83	3.38	726.35	Not Available	Estimated only***	0.7%	N

26 See generally, "The GHG Protocol Corporate Accounting and Reporting Standard," Greenhouse Gas Protocol.

Issuer	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]	Carbon emission scope 3 reported [millions of tons of CO2e]	Reported emissions (sum) as a percentage of MSCI estimated total emissions**	Ratio of total company emissions (reported/ estimated) vs MSCI ACWI IMI total emissions****	Does the company have a self-declared net-zero target? (Y/N)
Shell PLC*****	U.K.	719.51	91	9	619.51	1299	194%	0.6%	Y
China Shenhua Energy Company Limited	China	717.49	126.68	8.22	582.59	Not Available	19%	0.6%	N
BP PLC	U.K.	687.27	36.5	2.6	648.17	303.6	50%	0.6%	Y
Rio Tinto PLC	Australia	673.7	22.7	8.4	642.6	553.5	87%	0.6%	Y
BHP Group Limited	Australia	661.81	9.2	3.1	649.51	328.5	51%	0.6%	Y

MSCI ESG Research, data as of May 31, 2023

* 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.

*** Comparison between reported and estimated emissions does not apply because the company reports only some of its Scope 1 emissions. Hence, MSCI uses estimates alone to calculate the company's total carbon emissions.

**** Because companies share their value chain with multiple other companies, double counting is unavoidable when estimating Scopes 2 and 3 emissions. The comparison here, on average, cancels this double counting by comparing each listed company's share of total emissions with MSCI ACWI IMI total emissions.

***** Because Shell reports Scope 3 emissions from the sale of products that it produces, including oil, natural gas, liquefied natural gas, gas-to-liquids and biofuels, and the emissions of products it sells on behalf of third parties, the company's reported emissions exceed by nearly two times MSCI's estimate, which calculates the company's Scope 3 emissions based on products the company itself produces. See, "Greenhouse Gas Emissions," at shell.com.

Listed companies with **improved emissions reporting**

Exhibit 12 below shows 10 of the nearly 80 companies in the MSCI ACWI IMI Index that reported additional scopes or categories of greenhouse gas emissions in the 12 months that ended May 31, 2023, and that are now reporting substantially all their emissions across all scopes.[27] Note that reported emissions can exceed estimated emissions in instances where estimates do not capture emissions from specialized business segments or companies report sales of products on behalf of third parties.

Exhibit 12

Issuer	Country	Total estimated emissions [million tons of CO2e]	Total reported emissions [million tons of CO2e]	Total reported emissions as a percentage of MSCI-estimated total emissions*
Rio Tinto PLC	U.K.	584.6	581.07	101%
Toyota Motor Corporation	Japan	421.6	432.07	98%
Fortescue Metals Group Ltd.	Australia	257.28	254.69	101%
Occidental Petroleum Corporation	U.S	217.09	213.3	102%
Holcim AG	Switzerland	156	156.91	99%
Samsung Electronics Co., Ltd.	South Korea	143.4	144.32	99%
Mercedes-Benz Group AG	Germany	124.31	124.75	100%
The Southern Company	U.S	117.49	121.84	96%
Dow Inc.	U.S	109.86	115.27	95%
HeidelbergCement AG	Germany	94.55	96.81	98%

Source: MSCI ESG Research, data as of May 31, 2023

* MSCI ESG Research estimates 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 companies that do not report this Scope 1 or 2 carbon emissions, MSCI ESG Research estimates each scope separately based on either the company's previously reported emissions or, if none, the carbon emissions intensity of the company's production or industry segment. For more information, please see: "MSCI Climate Change Metrics Methodology and Definitions" and "Scope 3 Carbon Emissions Estimation Methodology," MSCI ESG Research.

27 Clients can view the complete list in MSCI ONE.

The largest emitters that have not disclosed their greenhouse gas emissions

Exhibit 13 below shows the 10 largest emitters based on MSCI ESG Research estimates of emissions (across all emissions scopes) that had not reported greenhouse gas emissions, as of May 31, 2023.

Exhibit 13

Issuer	Country	Emissions reference year	GICS® sector	Total estimated emissions [million tons CO2e]
Shaanxi Coal Industry Company Limited	China	2021	Energy	260.2
Berkshire Hathaway Inc.*	U.S.	2021	Financials	164.0
China State Construction Engineering Corporation Limited	China	2021	Industrials	139.0
Shanxi Coking Coal Energy Group Co., Ltd.	China	2021	Energy	36.1
Pbf Energy Inc.	U.S.	2020	Energy	96.1
Shanxi Lu'an Environmental Energy Dev. Co., Ltd.	China	2021	Energy	104.1
China Aviation Oil (Singapore) Corporation Ltd.	China	2021	Energy	49.0
Dongfang Electric Corporation Limited	China	2021	Industrials	56.4
Huayu Automotive Systems Company Limited	China	2021	Cons. Discretionary	56.8
MasTec, Inc.	U.S.	2021	Industrials	34.2

Source: MSCI ESG Research, data as of May 31, 2023

* Berkshire Hathaway Inc., a holding company, has not reported carbon emissions as of December 31, 2022. At least three of its subsidiaries — Berkshire Hathaway Energy, MidAmerican Energy Company, and Burlington Northern Santa Fe (BNSF) — have reported emissions separately. The holding cmopany, however, has not reported its financed emissoins in the aggregate. Shanxi Lu'an Environmental Energy Dev. Co. has said it plans to disclose greenhouse gas emissions but has not said when those disclosures might be. MasTec, Inc. has indicated that certain of its operations have implemented processes and procedures to collect and report information on greenhouse gas emissoins to CDP. The information, however, is not yet pubicly available for assessment.

Listed companies with the most comprehensive emissions-reduction targets

Not all decarbonization targets are fit for the purpose. Corporates with the most ambitious and comprehensive climate commitments aim to achieve net-zero emissions across their entire carbon footprint, yet some companies start with carbon-reduction targets that address only a fraction of net-zero emissions targets.

Exhibit 14 below shows 10 of the nearly 350 companies in the MSCI ACWI IMI that have published the most-thorough corporate decarbonization targets in the 12 months that ended May 31, 2023.[28] MSCI ESG Research assesses the thoroughness of decarbonization targets according to three criteria: comprehensiveness (the table below comprises targets that address a company's total emissions), the change in emissions (% of tons of CO2e) targeted each year and the Implied Temperature Rise that would result.[29]

Exhibit 14

Issuer	Country	Carbon emissions (most recent available year)*	Total carbon emission by issuer (estimated)**	Total carbon emission by issuer (reported)	Target summary annual change (annualized target)***	Comprehensiveness ****	Implied Temperature Rise (°C)
TotalEnergies SE	France	2021	547.15	405	-3.45%	100.00%	1.8
ENI S.P.A.	Italy	2021	294.71	237.39	-3.45%	100.00%	1.5
ENGIE SA	France	2021	336.78	166.36	-3.45%	100.00%	1.6
Hitachi, Ltd.	Japan	2021	93.81	137.67	-3.45%	100.00%	1.8
Tecnicas Reunidas S.A.	Spain	2021	5.01	123.48	-5.26%	100.00%	1.5

28 Clients can view the complete list in MSCI ONE.

29 MSCI ESG Research measures comprehensiveness as the percentage of Scopes 1, 2 and 3 emissions covered by the company's targets. MSCI ESG Research standardizes companies' projected emissions to show them as the amount to be reduced annually.

Issuer	Country	Carbon emissions (most recent available year)*	Total carbon emission by issuer (estimated)**	Total carbon emission by issuer (reported)	Target summary annual change (annualized target)***	Comprehensiveness ****	Implied Temperature Rise (°C)
Dow Inc.	U.S.	2021	115.27	109.86	-3.45%	100.00%	1.7
E.ON SE	Germany	2021	160.5	107.99	-7.20%	100.00%	1.8
Hyundai Motor Company	South Korea	2021	175.68	104.17	-3.45%	100.00%	1.8
Panasonic Holdings Corporation	Japan	2021	36.18	100.11	-3.33%	100.00%	1.3
Unilever PLC	U.K.	2021	35.42	61.72	-5.26%	100.00%	1.4

Source: MSCI ESG Research, data as of May 31, 2023

* Carbon emissions (most recent available year) shows the latest year for which the company has reported its emissions and may differ from the date of the company's latest climate target.

** Total carbon emissions (estimated) shows the sum of the company's reported Scopes 1 and 2 emissions, if reported, together with MSCI ESG Research's estimate of the company's Scope 3 emissions. See note on page 16 above.

*** Targeted change in emissions shows the projected normalized annual change in absolute emissions across all emissions scopes (Scope 1 and 2 reported, Scope 3 estimated).

****Comprehensiveness of target (%) refers to the percentage of a company's emissions (Scopes 1 and 2 reported, Scope 3 estimated) covered by its latest climate target.

Conclusion

While the number of listed companies committing to climate action continues to grow, net-zero pledges only matter if they translate to real reductions in global emissions this decade. A low-carbon transition on track to limit warming to 1.5°C would require emissions to peak within two years and fall by nearly half by 2030. Listed companies, however, continue to burn through their share of the remaining carbon budget for constraining warming to 1.5°C at a rate incompatible with achieving that goal.

Owners and managers of assets, financial institutions and intermediaries can play a unique leadership role in driving the climate transition by channeling capital into transition technologies through industries and companies that are decarbonizing the world. The magnitude of the shift to clean energy from fossil fuels also demands an extraordinary level of cooperation and collaboration across capital markets, governments, industry and citizens. It’s a formidable task, but the window for action is rapidly closing.

Glossary

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

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 of CO2e a company emits to generate every USD 1 million of revenue.

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

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

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 measure that estimates the increase in average temperatures this century that would occur if the economy were to overshoot or undershoot the global carbon budget by the same amount as the company in question.

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

MSCI ACWI Investable Market Index (MSCI ACWI IMI): Captures large-, mid- and small-cap listed companies across 23 developed markets and 27 emerging market countries. With 9,181 constituents, the index covers approximately 99% of the global equity investment opportunity set, as of May 31, 2023.

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

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: Listed companies' direct greenhouse gas emissions in tons of CO2e.

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

Scope 3 emissions: Listed 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.

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