

Welcome to MSCI's ESG and Climate Trends to Watch for 2023.

We're heading into the new year against a backdrop of a major war in Europe, inflation, cost-of-living crises, energy markets in turmoil, rising interest rates, pandemic fatigue, political uncertainty and what feels like an unending stream of climate-induced disasters.

At the same time, ESG itself is being put under the spotlight. Regulators around the world are upping the ante on everything from greenwashed fund names to stricter climate target disclosures, while the very idea of ESG investing is increasingly politicized.

Which is to say: There's a lot going on around the world. And it is shaping both the investment environment and the challenges and opportunities facing companies.

Now, if you're a longtime fan of our annual ESG trends research, you'll notice things look a little different this time. The large-scale trends shaping the ESG-investing world are well-known at this point: climate change risk and the road to net-zero, the growing existential threat of biodiversity loss, social inequalities, regulation and, lately, debate and controversy over what exactly ESG *should* be.

So this year, we've gone back to basics and asked the experts on our research team: With everything that is happening around us, what specifically will you be watching in 2023, and why?

The following pages contain a selection of the answers to that question. Not surprisingly, many touch on **climate change** across a variety of angles: from carbon credit funds to insured emissions, and from scrutiny of net-zero targets to decarbonizing industrial real estate.

Regulation is now top of mind not just in the EU, but increasingly in the U.S. and APAC markets: from requirements for financial institutions to conduct climate stress tests, to deforestation-free market-access rules, to investors getting ahead of potentially mandatory requirements to report on the SFDR's Principle Adverse Impact indicators.

Our team also has their eyes on **supply chain issues**, including the prospects for lab-grown commodities, tracking goods through blockchain technology and the mining of e-waste to reshape the dynamics of controversial raw material sourcing.

And to round it off, we've got a host of issues affecting **everyday lives** in what seem to be increasingly difficult times: striking rail workers (we're looking at you, U.K.), poor air quality, new ground rules for internet companies and more.

We hope you'll dive in, make yourself at home and come away with some fresh, and in-depth, perspectives. What will you be watching in 2023?



Meggin Thwing Eastman

Global ESG Editorial Director, ESG Research Director, EMEA
London

Contents



Climate



Governance



Workforce



Investment



Regulation







Biodiversity









Supply chain





Changing governance

-  1. Market conditions could test investors' commitment to say-on-climate voting 5
-  2. Will climate-focused boards help improve emissions trajectories? 7
-  3. As Asian companies add female directors, human capital could benefit 9
-  4. As boards age, what's the trade-off between experience and youth? 11





Responses to regulation

-  5. Regulators turn their gaze to ESG funds 13
-  6. Climate target disclosure standards: Regulatory inconsistencies remain 15
-  7. Will banks be ready for climate stress test regulations? 17
-  8. ESG ratings may fill in some blanks for Principal Adverse Impact indicators 19
-  9. Cutting deforestation: Market restrictions get real 21
-  10. Beyond GDPR: New regulations could alter the global digital landscape 23

Innovations in the supply chain

-  11. Cotton's crunch point and the future of fiber 25
-  12. Mining old electronics to fuel new energy tech 27
-  13. GMO regulatory resistance may be softening 29
-  14. Can blockchain help supply chains move away from controversy? 31

Work life

-  15. I'll be working on the railroad – Not? 33
-  16. Choking on smoke: human capital risks from air pollution 35
-  17. News shifts from pandemic to climate change, but labor hangs on 37
-  18. Bargaining with labor: Managing worker shortages in hard times 39



Climate



Governance



Workforce



Investment



Regulation



Biodiversity



Supply chain

Turning points

- 19. Is the honeymoon over for green bonds? 41
- 20. Sovereign policy dilemma: Energy security vs. the clean-energy transition 43
- 21. Energy crisis, Ukraine war driving fossil fuel agenda, but don't rule out renewables 45
- 22. Nuclear energy contemplates a comeback 47
- 23. Patent activity suggests energy firms still dig fossil fuels 49

New frontiers in measurement and transparency

- 24. Pulling back the veil on banks' loan emissions 51
- 25. Insurance emissions: the actuarial revolution has begun 53
- 26. Emissions attribution could help keep portfolios aligned with net-zero 55
- 27. Net-zero: Companies are aiming high, but are their strategies practical? 57

New investments

- 28. Lab-grown commodities: the new frontier? 59
- 29. Turning steel green(er) with blast furnace upgrades 61
- 30. Greening industrial real estate one warehouse at a time 63
- 31. New risks and opportunities in climate adaptation 65
- 32. Investing in emissions: carbon as a new asset class? 67

This document is research for informational purposes only and is intended for institutional professionals with the analytical resources and tools necessary to interpret any performance information. Nothing herein is intended to promote or recommend any product, tool or service.

For all references to laws, rules or regulations, please note that the information is provided "as is" and does not constitute legal advice or any binding interpretation. Any approach to comply with regulatory or policy initiatives should be discussed with your own legal counsel and/or the relevant competent authority, as needed.



Climate



Governance

TABLE OF CONTENTS



Florian Sommer
London



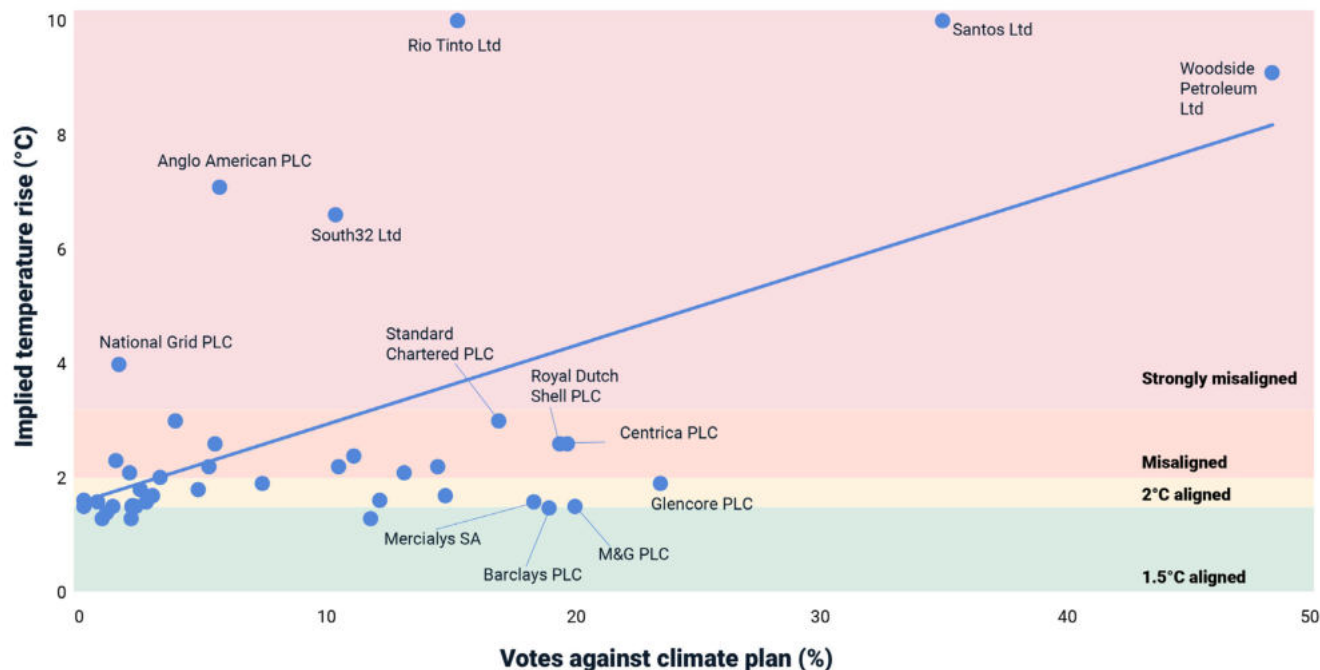
David Muirhead
London

Market conditions could test investors' commitment to say-on-climate voting

More investors voted against corporate climate strategies in the 2022 proxy season compared to 2021, according to our analysis below. We found that investors tended to vote against climate plans in 2022 where the company's emissions trajectory was misaligned with global temperature targets, as measured by MSCI Implied Temperature Rise (ITR).¹ Recent turmoil in energy markets and a focus on energy security may change some investors' voting behavior.² **In 2023, we will be watching whether investor opposition to corporate climate strategies will continue to increase, or whether more investors will give companies the benefit of the doubt on their climate plans in challenging market conditions.**

We identified 53 constituents of the MSCI ACWI Investable Market Index (IMI) that held management-sponsored votes on their climate plan in the last two years.³ Investors approved all these corporate climate strategies, mostly by large majorities. However, the average proportion of votes against went from 3.1% in 2021 to 9.6% in 2022, indicating increasing uneasiness among some investors. Our analysis of the limited number of votes in 2022 (43 companies) suggests that many dissenting investors may have opposed corporate climate strategies that they felt were not ambitious enough. With more say-on-climate votes scheduled for 2023, we will be watching whether or not this dynamic will hold.

Companies' emissions trajectories and 2022 say-on-climate vote results



Analysis covers all 43 constituents of the MSCI ACWI IMI that held management-sponsored say-on-climate votes in 2022 to date. The percentage of votes against accounts for votes in favor and votes withheld/abstained. Data as of Nov. 9, 2022. Source: MSCI ESG Research and company disclosures

- 1 MSCI Implied Temperature Rise is designed to show the temperature alignment of companies, portfolios and funds with global climate targets. It compares a company's current and projected greenhouse-gas emissions across all emission scopes with its share of the remaining global carbon budget for keeping global warming well below 2°C. It converts a company's "undershoot" or "overshoot" of its carbon budget to an implied rise in average global temperatures this century, expressed in degrees Celsius.
- 2 Masters, Brooke. "Shareholders back away from green petitions in US proxy voting season." *Financial Times*, July 1, 2022.
- 3 Votes in either 2021 or 2022, data as of Nov. 9, 2022.



Climate



Governance

TABLE OF CONTENTS



Florian Sommer
London



David Muirhead
London

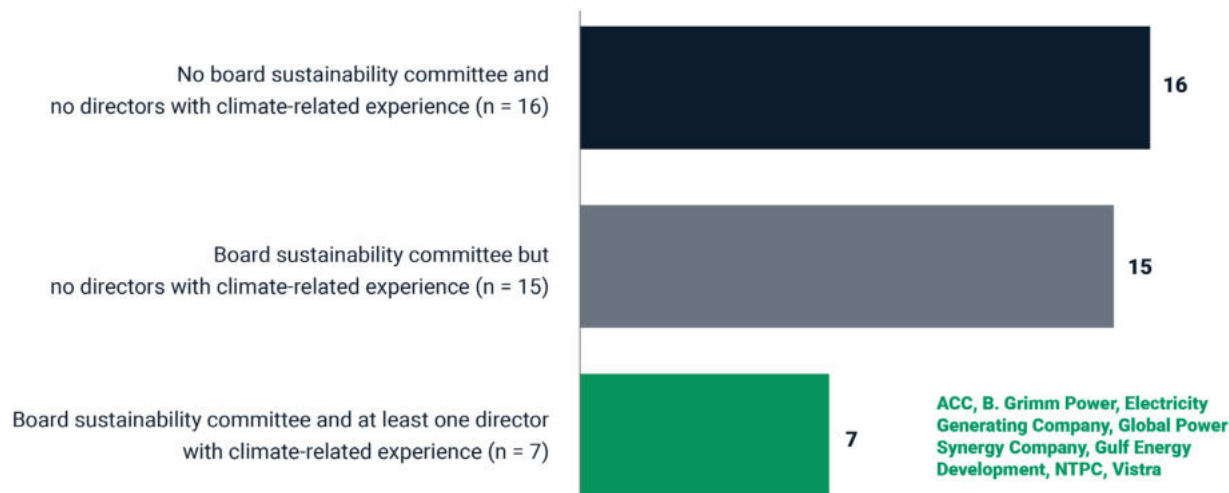
Will climate-focused boards help improve emissions trajectories?

Investors are increasingly showing themselves willing to challenge board directors on their companies’ climate performance, including scrutinizing climate risk management disclosures or emissions-reduction plans in some markets.⁴ **In 2023, we will be watching whether climate-focused boards help emissions-intensive companies stand up to that scrutiny.**

A recent study found that U.K.-listed companies with better governance practices tended to achieve higher carbon-emissions reduction compared to historic levels and to industry peers.⁵ If this holds more widely, boards that spend significant time on environmental or sustainability issues and include directors with climate experience could help firms address climate transition risk and reduce real-world emissions. Specifically, dedicated environmental or sustainability committees may focus director attention on climate-related issues. Boards that include climate-savvy directors may be better able to build support for emissions targets, compared to those that do not. These factors could help companies respond to questions from investors about their approach to climate change.

To explore these issues, we looked at board practices at a group of climate laggards: 38 constituents of the MSCI ACWI Index in emissions-intensive industries that were strongly misaligned with global temperature targets as of November 2022, as measured by MSCI Implied Temperature Rise (ITR).⁶ In the exhibit below, the seven companies highlighted in green had a board sustainability committee and at least one director with climate-related experience, based on our analysis.⁷ Their future emissions trajectories may answer whether climate-focused boards can help companies align with global temperature targets.

Climate board practices at select emissions-intensive companies



Analysis covers 38 constituents of the MSCI ACWI Index with an ITR above 3.2°C. Under the Global Industry Classification Standard (GICS®), these companies were classified in these sub-industries: independent power producers and energy traders, electric utilities and construction materials. These three sub-industries were the most emissions-intensive GICS sub-industries, based on our data for fiscal year 2020. GICS is the global industry classification standard jointly developed by MSCI and S&P Global Market Intelligence. Source: MSCI ESG Research and company disclosures (as of November 2022)

4 Verney, Paul. "Resolution round-up: Investors to target directors at climate laggards, ISS poll suggests." *Responsible Investor*, Oct. 18, 2022.

5 Luo, Le, and Tang, Qingliang. 2021. "Corporate governance and carbon performance: role of carbon strategy and awareness of climate risk." *Accounting & Finance* 61: 2891-2934.

6 Please see the note below the accompanying chart for more details about these companies. ITR is designed to show the temperature alignment of companies, portfolios and funds with global climate targets. It compares a company's current and projected greenhouse gas emissions across all emission scopes with its share of the remaining global carbon budget for keeping global warming well below 2°C. It converts a company's "undershoot" or "overshoot" of its carbon budget to an implied rise in average global temperatures this century, expressed in degrees Celsius.

7 We identified environmental or sustainability committees based on official board committee names. Our evaluation of climate-related director experience is based on a review of disclosed director biographies.



Governance



Workforce

TABLE OF CONTENTS

**SK Kim**
Seoul**Moeko Porter**
Tokyo

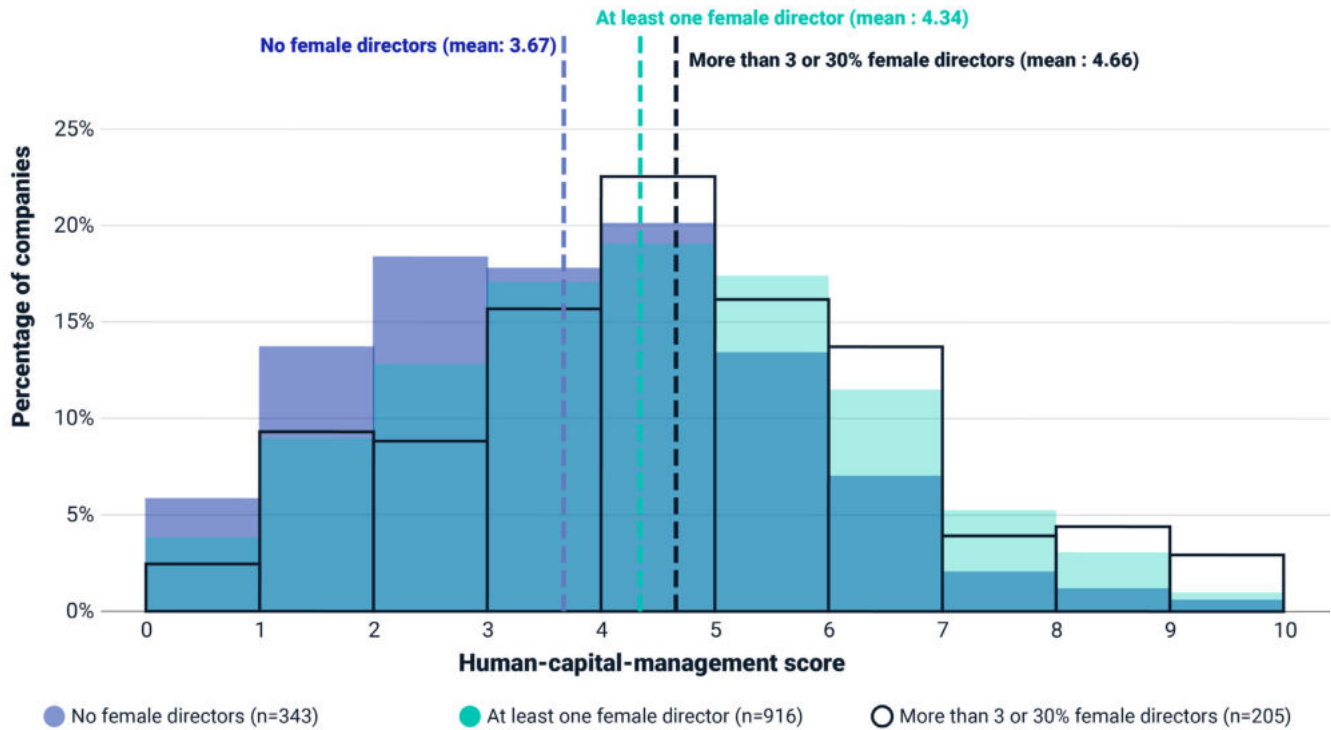
As Asian companies add female directors, human capital could benefit

When analyzing companies and their board composition, we have previously observed a correlation between the presence of [female directors and strong talent-management practices](#), as well as higher growth in employee productivity. **In 2023, we'll be watching whether the APAC region's regulatory efforts to increase the presence of women on boards also manifests in improvement of companies' human capital management.**

Malaysia introduced a 30%-female-director recommendation in its corporate governance code in 2017, and India strengthened gender-diversity requirements in 2020 to include an independent female director at the top 1,000 companies based on market cap.⁸ While India had previously mandated the appointment of one female director, there was criticism that companies were meeting the requirement with female relatives of controlling shareholders and senior managers.⁹ Generally, independent directors should help enhance management oversight and protect the interests of non-majority shareholders, while the requirement for an independent female director could also help improve talent-management practices. Most recently, large Korean companies scrambled to appoint at least one female director ahead of a new board-diversity regulation that came into effect in August 2022.¹⁰ Given the prevalence of controlled companies and family firms¹¹ in APAC,¹² many new female directors will likely come from connected interests, but we would also expect the number of independent female directors to increase.

Will regulatory efforts have the desired effect? While not necessarily evidence of causality, the exhibit below shows that, on average, companies with at least one female director had higher human-capital-management performance than those without any female directors (4.3 vs. 3.7 on a 0-10 scale).¹³ The difference was even greater at companies that had at least three female directors or 30% [women on the board, a potential "tipping point."](#) We will be watching whether this relationship holds as regulatory pressure intensifies, and whether other markets will follow India's example to incorporate aspects of independence in the push to increase board diversity.

Human-capital management at companies with female directors



Among the constituents of the MSCI Emerging Markets Investable Market Index (IMI), we selected APAC companies with labor management or human capital development as a weighted key issue in the MSCI ESG Ratings model: China (n=529), India (n=139), Indonesia (n=29), South Korea (n=328), Malaysia (n=65), Philippines (n=21), Taiwan (n=103) and Thailand (n=45). The MSCI Emerging Markets IMI (n=3,064) captures large-, mid- and small-cap representation across 24 emerging markets. Data reflects the distribution of management scores under our human-capital-development key issue for companies with varying levels of female-director representation. Data as of Oct. 25, 2022. Source: MSCI ESG Research

- 8 “Malaysian Code on Corporate Governance (As at 28 April 2021).” Securities Commission Malaysia, April 28, 2021.
“Securities and Exchange Board of India (Listing Obligations and Disclosure Requirement) Regulations, 2015.” Securities and Exchange Board of India, July 25, 2022.
- 9 Singh, Gagandeep. 2020. “Corporate Governance: An Insight into the Imposition and Implementation of Gender Diversity on Indian Boards.” *Indian Journal of Corporate Governance* 13: 99–110.
- 10 Korean companies listed in the KOSPI index, with total assets greater than KRW 2 trillion are required to appoint at least one female director as of August 2022.
- 11 MSCI ESG Research considers a company where the largest shareholder or shareholder group holds 30% or more of the voting rights a controlled company, and considers a company a family firm when the family holds 10% or more of the voting rights and at least one seat on the board of directors.
- 12 Porter, Moeko. “Keeping it in the Family.” MSCI Research Insight, Sept. 17, 2022. (Client access only.)
- 13 Human-capital-management performance refers to average key issue score for the labor-management and human-capital-development key issues under the MSCI ESG Ratings methodology.



Governance

TABLE OF CONTENTS

**Harlan Tufford**
Toronto**Tanya Matanda**
Toronto

As boards age, what's the trade-off between experience and youth?

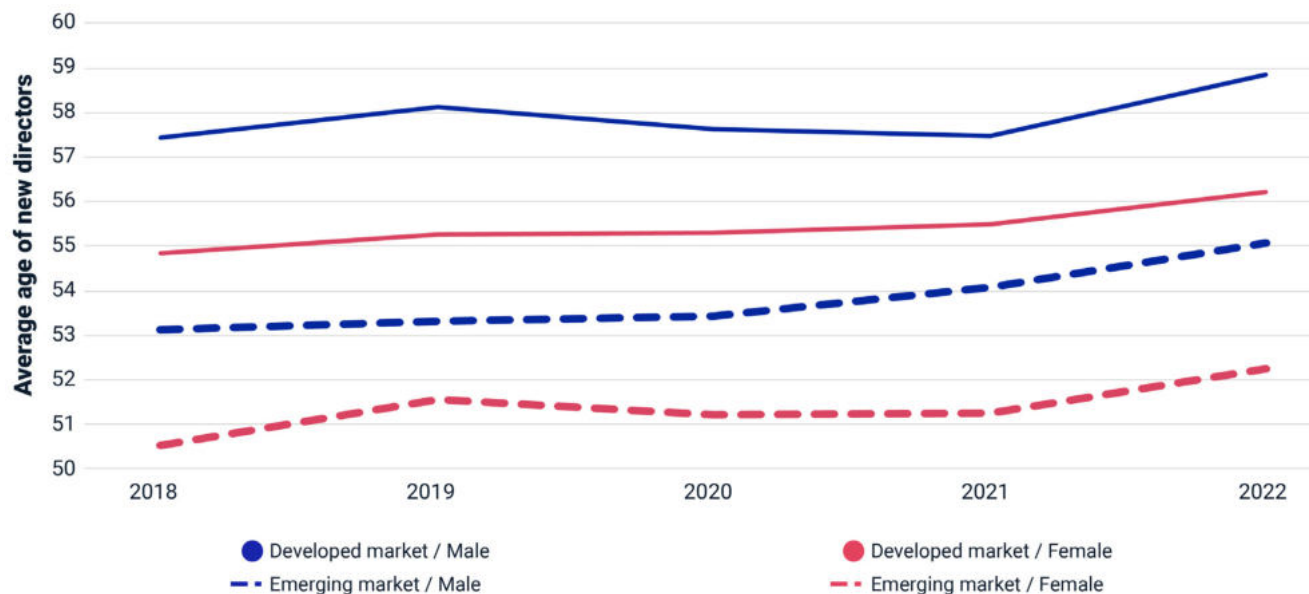
The average age of newly appointed directors is on track to hit a record high next year, with first-time male directors in developed markets approaching 60. But women and emerging-market directors are younger. **Amid ongoing global demographic shifts, in 2023 we'll be watching how nomination committees consider the potentially significant implications of age for director skill sets, as well as for board continuity and diversity.**

The average age of new directors for constituents of the MSCI ACWI Index has risen from 54.8 years in 2018 to 56.3 years in 2022. Globally, significant age gaps exist between male and female directors and between those who serve on the boards of companies in developed and emerging markets.¹⁴ When combined, these trends are amplified.

This may mean companies in emerging markets have an edge when harnessing new technologies and pursuing business innovation: Younger directors may enhance a board's generational diversity and help companies chart a path forward in an increasingly complex and technology-dependent business environment. However, boards and their nomination committees will require strong onboarding programs to maximize the contributions of younger directors who are likely to bring fewer years of professional experience and who may be less familiar with the nuances of board work.¹⁵ Additionally, nomination committees may need to monitor how new directors affect board-age diversity to ensure an appropriate balance. Boards seeking younger talent may also be forced to consider these directors' other commitments: They are more likely to be full-time employees at other companies, which could limit their capacity for board work.¹⁶

Meanwhile, nomination committees for developed-market boards with an abundance of older men may need to take a fresh look at their approach to director recruiting and consider diversifying their director-age demographics to bring wider perspectives to board discussions.

Average age of new directors by market and gender



Constituents of MSCI ACWI Index, as of Oct. 18, 2022. MSCI ACWI Index constituents (n=2,625), developed-market constituents (n=1,397) and emerging-market constituents (n=1,228). Includes directors who joined a board in the 12 months prior to Oct. 18 in each year. Source: MSCI ESG Research

14 Market classifications are based on the MSCI Market Classification Framework, July 2022.

15 “Directors’ Responsibilities in Canada.” Osler, Hoskin & Harcourt LLP and the Institute of Corporate Directors, Oct. 1, 2014.

16 “Episode 58: How do we get more young people serving in the boardroom.” Future Directors Podcast, March 1, 2021.



Regulation



Investment

TABLE OF CONTENTS



Sita Subramanian
 New York



Rumi Mahmood
 London

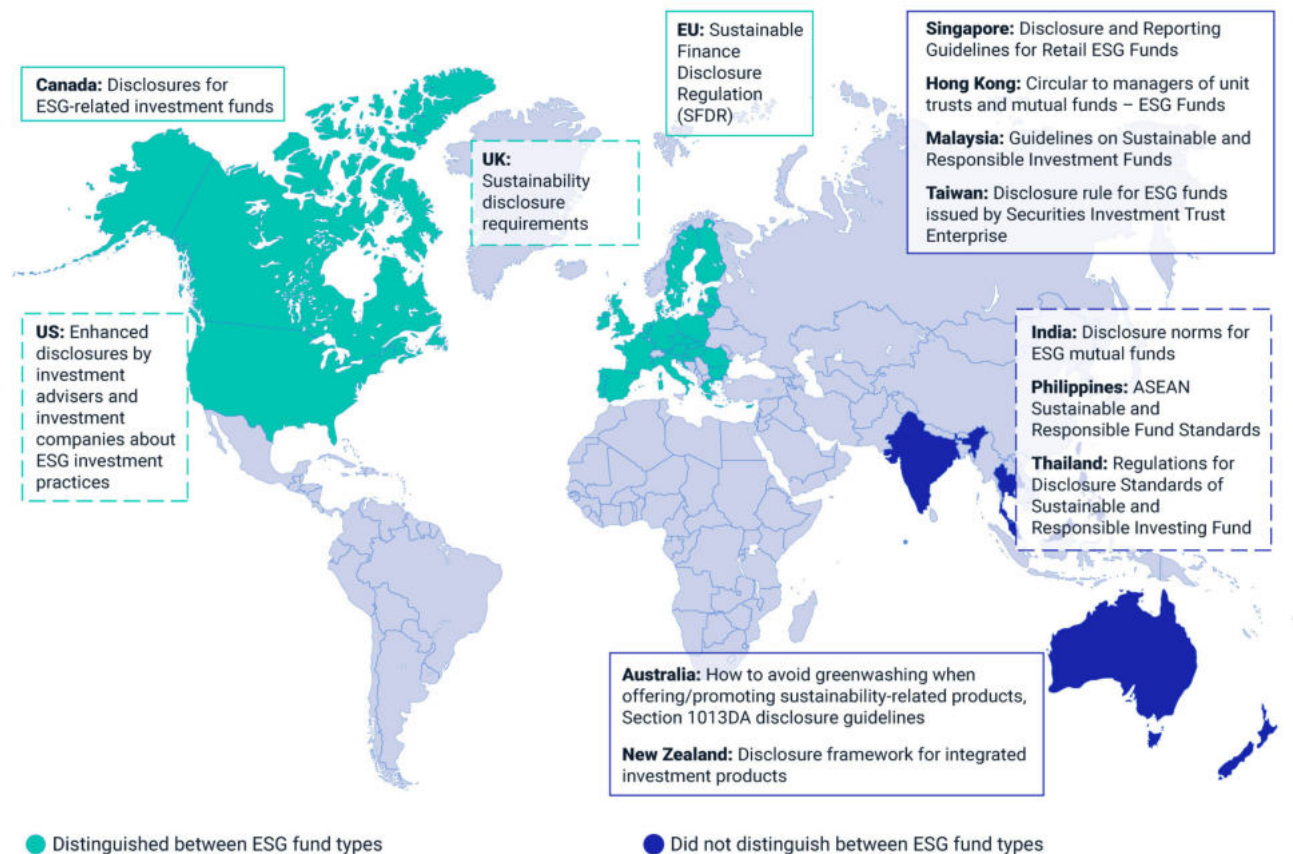
Regulators turn their gaze to ESG funds

For much of the past decade, ESG-oriented funds have operated with limited regulatory guidance.¹⁷ But that looks to be rapidly changing. Regulatory interest in fund names and funds’ classification and disclosure obligations are ramping up globally. Spearheaded by the EU’s Sustainable Finance Disclosure Regulation (SFDR) , which imposes requirements on more transparent reporting for ESG funds, other major market regulators are following suit. **In 2023, we’ll be watching for changes in ESG fund names and labels as unfolding disclosure regimes hold managers to stricter account.**

Australia, Hong Kong and Singapore, for example, have provided guidance to standardize disclosures on the integration of ESG factors in the investment-selection process. Regulators in the EU and Canada have gone further by seeking to classify sustainable funds, with more extensive ESG integration requiring more disclosure. The U.S. has taken tentative steps with a similar but not directly comparable proposal, a significant move for the world’s largest fund market (representing over 60% of global fund investments). If these collective proposals take effect, they could see USD 3.6 trillion of sustainable investments (8% of global fund assets) subject to oversight.

For investors, this could mean better-informed decisions. But it could also lead to the emergence of a multitude of disconnected regional standards for ESG-fund classifications, a challenge for investors in pursuit of a common ESG objective across jurisdictions.

Jurisdictions with active and proposed regulations or guidelines for ESG funds



Solid text boxes represent regulations in force, while dashed boxes represent proposed or planned regulations. List of jurisdictions with regulations or guidelines proposed or in force for ESG funds: U.S. (proposed); Canada; EU; U.K. (planned); Singapore; India (proposed); Hong Kong; Australia (including Section 1013DA); Malaysia; New Zealand; Philippines (proposed); Thailand (proposed); Taiwan. Data as of Oct. 12, 2022. Source: MSCI ESG Research

17 ESG funds are defined as any fund that employs any ESG considerations in its security-selection process (values and screening/ranking/exclusions/integration/optimization, etc., and their combinations). In simplest terms, it is the widest possible net under which any and all funds employing any ESG considerations in security selection are captured. All fund characterizations based on data from Broadridge and MSCI ESG Research, as of July 2022.



Climate



Regulation

TABLE OF CONTENTS

**Zohir Uddin**
London**Emma Zhe Wu**
Shanghai

Climate target disclosure standards: Regulatory inconsistencies remain

Investors need comparable, consistent and meaningful information to make decisions. A 2022 survey by the Task Force on Climate-related Financial Disclosures (TCFD) identified consistent reporting of climate targets as one of the biggest areas for companies to improve.¹⁸ Yet, despite the efforts to create common reporting standards across jurisdictions, differences persist. Regulatory misalignment on climate targets could mean critical data gaps remain, leading to continued difficulty in assessing and comparing corporate pledges. **In 2023, we will be watching to see how climate target disclosure frameworks move toward implementation: with further convergence and consistency or added fragmentation?**

In 2022, we saw the proposed drafts of the “big three” climate disclosure standards from the International Sustainability Standards Board (ISSB), the European Financial Reporting Advisory Group (EFRAG) and the U.S. Securities and Exchange Commission (SEC).

We assessed the extent to which the big three measured up against a set of key target factors, which in our view represent the essential information needed for a comprehensive disclosure of a company’s climate targets. This includes data points we assess as part of the MSCI Climate Target Scorecard, which collects information on companies’ targets and converts it into a standardized framework to allow for better comparison.

In our assessment, we found:

- The European Sustainability Reporting Standards (ESRS), proposed by the EFRAG, are the most detailed, asking companies to report fully on 11 of the 12 areas we assessed.
- All three frameworks require the disclosure of basic target information such as target year and type (i.e., absolute or intensity-based). However, neither the ISSB nor the SEC ask companies to fully report on more detailed measures such as whether or not their targets align with science-based criteria.
- Only one of the three standards asks companies to specify the coverage of emissions subject to the target (coverage ratio of scope).
- When it comes to expressing the percentage change from the baseline, the regulations leave space for companies to not disclose.

While some advances have been made toward more consistent and more comparable climate disclosure standards, this clearly remains a work in progress.

Gaps in alignment between the proposed 'big three' disclosure frameworks on climate targets



Data as of November 2022. Source: MSCI ESG Research



Climate



Regulation

TABLE OF CONTENTS



Simone Ruiz-Vergote
Frankfurt



Sita Subramanian
New York



Anqi Liang
Frankfurt

Will banks be ready for climate stress test regulations?

An increasing number of authorities across the world are requiring financial institutions to conduct climate-risk stress tests, with more likely to follow. Yet our analysis of banks across jurisdictions with existing or planned requirements for climate stress tests found that, while some banks were better placed than others, none could claim to be fully prepared (see exhibit below). **In 2023, we'll be watching which banks can rise to the challenge of developing climate-risk data and modeling capacities to meet the demands of regulatory climate stress tests.**

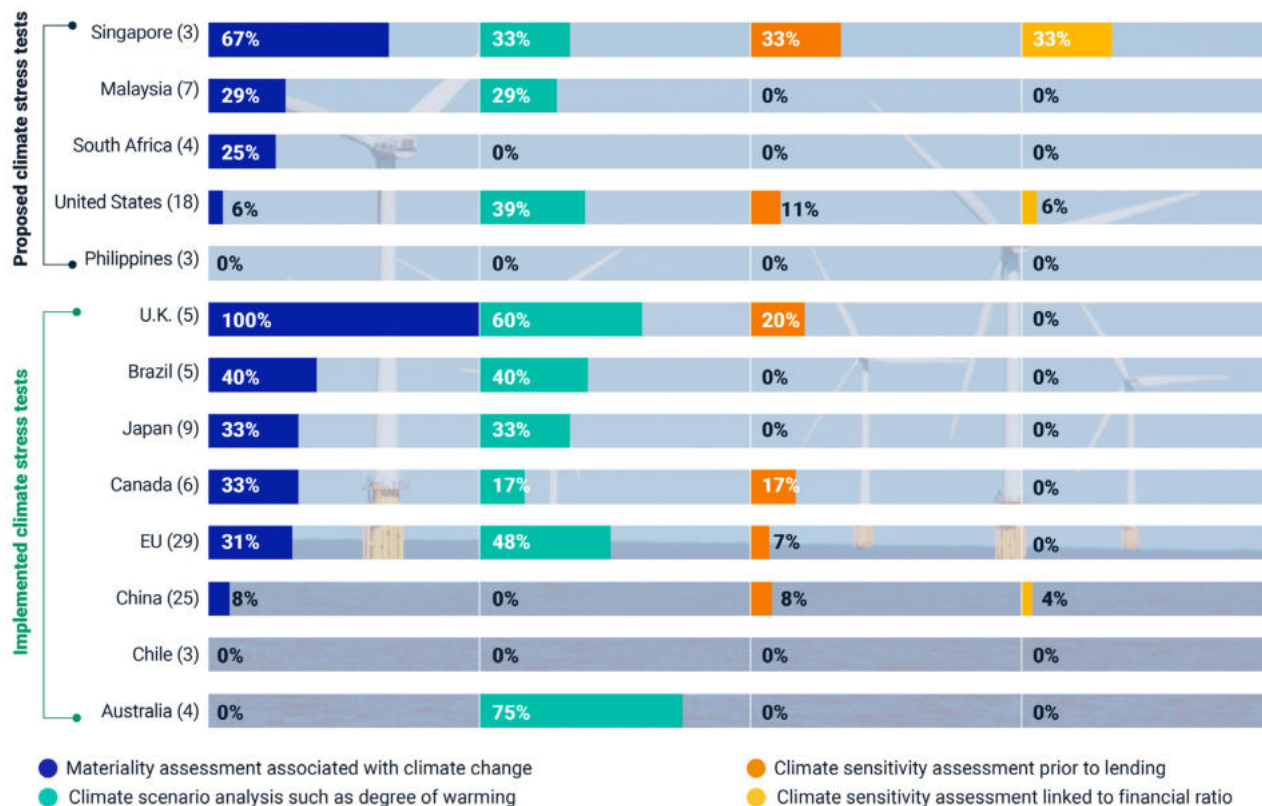
Understanding the exposure of a bank's balance sheet to climate-related risks has become increasingly important – and not just for the 117 signatories to the Net Zero Banking Alliance, with a combined USD 70 trillion in assets, that are working to transition their lending and investment portfolios to net-zero. In at least 18 jurisdictions, banks already are or soon will be subject to regulatory climate stress tests.¹⁹

Recent climate stress tests conducted by the European Central Bank (ECB), Bank of England, Hong Kong Monetary Authority and Bank of Canada found that:²⁰

1. Sector-level climate-risk credit-modeling capabilities and the allocation of income and exposures by sector/country and by emission intensity remained a major challenge, with fewer than 10% of banks assessed by the ECB using sufficient forward-looking and granular climate-risk information in risk-management practices.²¹
2. Addressing data gaps – particularly those related to Scope 3 emissions and the climate-related transition plans of customers and counterparties – will be critical for understanding the full picture of climate-risk exposure.
3. Uncertainty around the timing of the materialization of climate-related risks and the lack of historical data are hindering the development and validation of climate risk models.

With or without net-zero targets, coming regulations mean that banks need to be able to quantify the exposure of their balance sheets to climate-related risks going forward. Remediating the climate-related data and modeling shortfalls exposed by climate stress tests to date will be paramount.

Banks' performance on disclosed climate risk analysis indicators



Y-axis indicates jurisdiction (number of banks included in analysis shown in brackets). The exhibit shows the number of banks disclosed as having conducted climate-risk analysis in each of the four categories in each selected jurisdiction. The EU includes multiple member states, many of which have also announced regulatory climate stress tests. Analysis includes banking-industry constituents of the MSCI ACWI Index as of Oct. 30, 2022. The banking industry is defined according to the Global Industry Classification Standard (GICS®), which is the industry-classification standard jointly developed by MSCI and S&P Global Market Intelligence. Source: MSCI ESG Research

- 19 "Scenarios in Action. A progress report on global supervisory and central bank climate scenario exercises." Network for Greening the Financial System, Oct. 19, 2021.
"Federal Reserve Board announces that six of the nation's largest banks will participate in a pilot climate scenario analysis exercise." Federal Reserve Board, Sept. 29, 2022.
- 20 "2022 climate risk stress test." European Central Bank Banking Supervision, July 7, 2022.
"Results of the 2021 Climate Biennial Exploratory Scenario (CBES)." Bank of England, May 24, 2022.
"Pilot Banking Sector Climate Risk Stress Test." Hong Kong Monetary Authority, Dec. 30, 2021.
"Using Scenario Analysis to Assess Climate Transition Risk. Final Report of the BoC-OSFI Climate Scenario Analysis Pilot." Bank of Canada and Office of the Superintendent of Financial Institutions, Jan. 14, 2022.
- 21 "Walking the talk. Banks gearing up to manage risks from climate change and environmental degradation. Results of the 2022 thematic review on climate-related and environmental risks." European Central Bank Banking Supervision, Nov. 1, 2022.



Regulation



Investment

TABLE OF CONTENTS



Yuliya Ferenc
Frankfurt



Simone Ruiz-Vergote
Frankfurt

ESG ratings may fill in some blanks for Principal Adverse Impact indicators

In the coming year, financial-market participants subject to the EU’s Sustainable Finance Disclosure Regulation (SFDR) must begin reporting Principal Adverse Impact indicators (PAIs) – the negative environmental or social impacts – associated with their portfolio holdings, and from 2024 they will also need to report year-on-year changes. But companies themselves will not have to report PAIs until 2024. **In 2023, we will be watching how asset managers try to bridge the gap between scarce PAI data and an urgent need to monitor and manage their exposure.**

A sustainable investment, as defined by SFDR Article 2(17), should not cause significant harm under any of the mandatory PAIs. Under the revised Markets in Financial Instruments Directive (MiFID II) rules, consideration of PAIs in portfolio construction is one way to serve an investor’s sustainability preferences.²² Given data issues for some PAIs and the widespread adoption of ESG ratings in investment processes, it is possible that asset managers will leverage them to proxy the PAIs of their portfolios. While that is not the intended purpose of ESG ratings, could they prove to be a useful guide while we wait for more complete corporate disclosures?

In a case study where we increased a hypothetical portfolio’s weighted average MSCI ESG Rating by 20% through portfolio optimization, we found that most weighted average PAIs decreased, and data coverage improved.²³ It may be that companies that better managed ESG issues also tended to better manage, and disclose, a wider range of external impacts. Portfolio PAIs only scale the holdings of constituents with available data; and where data coverage is low, such PAIs are not purposeful for comparing different portfolios. Still, for asset managers looking to manage PAI exposure, ESG ratings might provide a useful starting point until more extensive corporate reporting rules come into force in the EU and elsewhere.

Using MSCI ESG Ratings as a proxy to improve PAI metrics

Principle Adverse Indicators (PAI)		PAI data coverage: % of issuers in MSCI ESG Ratings Coverage Universe	PAI improves through best-in- class portfolios	Optimized Portfolio: 20% increase of MSCI ESG Ratings	
				% change in PAI	Data coverage, % of issuers
Climate and other environment- related indicators	1. GHG emissions	Scope 1 - 95%, Scope 2 - 97%, Scope 3 - 27%	Yes	-9.8%	97.7%
	2. Carbon footprint	27%	Yes	-9.8%	99.7%
	3. GHG intensity of investee company	66%	No	-6.0%	89.4%
	4. Exposure to companies active in the fossil fuel sector	91%	No, data issues	-5.6%	100.0%
	5. Share of non-renewable energy consumption and production	47%	Yes	3.4%	70.3%
	6. Energy consumption intensity per high-impact climate sector	54%	Yes	-49.7%	76.1%
	7. Activities negatively affecting biodiversity-sensitive areas	0.1%	No, data issues	-75.2%	100.0%
	8. Emissions to water	6%	No, data issues	-18.0%	8.4%
	9. Hazardous waste ratio	18%	No, data issues	-91.0%	26.3%
Social and employee, respect for human rights, anti-corruption and anti-bribery	10. Violations of UN Global Compact principles and OECD Guidelines for Multinational Enterprises	98%	Yes	-33.9%	100.0%
	11. Lack of processes and compliance mechanisms to monitor compliance with UN Global Compact principles and OECD Guidelines for Multinational Enterprises	88%	Yes	-6.3%	100.0%
	12. Unadjusted gender pay gap	7%	No, data issues	-1.9%	12.9%
	13. Board gender diversity	98%	Yes	-0.3%	99.8%
	14. Exposure to controversial weapons	98%	No	-11.2%	100.0%

The MSCI ESG Ratings coverage universe encompassed 8,198 issuers as of June 2022. The optimization was designed to achieve a 20% improvement in the MSCI ESG Score over that of the coverage universe, from 6.3 (MSCI ESG Rating A) to 7.3 (MSCI ESG Rating AA), while retaining the same GICS® sector allocation as in the coverage universe. The optimized hypothetical portfolio contained 1,902 stocks. Source: MSCI ESG Research

22 “Commission Delegated Regulation of 21.4.2021 amending Delegated Regulation (EU) 2017/565 as regards the integration of sustainability factors, risks and preferences into certain organisational requirements and operating conditions for investment firms.” European Commission, April 21, 2021.

23 This section contains analysis of historical data, which may include hypothetical, backtested or simulated performance results. A different set of assumptions from the one described here may produce different results. There are frequently material differences between back tested or simulated performance results and actual results subsequently achieved by any investment strategy. The analysis and observations in this section are an example for illustrative purposes only and are limited solely to the period of the relevant historical data, backtest or simulation. Past performance – whether actual, backtested or simulated – is no indication or guarantee of future performance. None of the information or analysis herein is intended to constitute investment advice or a promotion of any product or a recommendation to make (or refrain from making) any kind of investment decision or asset allocation and should not be relied on as such.



Climate



Biodiversity



Regulation

[TABLE OF CONTENTS](#)

Arne Klug

Frankfurt

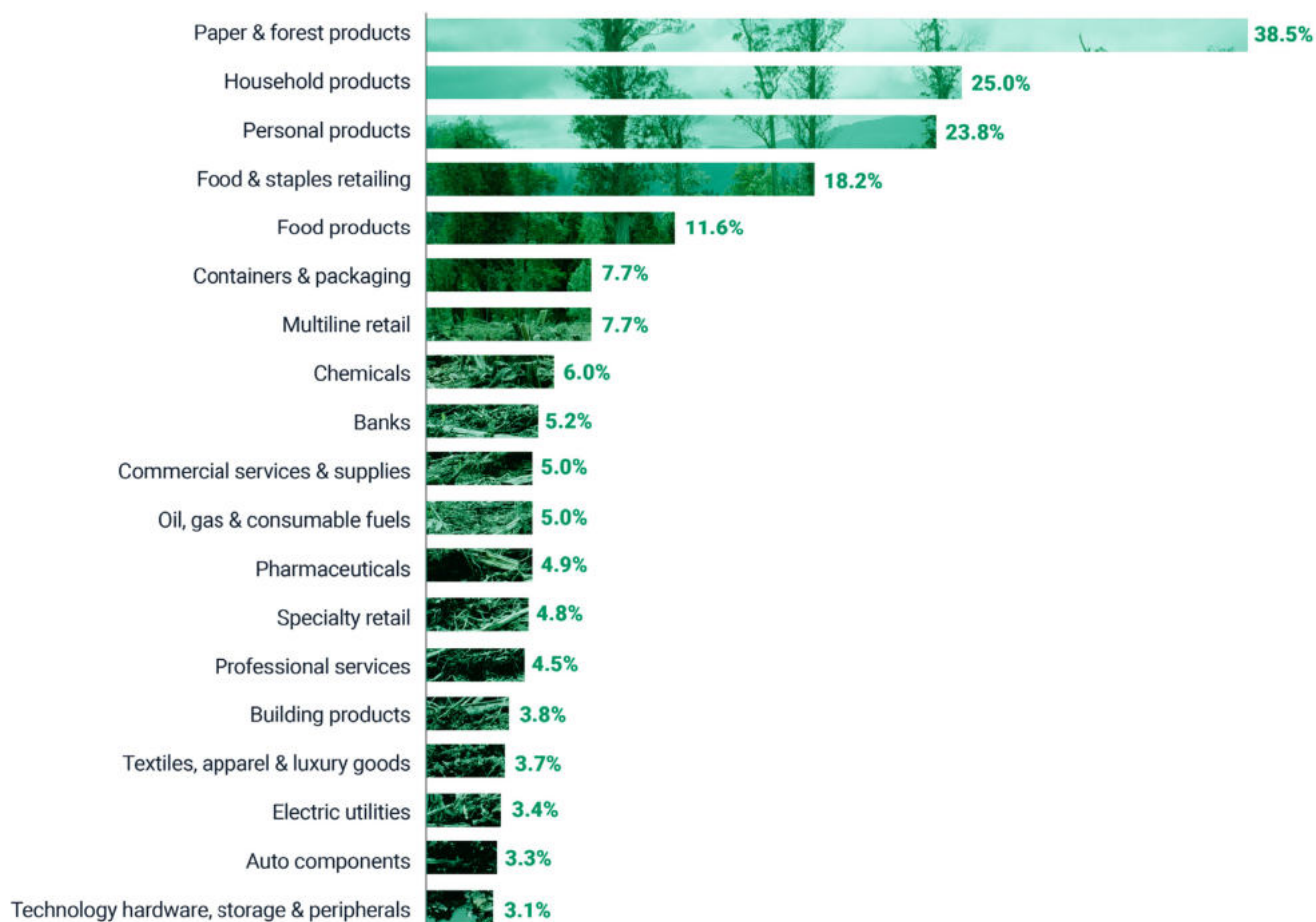
Cutting deforestation: Market restrictions get real

Despite COP26 commitments to halt and reverse forest loss,²⁴ 2021 saw tree-cover loss of 25.3 million hectares globally, an area larger than Great Britain. The Amazon alone lost an area equal to the size of Northern Ireland.²⁵ In addition, the summer of 2022 saw a wave of wildfires around the globe, burning down millions of hectares more. COP15²⁶ is scheduled to address such natural capital losses, while the European Parliament recently voted in favor of stringent new regulation that would require all products sold in the EU to be deforestation-free. **In 2023, we'll be watching which companies with high deforestation exposure can improve their due diligence and supply-chain monitoring programs as they seek to maintain access to key markets.**

Under the proposed regulation, the EU will not accept products made or based on land that was deforested after the end of 2019.²⁷ This should reduce its deforestation footprint and would significantly increase regulatory pressure for companies with EU market exposure. Palm oil, soy, timber and beef production are the main drivers of deforestation.²⁸ But the regulation isn't limited to these obvious suspects. Leather car seats, rubber used for clothing and printed paper products are among other goods affected – producers and distributors here may need to take action as well.

Based on our analysis, however, the level of preparedness does not appear to be high. Only 11.7% of listed food-products companies and 18.2% of food retailers had disclosed a deforestation policy, while the numbers for auto components (3.3%) and textiles, apparel and luxury goods (3.7%) were even lower.²⁹ Even at paper and forest products companies the figure was below 40%. And policies are only a first step – eliminating products rooted in deforested land from a supply chain is typically a major endeavor requiring extensive due diligence. Complying with the new regulation may therefore require significant efforts on the part of companies. Firms that have been thinking of deforestation as an issue for somebody else or someday down the road may have to get a handle on it and in a hurry.

Paper and forest-products companies lead, but deforestation policies remain thin on the ground



Share of companies within selected industries of the MSCI ACWI Index that have disclosed a deforestation policy; industries included where at least 2% of the peers have disclosed a policy. Data as of Oct. 12, 2022. Source: MSCI ESG Research

- 24 “Glasgow Leaders’ Declaration on Forests and Land Use.” UN Climate Change Conference UK 2021, Nov. 2, 2021.
- 25 University of Maryland and World Resources Institute. “Global Primary Forest Loss.” Accessed Oct. 12, 2022. www.globalforestwatch.org. Tree-cover loss is defined as the removal of tree canopy through human-caused or natural events.
- 26 The 15th Conference of the Parties to the Convention on Biological Diversity in Montreal, Canada, commonly abbreviated as COP15, will take place from Dec. 7 to 19, 2022.
- 27 “Climate change: new rules for companies to help limit global deforestation.” European Parliament, Sept. 13, 2022. Products include: cattle, cocoa, coffee, palm oil, soya and wood; and products that contain, have been fed with or have been made using these commodities (such as leather, chocolate and furniture). Parliament wants to also include pig meat, sheep and goats, poultry, maize and rubber, as well as charcoal and printed paper products.
- 28 “The Global Assessment Report on Biodiversity and Ecosystem Services.” Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, 2019
- 29 Constituents of the MSCI ACWI Index as of Oct. 12, 2022.



Regulation

TABLE OF CONTENTS

**Andrew Young**
London**Gabriela de la Serna**
London

Beyond GDPR: New regulations could alter the global digital landscape

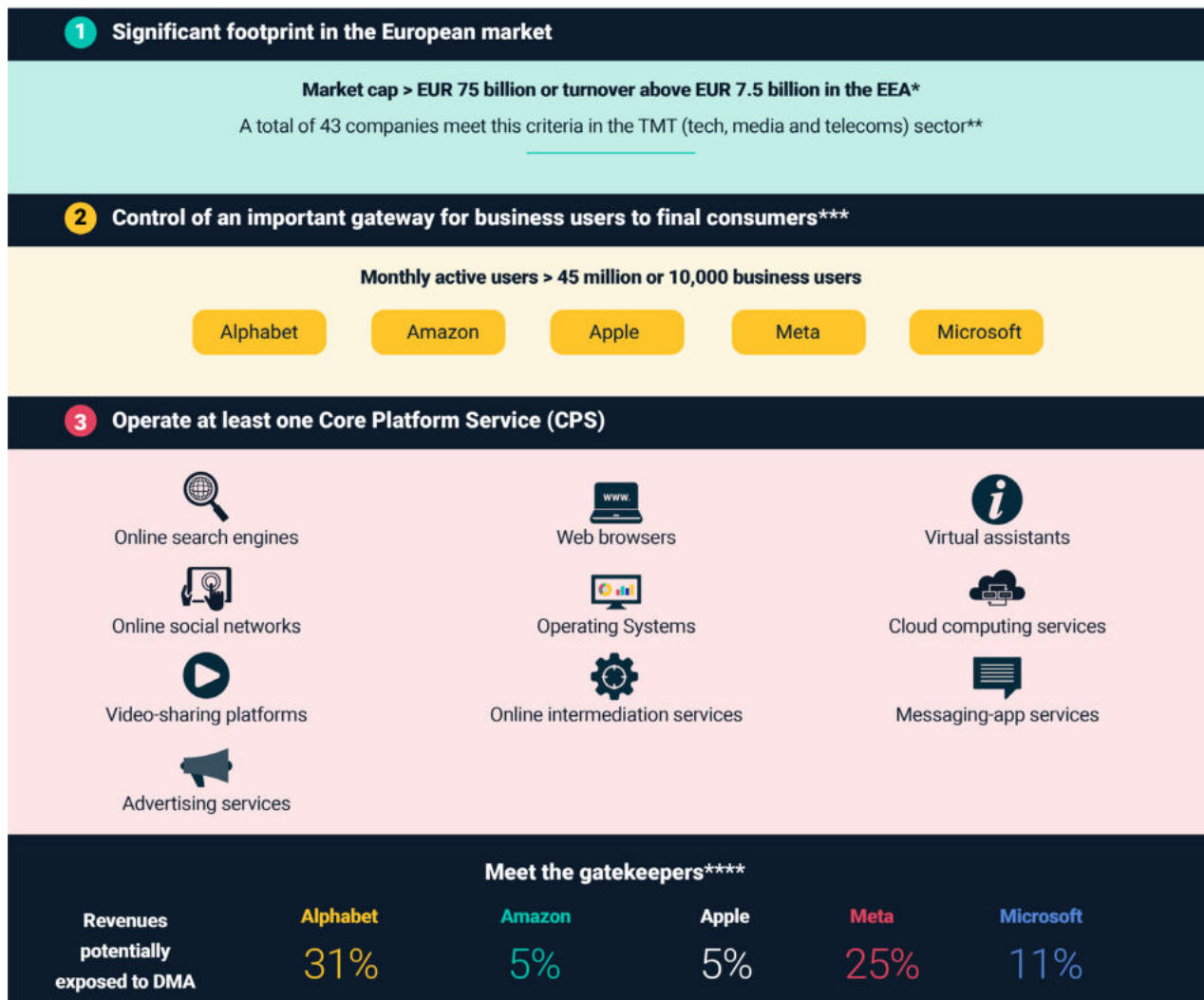
Over the last several years, European regulators have had Big Tech firmly in their sights. The landmark General Data Protection Regulation (GDPR), enacted in 2016, changed the way companies process and protect user data. Not only does it seek to safeguard consumers' rights to privacy, but it can lead to hefty fines for violators. GDPR's principles have since been adopted in several other jurisdictions.³⁰ Now, the digital landscape may be seeing its next regulatory realignment, with the passing in 2022 of the EU's Digital Markets Act (DMA) and Digital Services Act (DSA). **In 2023, we will be watching which of the big internet players can adapt fastest to the new regulations and who acts to get ahead of possible moves in other jurisdictions.**

By focusing on size and reach, the DMA specifically targets big tech companies, the so-called "internet gatekeepers." Its vast scope includes provisions that might push these companies to open their walled-garden ecosystems (platforms that limit users' access to competing services), facilitate competitive practices and ensure transparency in their advertising services. The DSA has a narrower focus: to manage disinformation and illegal content on consumer-facing platforms.

Compliance with both acts starts in 2024. The rollout of GDPR, and subsequent adoption of similar standards in other markets, may serve as a useful comparison. Within the EU, GDPR immediately resulted in improvements in privacy practices, but significant enforcement actions and fines only emerged in subsequent years, according to the CMS.Law GDPR Enforcement Tracker and MSCI ESG Research. It remains to be seen whether regulators will repeat this exploratory and precedent-building approach before penalties start to roll out.

Below is our interpretation of the application of the European Commission's proposed quantitative indicators to indicate whether a company qualifies (succeeds at becoming) an internet gatekeeper.

Identifying the gatekeepers (though you know them already)



Constituents of the MSCI ACWI Index, as of Sept. 29, 2022.

* EEA refers to the European Economic Area. It includes EU countries as well as Iceland, Liechtenstein and Norway.

** TMT refers to the combined information technology and telecommunications services sectors, as per the Global Industry Classification Standard (GICS®). GICS is the global industry classification standard jointly developed by MSCI and S&P Global Market Intelligence.

*** The interpretation of these criteria was made by MSCI ESG Research for illustrative purposes only and may differ significantly from the European Commission’s ultimate determination. We assessed that the regulation may likely include at least these five companies, which appear to surpass the monthly-active-users (MAU) threshold (sources: Alphabet: 10-K, 2019; Meta: 10-K, 2018; Apple: Q2 2020 earnings call; Microsoft: Q4 2021 earnings call; Amazon: Annual shareholders letter, 2021).

**** Based on MSCI ESG Research’s geographic-exposure assessment and company reports.

Source: MSCI ESG Research

30 Aridor, Guy, Che, Yeon-Koo, and Salz, Tobias. 2020. “The Effect of Privacy Regulation on the Data Industry: Empirical Evidence from GDPR.” NBER.



Supply chain



Climate

TABLE OF CONTENTS



Liz Houston

London

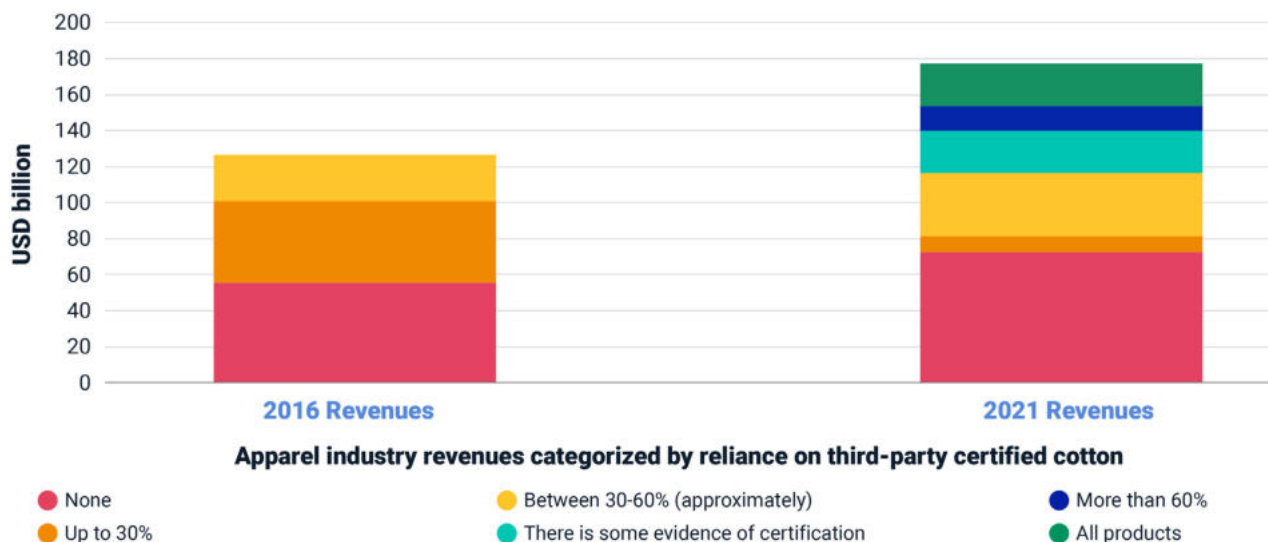
Cotton's crunch point and the future of fiber

Cotton makes up over a quarter of all the clothes we wear, but its harmful impacts, like soil degradation and water consumption, have spurred demand for more environmentally sustainable options (see exhibit below).³¹ Apparel retailers have responded by working with third-party certifiers for sustainable cotton and exploring cotton alternatives. However, catastrophic flooding in Pakistan and the withdrawal of some certifications from much of China have created supply headaches. **In 2023, we'll be watching to see which retailers can navigate near-term shortages in responsibly sourced cotton, and which ones are prepared to back new, alternative fibers.**

A short-term supply shock gives us a glimpse into how cotton's long-term future could play out. Water scarcity and extremes in rainfall are expected to increase production risks in cotton's most important growing regions, making life far more precarious for cotton farmers.³² At the same time, ballooning demand for sustainable cotton may make certification efforts more challenging. To meet this demand, Better Cotton, the industry's largest sustainability initiative, estimates that the current number of farmers with which it works will need to triple to an estimated total of 7.5 million by 2030.³³

Against this backdrop, the apparel industry has been developing alternative sources of sustainable fiber, including lab-grown cotton and processes to recycle post-consumer textile waste into new materials. These innovations may hold solutions to some of the environmental and social challenges facing the industry today. To benefit textile companies and investors, these new technologies will have to show not only that they can operate at scale, but that they get there quickly (and cheaply) enough to avoid potential shortages of responsible materials.

Apparel retailers increasingly relied on third-party certification for responsible cotton



Data is based on apparel retail constituents of the MSCI ACWI Index, as of Oct. 21, 2022. Source: Refinitiv, MSCI ESG Research

31 In 2021, companies in the apparel-retail sub-industry with combined revenues of over USD 100 billion were sourcing cotton certified to a third-party standard. This reflects revenue from eight out of 12 constituents of the MSCI ACWI Index in the apparel-retail sub-industry that report sourcing third-party certified cotton. Apparel-retail sub-industry defined according to the Global Industry Classification Standard (GICS®). GICS is the global industry classification standard jointly developed by MSCI and S&P Global Market Intelligence.

32 Robinson, Noah. "Cotton industry unprepared for climate change threat to crop and farmers." Reuters, June 23, 2021.

33 "2021-30 Strategic Direction." Better Cotton Initiative, December 2021.



Supply chain



Climate

TABLE OF CONTENTS



Siyu Liu
New York

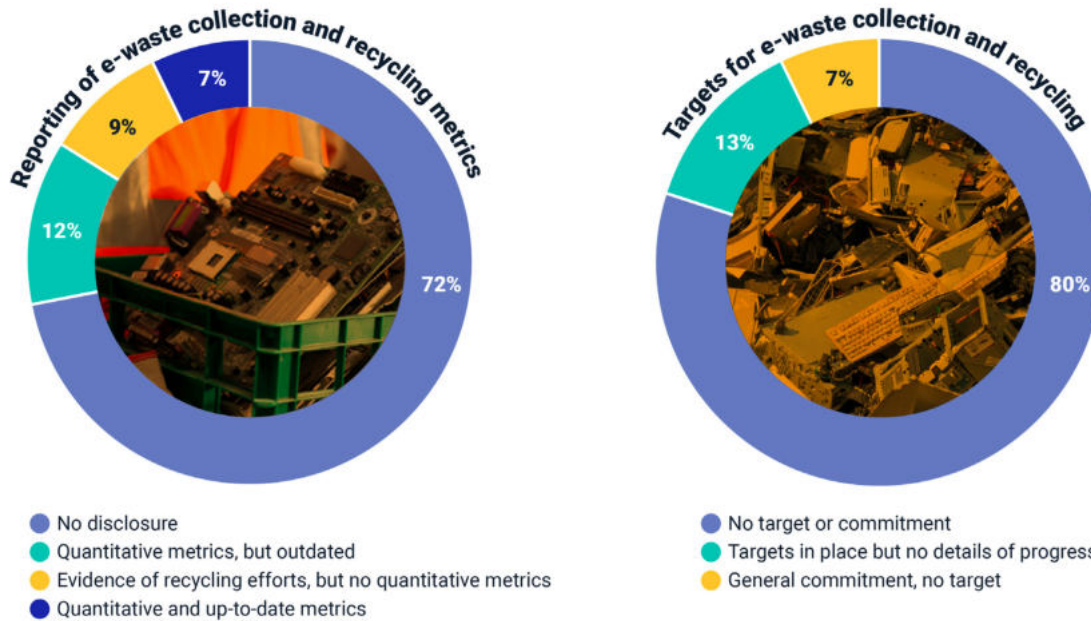
Mining old electronics to fuel new energy tech

In the last four years, China and the EU have strengthened policies and guidelines on the circular treatment of materials and waste, including electronic waste (e-waste). In September 2022, the U.S. followed suit, passing a bill specifically on recycling electric-vehicle (EV) batteries. **In 2023, we will be watching which companies up their efforts to mine secondary metals from e-waste – both as a way of keeping regulators happy and boosting access to metals critical for clean-energy technologies.**

Efficiently extracting metals from e-waste could reduce dependency on mining, including in regions prone to conflict and poor labor practices. It also means fewer emissions. For example, a modern Midas touch that extracts gold from e-waste emits 80% less carbon dioxide than conventional mining.³⁴ In addition to precious metals like gold and copper, e-waste also contains critical metals commonly found in many types of rechargeable batteries. Turning e-waste into a viable source of secondary metals could help meet rising demand for clean-energy technology, including EVs and energy storage solutions.

Cobalt may be a bellwether for these efforts to mine e-waste – recycling programs could reduce the projected 2040 demand for mined cobalt by 35%.³⁵ But there remains a sizable gap between theory and practice. Although the total recovery rate for cobalt could theoretically reach 95% using existing technology, current recovery rates are at just 30%.³⁶ And more broadly, while global e-waste continues to rise – by 9.2 million tons between 2014 and 2019, reaching a total of 53.5 million tons – the growth in documented collection and recycling rates has been agonizingly slow – from 16.9% to 17.4% over the same period.³⁷ This gap is particularly evident in technology-hardware and household-durable companies, which have yet to ramp up the collection and recycling capacity of critical metals from e-waste (see exhibit). But necessity is the mother of invention. A dwindling supply of clean-energy metals, combined with tightening regulations, may be the catalyst needed to push e-waste recycling into the next phase.

A long way off from a circular economy for metal



Analysis includes 68 technology-hardware and household durable constituents of the MSCI ACWI Index, as of Sept. 27, 2022. Based on the public disclosure of these companies (e.g., annual reports and 10-Ks), we analyzed the differences in the reporting of e-waste collection and recycling metrics, as well as any targets related to these collection and recycling efforts. Source: MSCI ESG Research

34 “A New Circular Vision for Electronics.” World Economic Forum, January 2019.
 35 Dominish, Elsa, Florin, Nick, Wakefield-Rann, Rachel, “Recycling Electric Vehicle Battery Minerals Can Significantly Reduce Need for New Mining.” Earthworks, April 2021.
 36 “A New Circular Vision for Electronics.” World Economic Forum, January 2019.
 37 Forti, Vanessa, Baldé, Cornelis Peter, Kuehr, Ruediger, and Bel, Garam. “The Global E-waste Monitor 2020: Quantities, flows and the circular economy potential.” United Nations University, July 2, 2022.



Climate



Biodiversity



Regulation

TABLE OF CONTENTS



Cole Martin

London

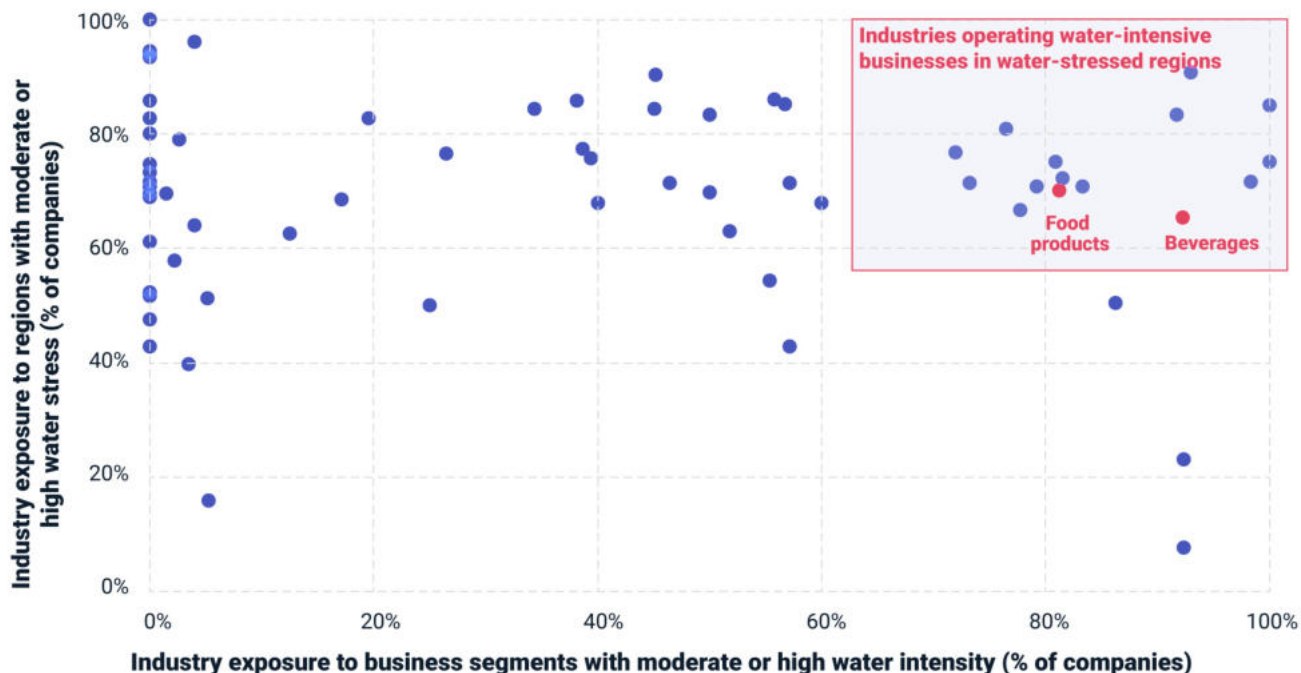
GMO regulatory resistance may be softening

In 2022, both China and the EU, two of the world's largest corn producers, continued to prevent widespread commercialization of genetically modified organisms (GMOs) for food crops such as corn and soybean. This has been due to real and perceived concerns about their health and environmental impacts, as well as the business practices of companies that sell them. **In 2023, amid signs that China and the EU may be revisiting their stances, we'll be watching for more concrete steps toward GMO food crops, and which food and agriculture companies are ready for any emerging opportunities.**

The EU and China, already large importers of GMO soybean and corn, respectively, have signaled that they may look to loosen the restrictions on GMO seed products. In particular, the EU Green Deal mentioned the development of "seed technology," while in 2021 the European Commission launched a (still ongoing) review of EU rules on GMOs. In China, research funding for GMO development has increased and the government has been amending its GMO regulatory framework.³⁸ The rising threat of droughts, demand for increasing agricultural yields in the context of national decarbonization commitments and softening consumer resistance,³⁹ may all be altering the long-held policy calculus.

Meanwhile, new gene-editing techniques could allow seed makers to engineer crops with the ability to withstand harsh environmental conditions such as droughts⁴⁰ or require less insecticide compared to non-GMO crops.⁴¹ This, combined with the increased adoption of regenerative farming, could allow countries to embrace land-use and agrichemical policy changes that would decrease emissions while preserving domestic food security. For food and beverage companies whose products are sourced from crops, especially corn and soybean, additional commercialization of GMOs could lead to both reduced (or less-volatile) input costs and lower exposure to water-stress risks due to drought-resistant crops. However, questions may remain about the success of commercialization due to continued opposition from consumers and NGOs around biodiversity, patents, herbicide resistance and the perceived human health effects.

Food and beverage companies' water dependence could drive interest in drought-resistant GMOs



Our analysis included all issuers within MSCI ESG Ratings coverage, across 68 ESG industries, as of Oct. 28, 2022. Each dot reflects, for each ESG industry, the proportion of issuers that were operating in geographies with moderate or high exposure to water-stress risks (y-axis), and whose assets were classified in business segments with moderate to high levels of water intensity (x-axis). Risk exposure was based on assessments from the MSCI ESG Ratings model. Source: MSCI ESG Research

38 Byrne, Jane, "Will GM seed planting see China reduce its dependence on feed imports?" *FeedNavigator*, Jan. 18, 2022.

39 "Special Barometer: Food Safety in the EU." European Commission, June 2019.

40 Nuñez-Muñoz, Leandro, Vargas-Hernández, Brenda, Hinojosa-Moya, Jesús, Ruiz-Medrano, Roberto, and Xoconostle-Cázares, Beatriz. 2021. "Plant drought tolerance provided through genome editing of the trehalase gene." *Plant Signaling & Behavior* 16(4), 1877005.

41 Greenthal, Eva, and Jaffe, Greg. "In the weeds: Understanding the impact of GE crops on pesticide use." Center for Science in the Public Interest, April 2021.



Supply chain

TABLE OF CONTENTS

**Aura Toader**
London

Can blockchain help supply chains move away from controversy?

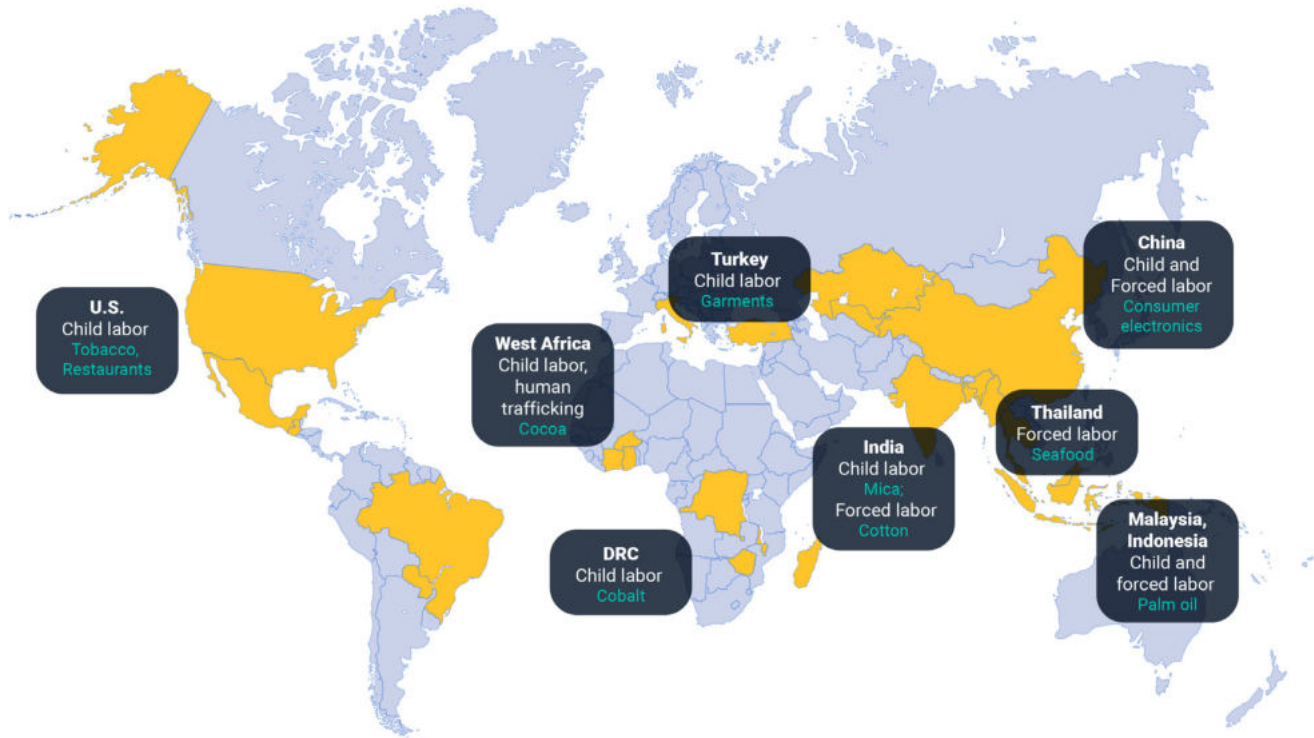
Modern-slavery regulations that require companies to identify human-rights violations, such as child labor, forced labor or human trafficking, in their supply chains are either in effect or pending implementation in several jurisdictions, including the EU, Canada, U.S. and Australia. Consumers have also been exerting increasing pressure by including ethical considerations in their purchasing decisions.⁴² **In 2023, we'll be watching pilot projects that use blockchain for supply-chain transparency and traceability, where successful experiments could herald the beginning of a sea-change in supply-chain management.**

Admittedly, the task ahead is considerable. As raw materials ship in bulk, certified and noncertified materials can become comingled, making batch traceability difficult. For larger companies, this difficulty compounds as they look to trace materials through multiple tiers of suppliers.

Blockchain offers a potential tool for this thorny issue, through a decentralized, immutable record of all supplier transactions. For example: Walmart Inc. has partnered with IBM to track pork products in China in a farm-to-table approach; Unilever plc adopted SAP SE's GreenToken blockchain technology to source 188,000 tons of palm oil; and Ford Motor Co. used the technology to track cobalt – a key mineral for lithium-ion batteries – from mine to end user.

So far, these pilot projects have been relatively niche. Solving traceability challenges will require much broader adoption. That may mean a combination of factors, including greater standardization and interoperability between systems,⁴³ and companies willing to experiment with new technology. We do not expect to see the challenges of supply-chain transparency solved overnight, but we will be watching for signs of a much-needed turning point.

Modern slavery: A global issue across all industries



The map is based on an analysis of all controversy cases (with a status of “Ongoing,” “Concluded,” “Partially Concluded,” “Historical Concern” and “Archived”). We identified the MSCI ESG Ratings industries with the highest number of modern-slavery-related controversies (forced labor, child labor, bonded labor, human trafficking and migrant workers) and filtered for those with at least 10 controversy cases. For the 15 industries identified, we conducted a deeper analysis and categorized each controversy case based on the type of human-rights violation (e.g., child labor), country/region where the controversy took place and respective commodity/product. We then identified the countries with the highest number of controversies and highlighted on the map those with at least five controversies. The most prevalent types of human-rights violations were highlighted per country, along with their respective commodity/product. Data as of September 2022. Source: MSCI ESG Research

42 “How consumers are embracing sustainability.” Accessed Oct. 14, 2022. <https://www2.deloitte.com/>.

43 Jabbar, Sohail, Lloyd, Huw, Hammoudeh, Mohammed, Adebisi, Bamidele, and Raza, Umar. 2021. “Blockchain-enabled supply chain: analysis, challenges, and future directions,” *Multimedia Systems* 27: 787-806.



Workforce

TABLE OF CONTENTS

**Bentley Kaplan**

Cape Town

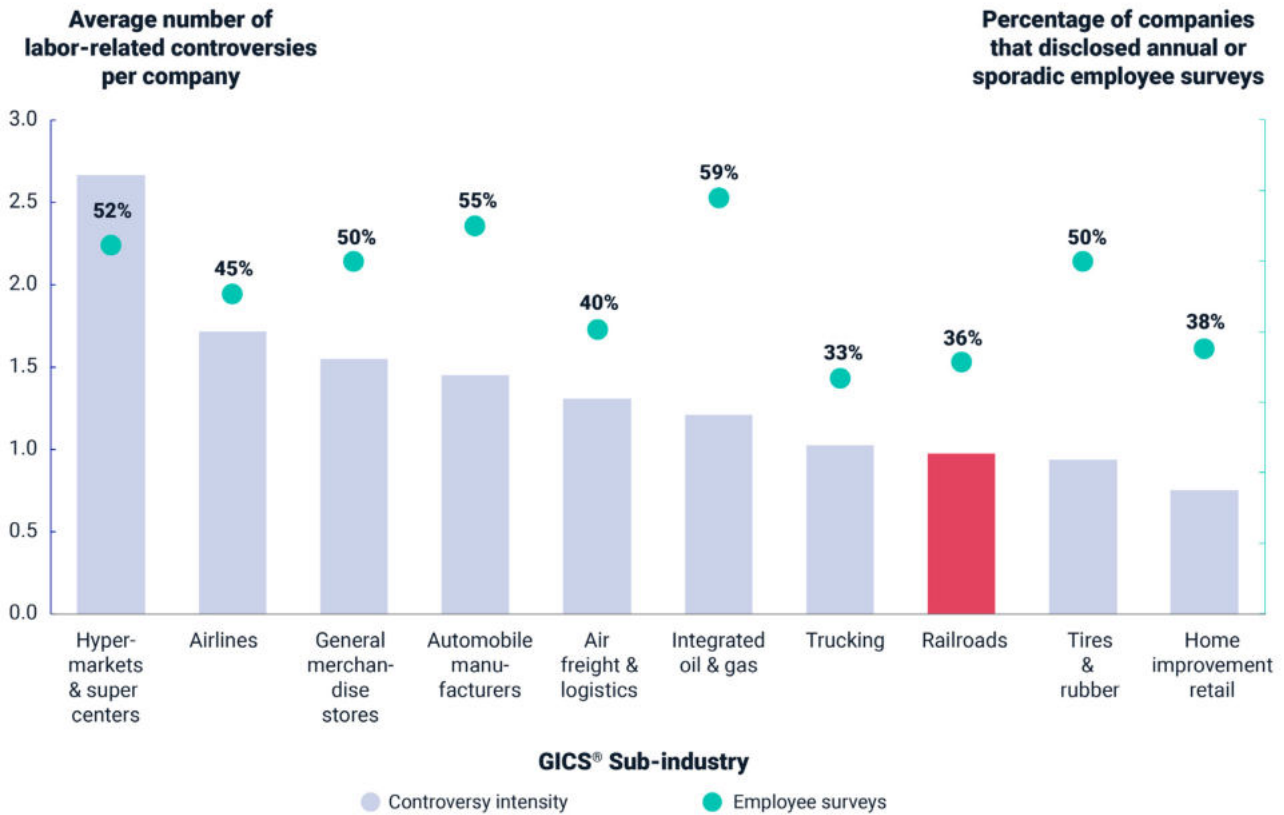
I'll be working on the railroad – Not?

With COVID-19 travel restrictions beginning to lift, 2022 should have been the jump-start the rail industry needed. Instead, the year has been fraught with disruptions. We've seen recurrent strikes in the U.K.'s passenger-rail industry⁴⁴ and a narrowly averted industrywide shutdown in U.S. freight rail.⁴⁵ Further industrial action across several countries, including the Netherlands,⁴⁶ France,⁴⁷ Australia⁴⁸ and South Africa⁴⁹ suggests that all may not be well between rail companies and their employees. **In 2023, we'll be watching to see which railroads can build out better communication channels to their employees and whether those efforts can stem a rising tide of labor strikes.**

While complaints differ by market, similar threads run through these agitated workforces, which have been hit by company downsizings, COVID-19-related reductions in pay packages and inflationary pressures. One starting point to ease this growing tension may lie in a very basic approach – efforts by company management to listen to employee feedback or gauge morale. As the exhibit below shows, rail companies may be falling short in this regard. Among 10 sub-industries⁵⁰ where labor disputes and controversies have been most common (including hypermarkets and airlines), rail companies reported one of the lowest frequencies of employee surveys.

Strikes may well be a perennial risk for this highly unionized industry (averaging 60.4% of workers).⁵¹ But finding better ways to monitor workforce morale could provide an initial way to address rising dissatisfaction.

Rail faces labor controversies but falls short in efforts to gauge workforce morale



All issuers within MSCI ESG Ratings coverage were included in the assessment. Data as of Nov. 7, 2022. Proportion and percentage figures represent the average for issuers by GICS sub-industry. Controversies were sourced from MSCI ESG Controversies data and includes all cases classified as “ongoing,” “partially concluded” or “concluded.” The 10 GICS sub-industries shown here were those with the highest proportion of controversies per company that were also assessed in the MSCI ESG Ratings model on the labor-management key issue. This key issue assesses a company’s management programs in the context of its exposure to workforce-related risks. More detail is provided in the MSCI ESG Ratings Methodology document. Source: company disclosures; MSCI ESG Research

44 Georgiadis, Philip. “UK’s biggest rail union seeks mandate to continue strikes into spring.” *Financial Times*, Oct. 12, 2022.

45 Hunnicutt, Revot, Shepardson, David, and Holland, Steve. “US rail strike averted, but labor deal faces tough union votes.” *Reuters*, Sept. 16, 2022.

46 Van Campenhout, Charlotte. “Ongoing labour dispute brings Dutch trains to a halt again.” *Reuters*, Sept. 9, 2022.

47 Sandford, Alasdair. “France strikes: Transport hit amid nationwide walkout over pay and cost of living.” *Reuters*, Oct. 19, 2022.

48 Australian Associated Press. “Sydney train strikes: NSW government and rail unions to seek conciliation next week.” *Guardian*, Sept. 9, 2022.

49 Banya, Nelson. “South Africa’s rail and port workers to strike this week over wages.” *Reuters*, Oct. 4, 2022.

50 Classified according to the Global Industry Classification Standard (GICS®). GICS is the global industry classification standard jointly developed by MSCI and S&P Global Market Intelligence.

51 For railroad companies in MSCI’s ESG Ratings coverage that reported this data, as of Nov. 7, 2022.



Workforce

TABLE OF CONTENTS

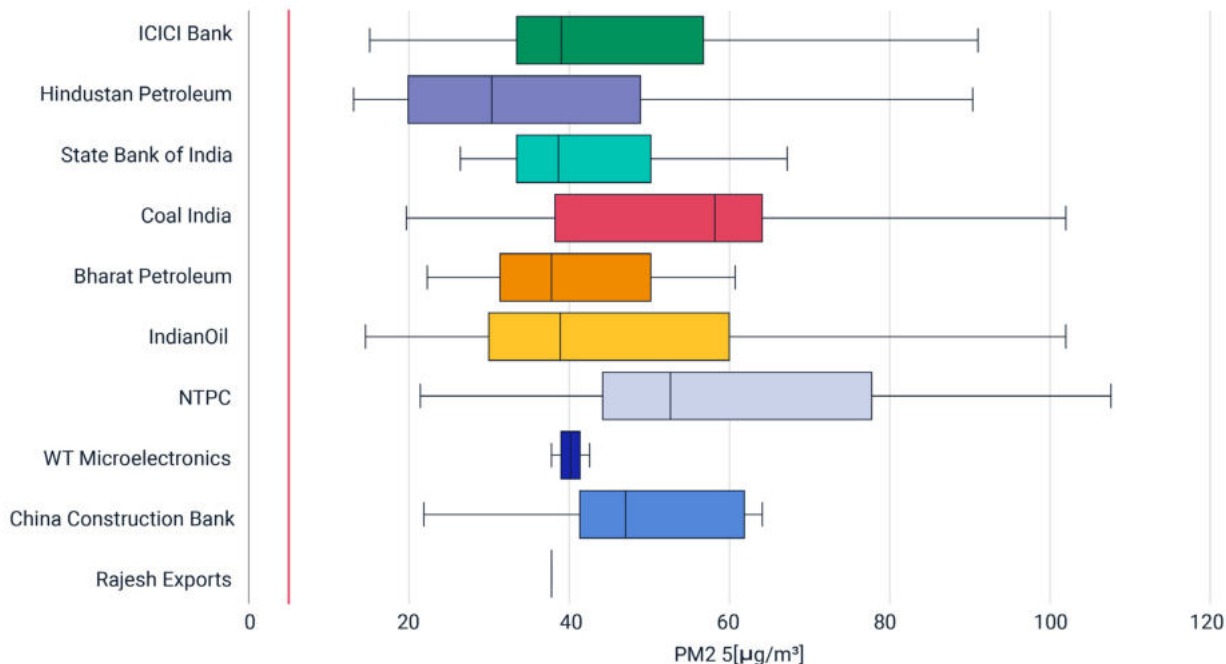
**Simon Albrecht**
Zurich**Jurgita Balaisyte**
Hong Kong

Choking on smoke: The human-capital risks from air pollution

The World Health Organization (WHO) has named air pollution as the number-one global environmental health risk, causing millions of premature deaths and substantial economic losses.⁵² While companies polluting the air themselves may face risks that regulators or impacted communities might push for facilities to be shut down or overhauled,⁵³ it may be overlooked that companies generating minimal pollution can also be impacted through worsening employee health or difficulty retaining talent in polluted regions.⁵⁴ **As the terms of work continue to evolve post-pandemic, and air quality starts to look like a perk, in 2023 we'll be watching to see which companies work the hardest to stop their employees from choking on smoke.**

Using MSCI Asset Locations, we looked at potential company exposure to pollution-related risks, including ultrafine particulate matter PM2.5 — a particularly harmful pollutant.⁵⁵ To illustrate this exposure, we looked at the 10 constituents of the MSCI ACWI Investable Market Index (IMI) with the highest revenues in India — a country with some of the worst air-pollution levels in the world.⁵⁶ We found that not a single company asset was located in an area where the particle level was below the WHO-recommended threshold of 5 $\mu\text{g}/\text{m}^3$;⁵⁷ some were in areas where the particle level exceeded 100 $\mu\text{g}/\text{m}^3$. Such pollution levels may not be surprising for an electric utility using coal to generate power (e.g., NTPC Ltd.), but our analysis also covered banks (ICICI Bank Ltd., State Bank of India and China Construction Bank Corp.), a retailer (Rajesh Exports Ltd.) and an electronics distributor (WT Microelectronics Co., Ltd).

Air pollution exposure may pose human-capital risks regardless of industry



PM2.5 exposure of the 2020 annual mean value (averaged for all locations in India) for the 10 constituents of the MSCI ACWI Investable Market Index with the highest revenue generated in India, as of July 1, 2022. Red line shows the WHO guideline of 5 µg/m³. The box represents the interquartile range/median, with significant outliers excluded (all 13 of which were above 80 5 µg/m³). Source: Air Quality Life Index, MSCI ESG Research

- 52 “Global air quality guidelines: particulate matter (PM2.5 and PM10), ozone, nitrogen dioxide, sulfur dioxide and carbon monoxide. Executive summary.” World Health Organization, 2021.
- 53 Pasricha, Anjana. “Delhi’s Air Pollution Crisis Prompts Shutdown of Thermal Plants, Schools, Colleges.” Voice of America, Nov. 17, 2021.
- 54 Xue, Shuyu, Zhang, Bohui, and Zhao, Xiaofeng. 2021. “Brain drain: The impact of air pollution on firm performance.” *Journal of Environmental Economics and Management*, Volume 110.
- 55 Greenstone, Michael, Hasenkopf, Christa, and Lee, Ken. “Air Quality Life Index® June 2022: Annual Update.” Energy Policy Institute at the University of Chicago, June 2022.
- 56 Beng, Richard Fuller, Landrigan, Philip, and Balakrishnan, Kalpana. 2022. “Pollution and health: a progress update.” *Lancet Planetary Health* 6: E535-E547.
- 57 The concentration of an air pollutant is given in micrograms (one-millionth of a gram) per cubic meter of air [µg/m³].



Climate



Workforce

TABLE OF CONTENTS



Arun Sharvirala
Toronto



Satish Shinde
Mumbai



Jonathan Ponder
Toronto

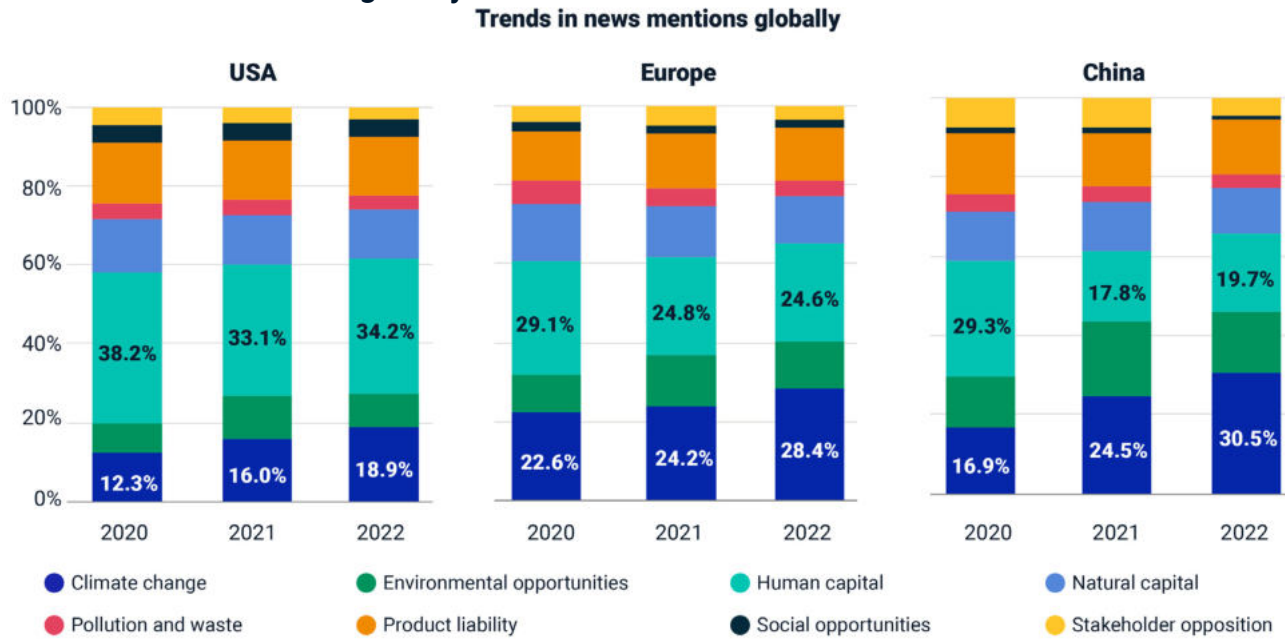
News shifts from pandemic to climate change, but labor hangs on

Since 2020 we have seen a significant shift in media attention from largely pandemic-driven news about how companies dealt with their workforces toward a renewed momentum around climate change. Of the markets we examined, this shift was starkest in China, while U.S. media has remained more focused on human capital. **In 2023, we'll be watching how further shifts in media attention may provide insights into the perception of ESG risks and issuer-engagement priorities as they evolve in different markets.**

During 2020, the glut of news pieces related to human capital was directly driven by the impact of COVID-19, as business operations and the future of work radically shifted. At the same time, boards and executives of companies scrambled to adjust to this sea change in worker expectations and the reality of maintaining operations.⁵⁸ However, with the advent of COVID-19 vaccines and subsequent reopenings, focus quickly shifted back to tackling climate change and attention there grew substantially, especially in China.

In the U.S., though, human capital remained a dominant newsworthy theme, comfortably outstripping the climate crisis, as companies contend with a tight labor market in the face of elevated worker discontent across the country.⁵⁹ Although one may contend that news is often a reactive medium, investors may wish to keep their eyes and ears open for any shifts in ESG risk sentiment and interest as a gauge of new ESG risks at the market level.

Trends in news mentions globally



A proprietary algorithm was used for primary topic collection, prior to manual validation to ensure proper classification of the topics to ESG themes. We used these topics to collect the news articles from September 2019 to August 2022. Calendar years are adjusted accordingly to reflect news articles from September to August. Source: Lexis-Nexis, MSCI ESG Research

58 Ng, Matthew A., et al. 2021. "Has the COVID-19 Pandemic Accelerated the Future of Work or Changed Its Course? Implications for Research and Practice." *International Journal of Environmental Research and Public Health*.

59 Gurley, Lauren K. "Labor movement's next big challenge: Keeping momentum as economy slows." *Washington Post*, Oct. 24, 2022.



Workforce

TABLE OF CONTENTS



Aura Toader
London



SK Kim
Seoul



Liz Houston
London

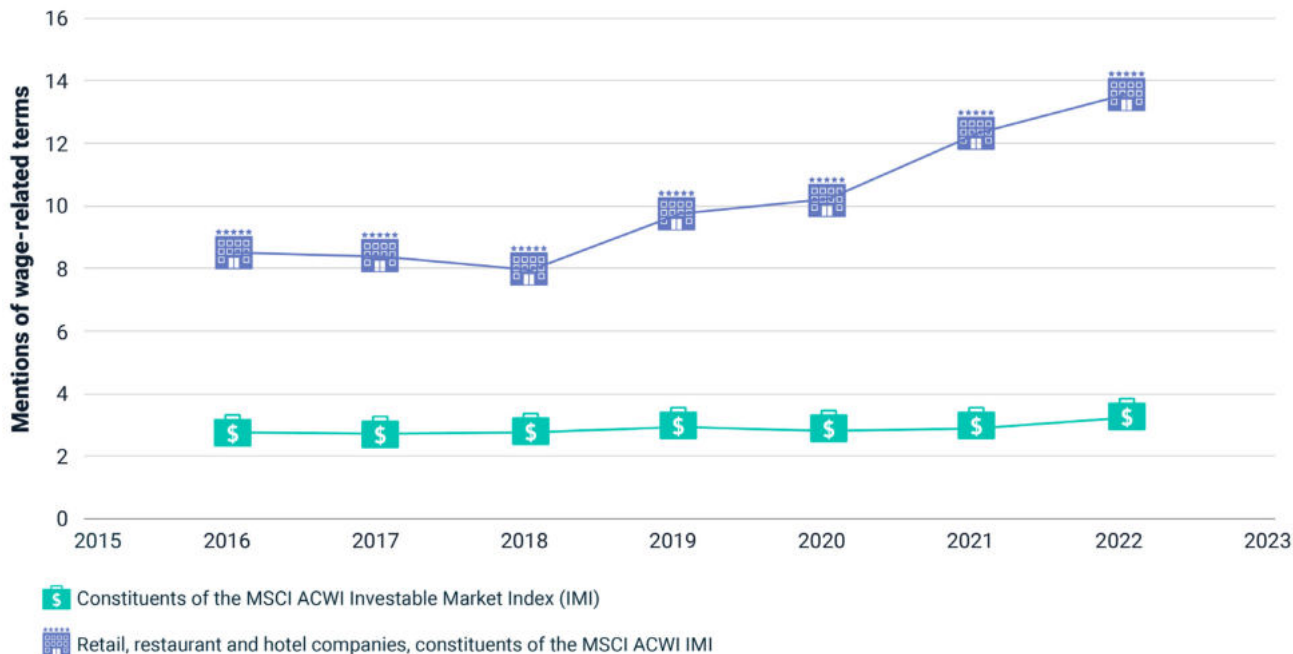
Bargaining with labor: Managing worker shortages in hard times

After the reopening of economies following the COVID-19 pandemic, labor markets have tightened and many companies struggled to fill vacancies. At the same time, most developed and emerging economies saw substantially higher inflation, pushing up the cost of living. This has contributed to rising hourly earnings for workers, with industries such as retail, hotels and restaurants potentially seeing the biggest [impact on profits due to their large workforces and reliance on relatively low-paid employees](#). **In 2023, we will be watching for new winners and losers as the ground continues to shift under companies tackling complex workforce relations and demands for higher wages.**

Rising employee costs have become an increasingly important issue for companies in consumer sectors, more broadly, reflected in growing mentions of wage-related terms in company filings since June 2015 (see exhibit below). For some employers, including those in the U.K., wages have been growing through nationally mandated increases. Elsewhere – e.g., in the U.S. – companies have proactively raised wages ahead of a potential increase in the legal minimum wage. Even when overheated labor markets have cooled down, research shows that employee satisfaction has been a persistent indicator of excess returns, particularly in times of crisis.⁶⁰

Many employers have reflected on their strategies in this area. Committing to paying a living wage could attract and retain workers in a tight labor market. Reorganizing or reducing bonuses and benefits to fund higher basic wage rates may be tempting, but could arguably be short-sighted. Offering nonstatutory benefits, such as paid parental leave or health insurance, could help companies make themselves more attractive. Our research shows that as of June 2022, only 10% of hotels and travel, restaurants, food and staples retailing and consumer discretionary retail constituents of the MSCI ACWI Index offered a broad range of nonstatutory benefits to their employees. If the same old strategies aren't getting the job done, companies willing to take more creative approaches might find a new advantage.

A growing focus on wages for retail, restaurant and hotel companies



We looked at company filings from June 2015 to September 2022 and used natural-language processing to quantify trends in discussions and proactive measures around potential increases in employee-related costs. Annual reports, 10-Ks, 40-Fs and 20-Fs of MSCI ACWI Investable Market Index (IMI) constituents were matched and analyzed using keyword analysis. Results were aggregated for related keywords, which included: wage, minimum wage, minimum hourly wage, wage increase, labor cost increase, living wage, fair wage and minimum wage increase. We compared the performance of 146 consumer discretionary constituents of the MSCI ACWI IMI – retailing (n=66), food & staples retailing (n=53), hotels (n=10) and restaurants (n=17) – versus the overall index constituents. Data as of Oct. 26, 2022. Source: MSCI ESG Research

60 Boustanifar, Hamid, and Kang, Young Dae. 2022. "Employee Satisfaction and Long-Run Stock Returns, 1984–2020." *Financial Analysts Journal* 78: 129-151.



Climate



Investment

TABLE OF CONTENTS



Yoon Young Chung
Boston



Meghna Mehta
Mumbai



Vishakha Pandey
Mumbai

Is the honeymoon over for green bonds?

Despite inflationary pressures, the supply of green bonds retreated by just 1% during the first half of 2022, compared with the second half of 2021.⁶¹ But that could be just the first sign of things to come. **In 2023, we will be watching whether green bonds can maintain a credible growth path in the face of rising interest rates, lower spread premiums and growing concerns about greenwashing.**

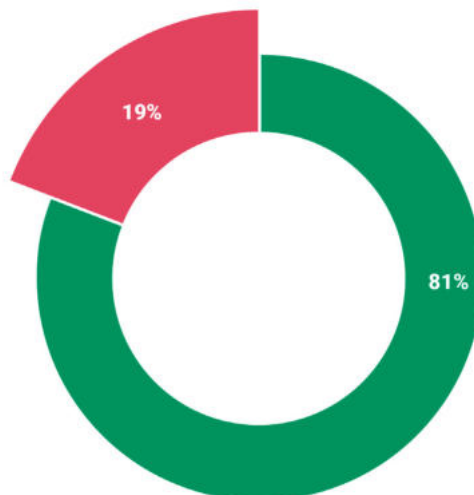
Since the first major launch of green bonds in 2007,⁶² they have been on a rapid upward trajectory, growing from a total issuance of USD 37 billion in 2014 to USD 578 billion in 2021.⁶³ This growth reflects a broader enthusiasm for green, social and sustainability (GSS) bonds, which accounted for 1.7% of the global USD 100 trillion bond market in 2020. Despite a collective interest, green bonds specifically have continued to hold pole position, making up roughly 60% of the total issuance value of GSS bonds each year. But the honeymoon period may be starting to wane, as yield spreads of green bonds have remained lower (eight basis points on average) compared with conventional bonds.⁶⁴

In addition to lower yield spreads, investors may also be weighing the credibility of green bonds – and specifically the “greenness” of the activities they are funding.⁶⁵ Without a widely adopted, standardized framework, issuers have had some flexibility in the labeling of their bonds. Between January 2021 and September 2022, of the more than 600 bonds we assessed, approximately one in five fell short of explicit green-bond criteria (see exhibit), with some even going so far as to fund fossil-fuel generation or transmission. Investor skepticism may be soothed by developments that include the proposed EU Green Bond Standard, but until these types of standards are in place, companies may have to work harder against the perception that they are issuing “green-ish” bonds with potentially questionable practices and reduced yields.

One in five 'green' bonds falls short of Bloomberg MSCI Green Bond Index criteria

% of "Green Bonds" that satisfy Bloomberg MSCI Green Bond Index criteria

- Criteria-noncompliant bonds
- Criteria-compliant bonds



Analysis of 632 investment-grade self-labeled green bonds tracked by MSCI ESG Research from January 2021 to September 2022. The universe of these bonds is restricted to all self-labelled green bonds meeting the Bloomberg Global Aggregate Index criteria. While around 81% of these bonds are part of the Bloomberg MSCI Green Bond Index, the remaining 19% failed to meet the MSCI green bond and green loan assessment methodology. These bonds are potentially funding projects which are not considered green as per the methodology. Sources: Bloomberg MSCI Green Bond Index, Bloomberg Global Aggregate Index, MSCI ESG Research

61 "Green Bond Pricing in the Primary Market: January-June 2022." Climate Bonds Initiative, Sept. 16, 2022.

62 AAA-rated issuance from multilateral institutions European Investment Bank (EIB) and World Bank.

63 "\$500bn Green Issuance 2021: social and sustainable acceleration: Annual green \$1tn in sight: Market expansion forecasts for 2022 and 2025." Climate Bonds Initiative, Jan. 31, 2022.

64 Caramichael, John, and Rapp, Andreas. "The Green Corporate Bond Issuance Premium." Federal Reserve Board, June 2022.

65 Flood, Chris. "Fears rise over 'greenwash' bonds." *Financial Times*, March 21, 2022.



Climate

TABLE OF CONTENTS



Magdalena Sordyl

New York

Sovereign policy dilemma: Energy security vs. the clean-energy transition

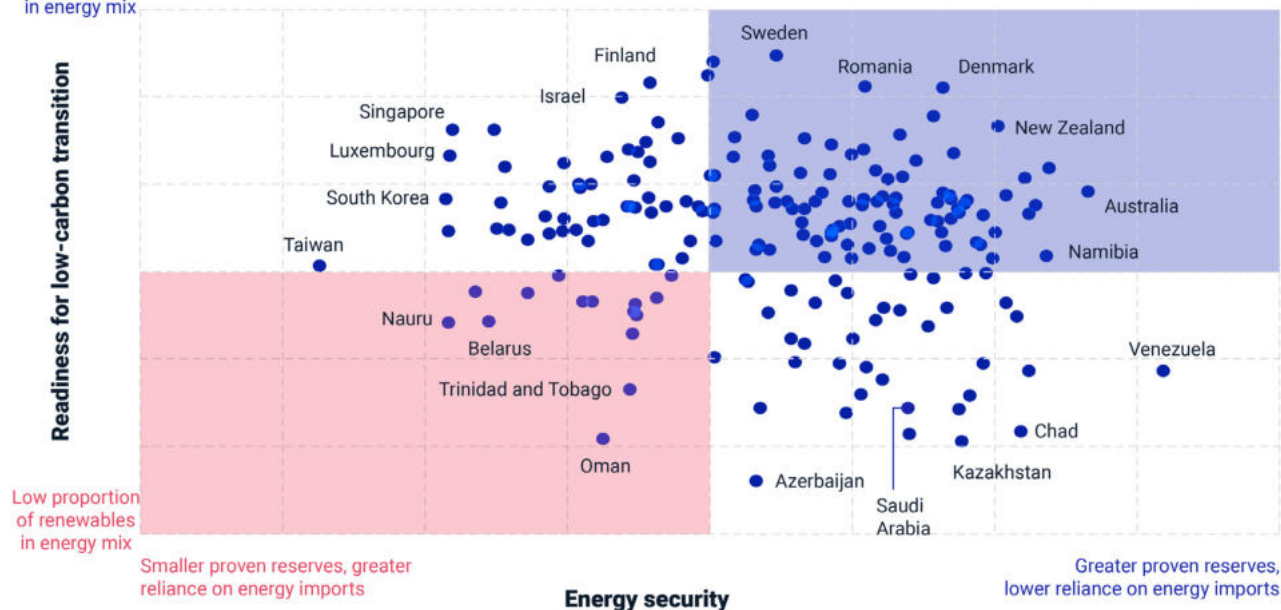
Economic sanctions on Russia in response to its invasion of Ukraine have led to international markets avoiding Russian energy, higher shipping costs and greater competition to secure alternative energy supplies. National energy security has long meant possession of, or ready access to, fossil-fuel reserves, but a handful of countries have managed to alter the calculus. **In 2023, we'll be watching how continued energy-market disruptions impact the global clean-energy transition in different countries and what it could mean for longer-term sovereign risk exposure.**

With European governments scrambling to find alternative energy options to substitute Russian hydrocarbon supplies, the move to a zero-carbon economy seems to have become a secondary concern, at least for now. Some governments have resorted to importing coal, the most carbon-intensive fossil fuel, and locked into long-term gas contracts at the expense of investment in renewables. Yet several governments have also committed to accelerate renewable expansion.

These policy shifts could have a crucial impact on how governments adjust their plans for energy transition. Our analysis, as detailed in the exhibit below, showed that some countries appeared to be better positioned to manage the transition to a low-carbon economy than others. For example, Denmark and New Zealand are among countries with some of the highest energy security *and* progress toward energy transition because they diversified their energy supplies and invested in renewable energy early enough to stay on track to meet their net-zero emission targets. These countries could be better placed to use the global energy-market disruptions to their benefit and capture green opportunities. Over the medium term, we would expect them to be able to mitigate energy risks and sustain higher growth dynamics. However, countries with poor energy security and limited transition efforts might be forced to sacrifice long-term GDP growth prospects in favor of immediate carbon-intensive solutions, delaying the global clean-energy transition.

A trade-off between energy security and energy transition is not inevitable

High proportion of renewables in energy mix



MSCI assesses the exposure of countries to ESG risks and their management of those risks in the MSCI ESG Government Ratings. The axis titles used in the chart are a simplification of the analysis undertaken for both energy security and low-carbon-transition preparedness. The positioning of countries along each axis reflects an aggregation of risk exposure and management in their energy security and readiness for a low-carbon transition, respectively. Outliers are highlighted for illustrative purposes. Data as of October 2022. Source: MSCI ESG Research.



Climate

TABLE OF CONTENTS

**Elchin Mammadov**
London**Mathew Lee**
New York

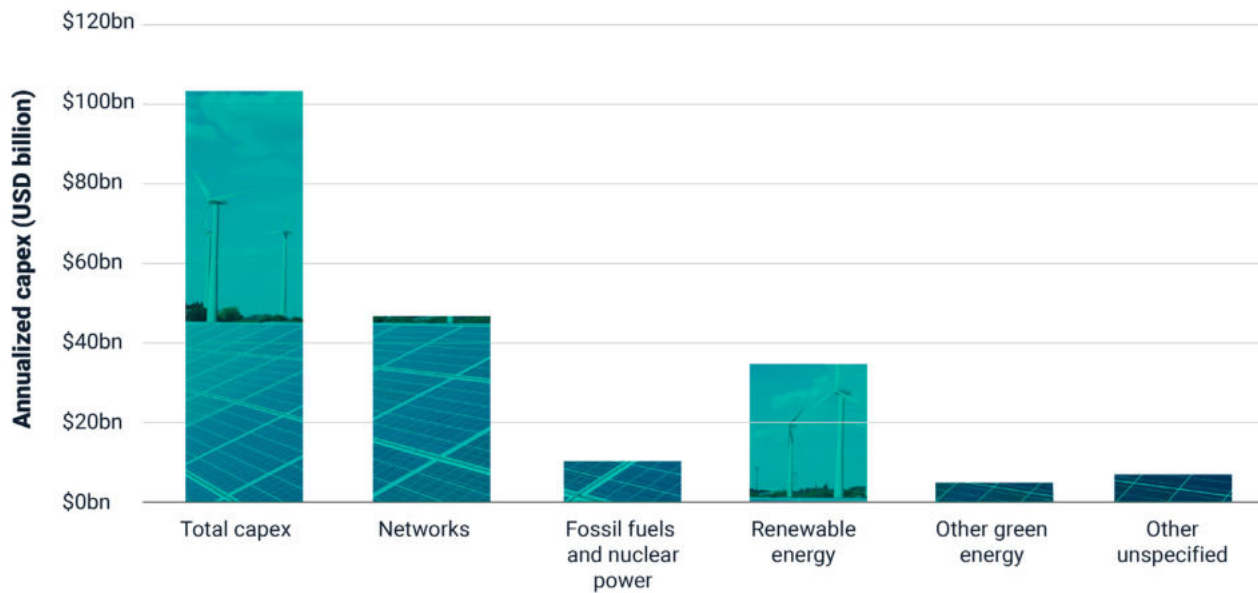
Energy crisis, Ukraine war driving fossil-fuel agenda, but don't rule out renewables

The ongoing war in Ukraine and high-inflationary environment may limit near-term pressure to reduce global greenhouse-gas (GHG) emissions as governments prioritize energy security and affordability. But for power companies, swapping coal and oil for natural gas may not be the only practical option. **In 2023, we'll be watching which companies are keeping their eyes on longer-term decarbonization trends and expanding deployment of renewables.**

The U.S. is releasing oil from its strategic petroleum reserve, which may encourage a near-term increase in hydrocarbon production.⁶⁶ Across the pond, the U.K. is launching a new oil and gas licensing round⁶⁷ and some EU member states are delaying their planned phaseout of coal-power plants.⁶⁸ And if natural-gas prices remain elevated, this may continue to boost demand for more emission-intensive coal and oil products as cheaper alternatives for producing power and heat.

But for companies sticking with their net-zero plans, these alternatives come with complications. Renewables face some short-term uncertainties such as supply-chain bottlenecks, windfall taxes on low-carbon power generation and trade wars. But looking beyond 2023, long-term regulatory tailwinds could encourage the deployment of renewables and once again put them at the forefront of the fossil-fuel agenda.

Networks and renewables dominate capex plans of major utilities in U.S. and Europe



Data for 26 European and U.S.-based power-generating constituents of the MSCI ACWI Index, as of Aug. 5, 2022. Definitions of capital expenditures are based on MSCI’s ESG climate-change metrics.

66 “President Biden to Announce New Actions to Strengthen U.S. Energy Security, Encourage Production, and Bring Down Costs.” The White House, Oct. 18, 2022.

67 Fisher, Jonah. “UK defies climate warnings with new oil and gas licences.” BBC News, Oct. 7, 2022.

68 Zachová, Aneta. “EU countries eye coal over gas supply fears.” Euractiv, March 15, 2022.



Climate



Regulation

TABLE OF CONTENTS



Hanna Trueb
Boston



Elchin Mammadov
London



Mathew Lee
New York

Nuclear energy contemplates a comeback

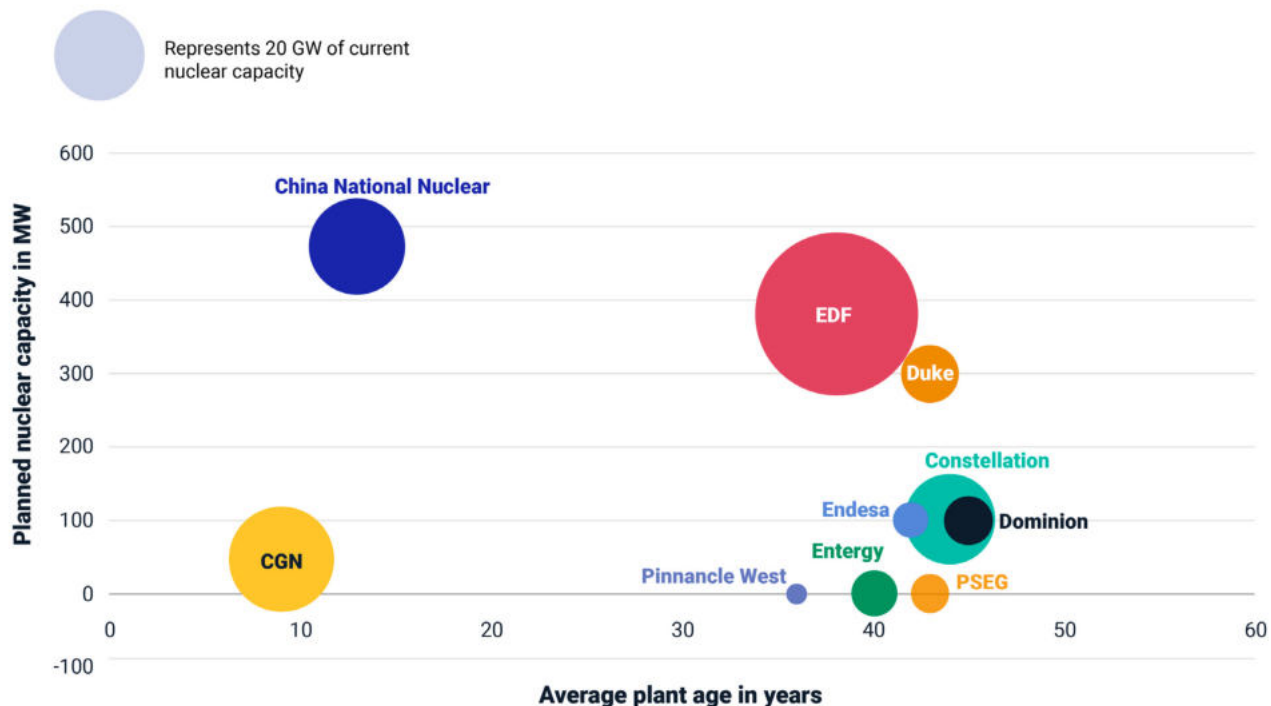
A global energy crunch and greater demand for low-carbon energy has shifted support toward nuclear power. **In 2023, we are watching whether an industry that enjoyed its last rise to prominence in the 1990s⁶⁹ will be able to manage high costs, long project lead times and labor constraints to rejuvenate itself.**

In July 2022, the EU voted to label nuclear energy a sustainable activity under their green taxonomy, aiming to make it easier for capital to flow into nuclear assets. While this move received criticism for enabling increased radioactive waste, China, South Korea and other countries developing taxonomies have taken the same approach.⁷⁰ Further, following Russia’s invasion of Ukraine, several countries including Germany, South Korea, Japan, Belgium, France, Netherlands and the U.S. have either reversed nuclear phaseout plans, moved to restart idled reactors, offered subsidies to extend the life of existing atomic units or announced the addition of new plants.⁷¹

The near decadelong lead times needed for project development means that nuclear energy will always be a long-term game.⁷² Companies that are already operating nuclear plants or have committed to plans to add new nuclear capacity in the coming years are therefore likely to benefit the most from more favorable regulatory conditions.

However, a nuclear renaissance is not guaranteed: Potential obstacles include construction delays, higher levelized costs compared to other technologies (not only wind and solar,⁷³ but dispatchable hydropower, coal and gas power with carbon capture and storage⁷⁴) and an aging workforce (25% age 55 and above⁷⁵). Therefore, astute financial decisions and human capital management may become the keys that unlock new opportunities in nuclear energy.

Biggest earners in nuclear power show clear differences in current and planned fleet capacity



The top 10 constituents of the MSCI ACWI Investable Market Index in terms of estimated percentage of revenue from nuclear power generation. Planned nuclear capacity refers to nuclear projects that are announced or under construction but not yet operational. Bubble labels and size correspond to each company's current installed nuclear capacity in gigawatts. Data as of Oct. 13, 2022. Source: S&P Capital IQ, MSCI ESG Research

- 69 Nuclear power generation as a percentage of total global energy generation peaked at 17% in 1996. "Statistical Review of World Energy." BP, Sept. 21, 2022.
- 70 "What the inclusions of gas and nuclear in the EU Taxonomy could mean for investors and asset managers." S&P Global, Feb. 22, 2022.
- 71 Connolly, Kate. "Germany to delay phase-out of nuclear plans to shore up nuclear security." *Guardian*, Sept. 5, 2022.
Lee, Heesu. "Korea pares back renewables as it taps nuclear for climate goal." *Bloomberg*, Aug. 30, 2022.
Patrick, Philip. "Japan's nuclear renaissance: The global energy crisis has shifted public opinion." *Spectator*, Aug. 25, 2022.
"Belgium reaches initial deal to prolong nuclear power by 10 years." *Euractiv*, Jul. 22, 2022.
Clifford, Catherine. "What the climate bill does for the nuclear industry." *CNBC*, Aug. 22, 2022.
Stuart Leeson, Sofia. "Dutch cabinet to reveal plans for new nuclear power plants." *Euractiv*, Jun. 27, 2022.
"Macron sets out plan for French nuclear renaissance." *World Nuclear News*, Feb. 11, 2022.
- 72 "Median construction times for reactors since 1981." *World Nuclear Association*, Sept. 25, 2020.
- 73 "Levelized Cost of Energy Analysis 15.0." *Lazard*, Oct. 28, 2021.
- 74 "LCOE range for selected dispatchable low emissions electricity sources in the Sustainable Development Scenario, 2030, 2040 and 2050." *International Energy Agency*, Jun. 29, 2022.
- 75 "Global Energy Talent Index Report 2022." *Airswift*, Jan. 2022.



Climate

TABLE OF CONTENTS

**Mathew Lee**
New York**Umar Ashfaq**
New York

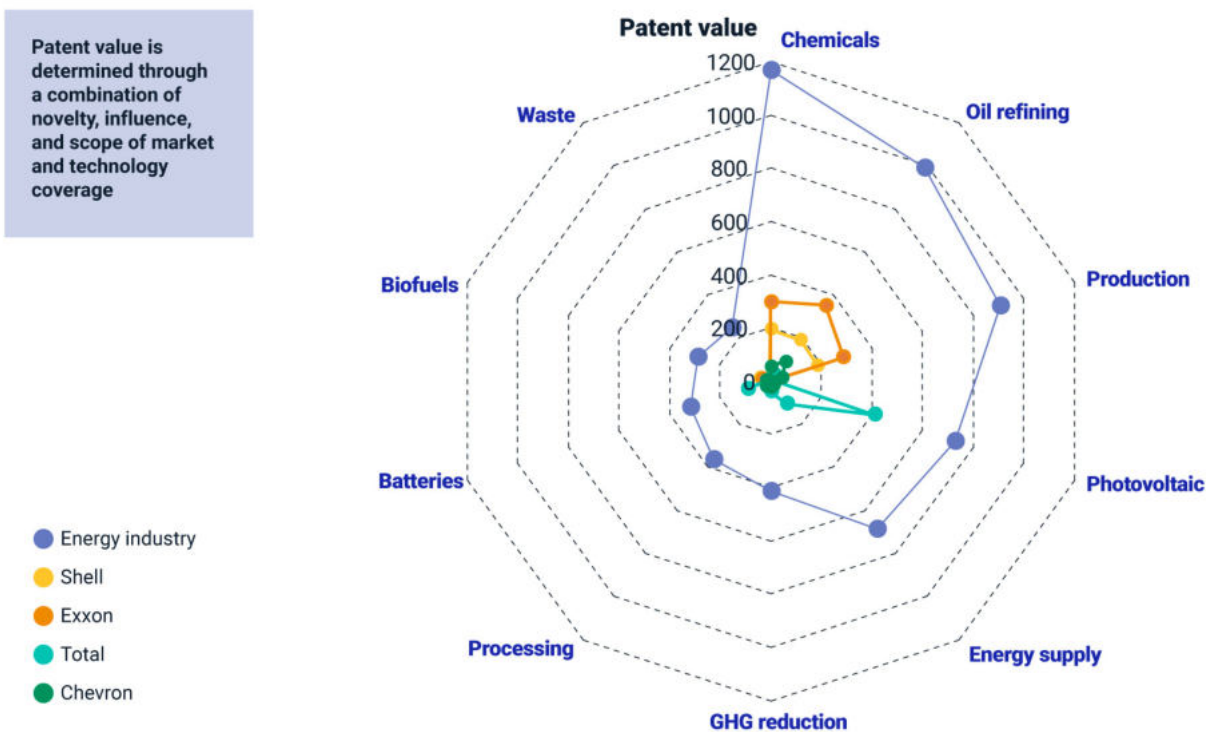
Patent activity suggests energy firms still dig fossil fuels

As oil prices are projected to stay above USD 90 a barrel in 2023,⁷⁶ energy companies are likely to continue to generate hefty profits, as in 2022. In the first quarter of 2022, they saw median profitability growth of 127% year-over-year.⁷⁷ Historically, high energy prices have also driven patenting activity toward renewable-energy technologies. However, examining the current patent portfolios of energy companies specifically we found that they were still firmly focused on the traditional business of fossil fuels and petrochemicals.⁷⁸ **In 2023, as energy companies look to continue benefiting from high oil prices, we'll be watching what they do with their cash-filled coffers: double-down on existing business models or funnel more toward clean-tech investments.**

Viewing patents as a proxy for investment in innovation can offer a glimpse into how energy companies are likely to change (or not change) their future business strategy. Using MSCI ESG Research's patent database,⁷⁹ including 57 types of low-carbon patents, we analyzed the patent portfolios of 1,714 energy companies to identify the 10 leading types of low-carbon patents for the energy industries.⁸⁰ Such patents cover all technologies or equipment intended to reduce emissions from existing processes, including those that ultimately yield fossil fuels.

On aggregate, the largest concentration of patents complemented the traditional activities of fossil-fuel extraction. Three of the four largest integrated oil and gas companies held a cluster of patents related to petrochemicals and enhanced efficiency of refining and production methods (ExxonMobil Corp., Shell plc and Chevron Corp.). An alternative concentration of patents around renewables may signal more aggressive investment toward the energy transition — e.g., in solar-power technologies (TotalEnergies SE). This means analyzing patent data may offer investors insight into how wedded energy companies are to fossil fuels and whether this matches their stated energy-transition ambitions.

Top 10 low-carbon patent categories for the energy industry



The four companies displayed are the largest integrated oil and gas companies within MSCI ESG Research's coverage by low-carbon patent scores and represent almost 30% of the total low-carbon patent values within the energy sector. MSCI ESG Research's Low-Carbon Patent Score seeks to establish a picture of the relative level and quality of patents held by companies. Each patent receives a score based on forward citations, backward citations, market coverage and Cooperative Patent Classification (CPC) / International Patent Classification (IPC) coverage. MSCI ESG Research's model currently covers 96 million unique patents that have been granted from over 70 patent authorities worldwide. Data as of Oct. 13, 2022. Source: MSCI ESG Research

76 "Short-term energy outlook." U.S. Energy Information Administration, Oct. 12, 2022.

77 Milman, Oliver. "Largest oil and gas producers made close to \$100bn in first quarter of 2022." *Guardian*, May 13, 2022.

78 Grubb, Michael et al. "Induced innovation in energy technologies and systems: a review of evidence and potential implications for CO2 mitigation." *Environmental Research Letters*, March 29, 2021.

79 For more on MSCI's patent database and value assessment methodology, please refer to: "MSCI Climate VaR methodology part 3: Technology opportunities," MSCI ESG Research, June 2020. (Client access only.)

80 We defined energy companies as those within MSCI's coverage in the following industries as of Oct. 5, 2022: energy equipment and services, integrated oil and gas, oil and gas exploration and production, oil and gas refining, marketing, transportation and storage.



Climate

TABLE OF CONTENTS



Cody Dong
Shanghai



Virag Bokodi
Budapest

Pulling back the veil on banks' loan emissions

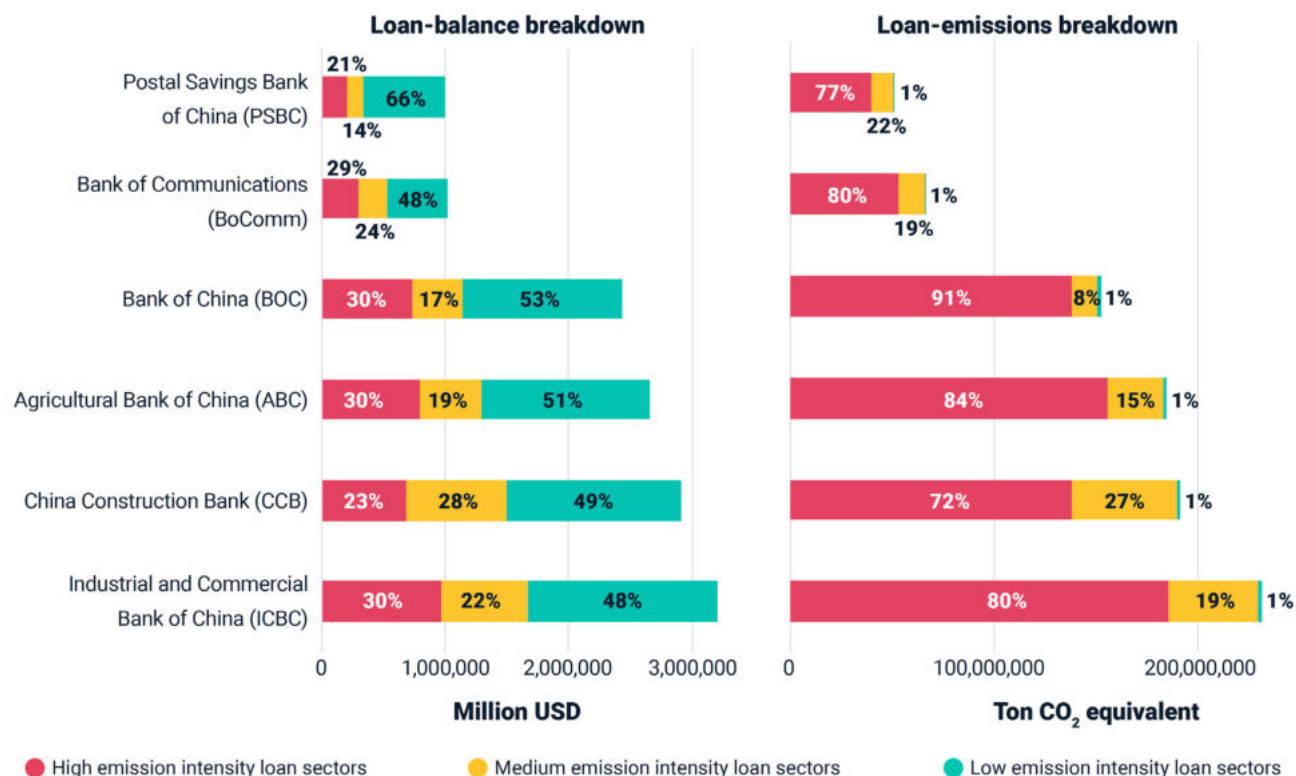
For banks, greenhouse-gas (GHG) emissions associated with their loans are fundamental to analyzing climate transition risk. Until recently, estimations and disclosures have been limited. Some banks in developed markets have already started to partially report GHG emissions associated with their lending books, but banks in emerging markets like China have yet to follow suit – despite likely being, in some cases, some of the world’s largest financers of new emissions. **In 2023, we will be watching to see if the increasing regulatory and investor pressure felt by developed-market banks to disclose loan emissions spreads to big emerging-market lenders.**

The number of companies that have committed to measure and disclose financed emissions under the harmonized reporting standard for financial institutions developed by the Partnership for Carbon Accounting Financials (PCAF)⁸¹ has grown rapidly.⁸² But they are concentrated in developed markets.

Using the MSCI Total Portfolio Footprinting solution, which follows PCAF principles and banks’ publicly available loan breakdown by sector,⁸³ we calculated a high-level loan emissions estimation for a sample of six state-owned Chinese banks (the “big six”).⁸⁴ These banks accounted for around 45% of the total loan balance in the country, as of the end of 2021.⁸⁵ As of October 2022, none of them had reported loan emissions.

Loan sectors with high emission intensity represented nearly 30% of the total loan balance of these banks, as of the end of 2021, but these sectors’ share of total loan GHG emissions was approximately 80%. Differences in emissions intensity measured by loan size between individual banks were driven by the sector distribution of loans. More detailed inputs from banks themselves could bring higher-quality estimations and help all stakeholders better understand the resulting risk exposure and financed contributions to climate change.

Breakdown of loan balance and emissions for the 'big six' state-owned Chinese banks



Emission data is calculated using GHG-emissions intensity (Scope 1 and 2) by loan sector using the MSCI Total Portfolio Footprinting methodology (quality score of 5). Emissions data includes both required (known use of proceeds) and optional (unknown use of proceeds). In this analysis, high-emission-intensity loan sectors are defined as those with >100 tons CO2 equivalent/USD 1 million, which include utilities, oil, gas & consumable fuels, metals & mining, transportation and manufacturing. Medium-emission-intensity loan sectors are defined as those with 10-100 tons CO2 equivalent/USD 1 million, which include commercial-other, wholesale, hotels, restaurants and leisure, telecommunication services, information technology and commercial and professional services. Low-emission-intensity loan sectors defined as those with < 10 tons CO2 equivalent/USD 1 million, which include real estate, services, financials, credit card, consumer, retail-other and mortgage. Data as of Oct. 13, 2022. Source: MSCI ESG Research

81 "The Global GHG Accounting & Reporting Standard for the Financial Industry. First Edition." PCAF, Nov. 18, 2020.
 82 "The Partnership for Carbon Accounting Financials (PCAF) welcomes 200th financial institution: Japan Post Bank Co., Ltd." PCAF, Jan. 31, 2022.
 Special PCAF News Update: Fall 2022." PCAF, Sept. 8, 2022.
 83 MSCI Total Portfolio Footprinting maps bank-disclosed loan sectors to the Global Industry Classification Standard (GICS®). GICS is the global industry classification standard jointly developed by MSCI and S&P Global Market Intelligence.
 84 As defined by the China Banking and Insurance Regulatory Commission.
 85 Calculated using company reported loan balances divided by total outstanding loans in China according to People's Bank of China.



Climate

TABLE OF CONTENTS

**Sylvain Vanston**
Paris**Cody Dong**
Shanghai

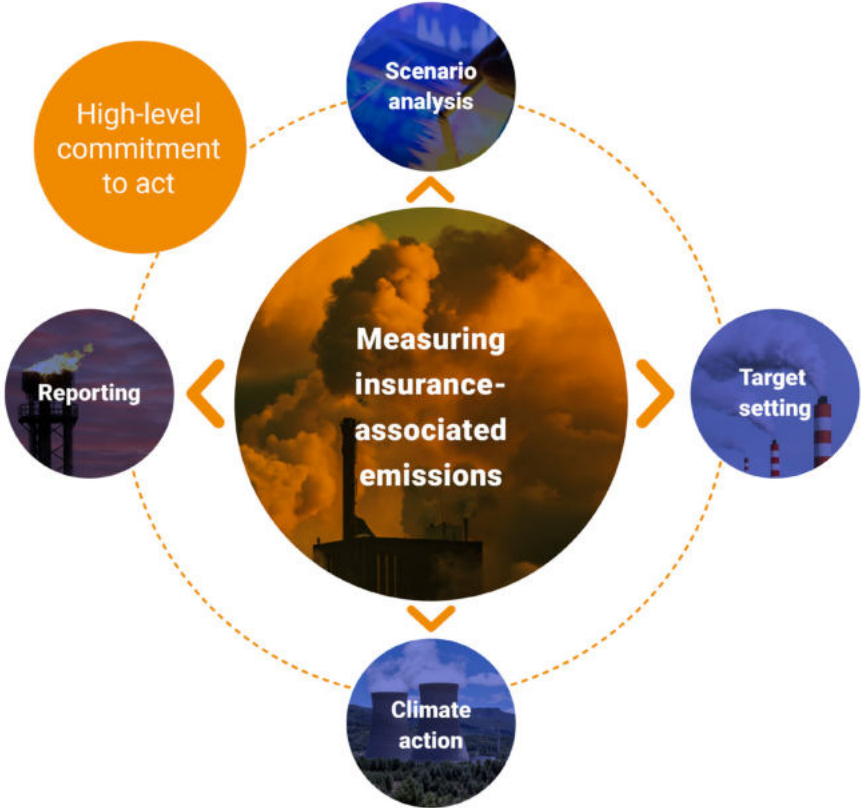
Insurance emissions: The actuarial revolution has begun

Financed emissions has become a mainstream ESG concern, but “insured emissions” – the attribution of an insurance-company client’s emissions to its insurance underwriter – is an emerging concept. **In 2023, we will be watching which global insurers act first to measure their insured-emissions footprints and position themselves ahead of investor pressure or any future regulatory-reporting requirements that might emerge.**

Insurers do not “own” their customers, yet they do have an “enabling” influence over their activities. Insurers that wish to evaluate the carbon emissions of their assets and liabilities strive to connect their role as asset owners and as risk carriers. The Net-Zero Insurance Alliance (NZIA) has partnered with the Partnership for Carbon Accounting Financials (PCAF) to develop the first global standard for measuring insurance-associated emissions (IAEs). The final guidance was released in November 2022, with a focus on commercial lines and retail-motor lines. The reporting and the reduction target of IAEs may help incentivize insurers to influence low-carbon behaviors for their customers.

Insurers that support the PCAF framework are expected to report on their IAEs and, by July 2023, NZIA members are also expected to publish decarbonization targets using this new metric for their commercial-lines and retail-motor portfolios. Effectively, the only ways to achieve these targets are to influence insurance clients or reorganize insurance-business exposure, neither of which may come easy. Nonetheless, with much of the world needing insurance for one thing or another, insurers dedicated to net-zero may have an influential role to play in driving decarbonization of the global economy. To claim any credit for that, they will need to measure their insured emissions.

Measuring insurance-associated emissions as the foundation for other initiatives



Source: MSCI ESG Research (adapted from PCAF)



Climate



Investment

[TABLE OF CONTENTS](#)**Bhaveer Shah**

Singapore

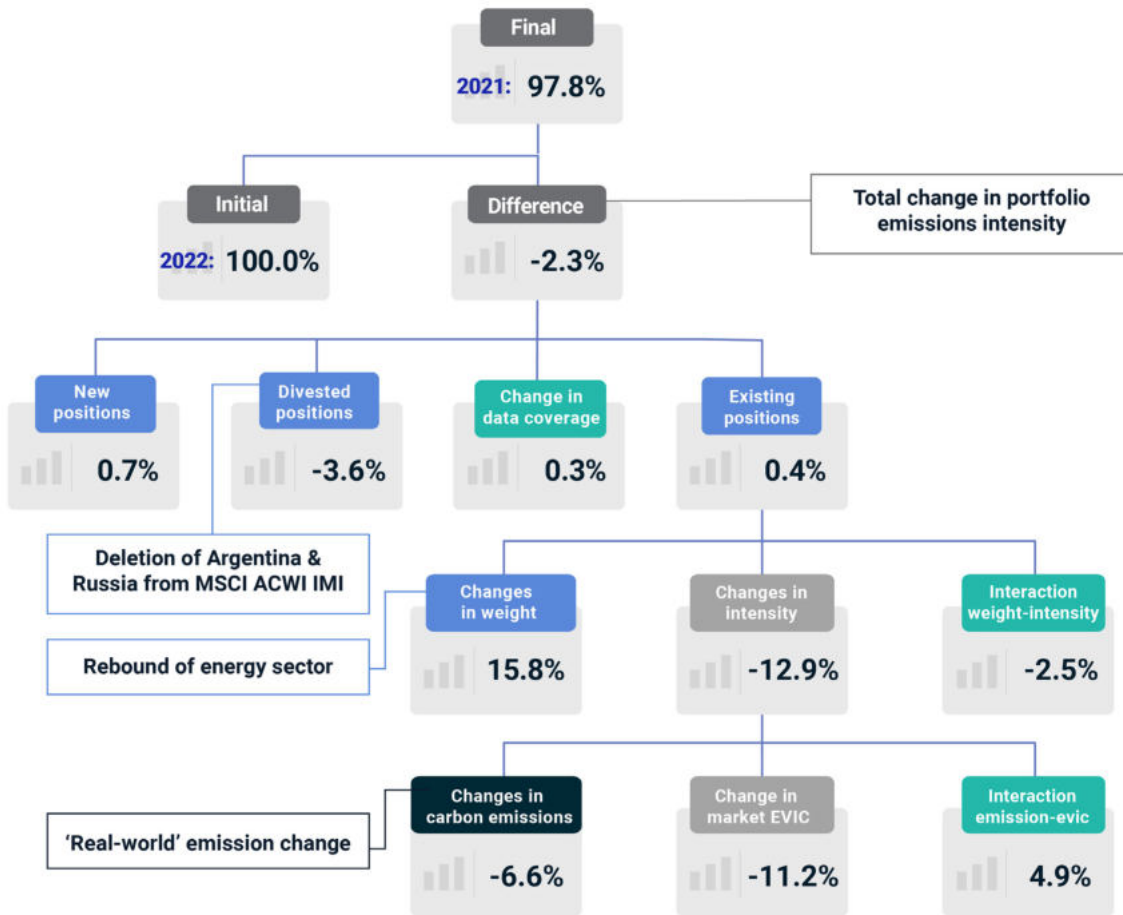
Emissions attribution could help keep portfolios aligned with net-zero

Following a volatile year for markets, investors now face the challenge of accounting for the ups and downs in their portfolios' associated financed emissions. To help overcome this challenge, new analytical models inspired by traditional performance-attribution analysis are emerging. **In 2023, we will be watching how investors might adopt these models to help them understand changes to their financed emissions and work toward staying aligned with long-term decarbonization pathways.**

These new models may be able to decompose headline emissions into their contributing factors, in part by segmenting changes in portfolio emissions from new, exited and existing positions – a particularly helpful tool during erratic market periods like 2022. Furthermore, with sharp adjustments to asset valuations sometimes affecting carbon-footprint intensity metrics, emissions-attribution models might help identify how factors like foreign-exchange fluctuations affected emissions intensities. Emissions-attribution models may also help isolate temporary one-off developments – such as the sudden divestments from Russian markets – from long-term trends.

Ultimately, emissions-attribution analysis has the potential to provide a framework for investors to understand the causes behind temporary deviations in their emissions profiles, helping them work toward staying aligned with long-term net-zero financed-emissions trajectories. Investors' stakeholders may also benefit from additional granularity and transparency into metrics that may currently be reported only at a headline level.

Example attribution analysis of changes in portfolio emissions intensity



This analysis is performed on a hypothetical basket of issuers that is based on the MSCI ACWI Investable Market Index from April 30, 2021, to April 29, 2022. The diagram is illustrative only and does not constitute any form of investment advice or actual index performance. Source: MSCI ESG Research



Climate

TABLE OF CONTENTS



Kenji Watanabe
Tokyo



Siyao He
Beijing



Antonios Panagiotopoulos
London

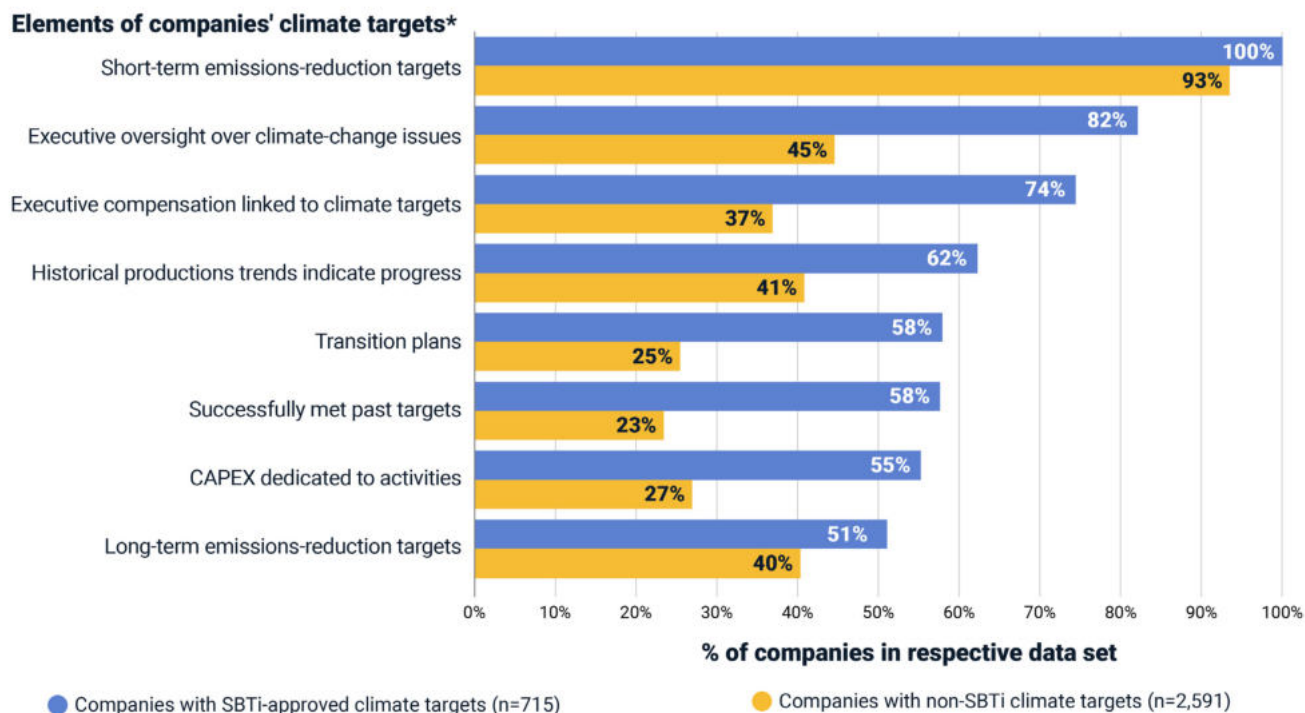
Net-zero: Companies are aiming high, but are their strategies practical?

Climate-target credibility is likely to become the next frontier for institutional investors aiming to decarbonize investment portfolios and reduce real-economy emissions of greenhouse gas (GHG) in accordance with United Nations-led net-zero initiatives, such as Net-Zero Asset Owner Alliance. We have observed an increasing number of companies setting climate targets, including net-zero emission targets. Yet questions remain as to whether these targets are achievable. **In 2023, we'll be watching which companies up their climate target game in the face of what we expect to be increasing pressure from institutional investors who have their own portfolio net-zero targets to meet.**

Of the 9,238 constituents in the MSCI ACWI Investable Market Index (IMI) as of October 2022, 36% (3,306) have set climate targets.⁸⁶ Of these, 715 companies have set targets aligned with the Paris Agreement and approved by the Science-Based Targets initiative (SBTi)⁸⁷ and 45 have set net-zero emissions targets for 2050 or earlier under the SBTi corporate net-zero standard, one of the most rigorous net-zero standards across industries. An additional 582 companies have committed to setting SBTi-approved net-zero targets in the next two years. Such third-party validations can boost investor trust in the information companies disclose and improve the transparency of climate targets. With other disclosure frameworks and regulations in the pipeline, companies and investors may have a more standardized manner of assessing climate targets.

The Glasgow Financial Alliance for Net Zero (GFANZ), for example, has proposed its own framework to help investors assess the soundness and credibility of corporate climate targets. We found companies with SBTi-approved targets typically scored better in the GFANZ framework than those without (see exhibit). This may suggest that companies that went through a rigorous third-party target-validation process (e.g., SBTi) were more likely to have disclosed transition planning and capital allocation for decarbonization activities and demonstrated successful track records — increasing the transparency of emissions-reduction strategies and enhancing the feasibility of climate targets. With the focus on corporate climate targets likely to intensify and regulations around disclosure likely to tighten, investors should be able to make better informed climate-investing decisions going forward.

Credibility assessments of constituents of the MSCI ACWI IMI with climate targets



For the 3,306 constituents of the MSCI ACWI IMI with climate targets, as of October 2022.

* GFANZ portfolio-alignment measurements – credibility indicators and CDP data metrics.

CDP is a not-for-profit charity that runs the global disclosure system for investors, companies, cities, states and regions to manage their environmental impacts. Source: CDP, MSCI ESG Research

86 The MSCI ACWI IMI constituents referenced in the report are as of Oct. 17, 2022. Target-level data was downloaded from MSCI ESG Manager on this date.

87 “Companies taking Action” and “SBTi Corporate Net-Zero Standard.” SBTi, October 2021. SBTi is a multinational organization promoting the adoption of climate targets aligned with the Paris Agreement. SBTi-related target-level data was downloaded from these reports.



Supply chain

TABLE OF CONTENTS



Helen Marlow
London

Lab-grown commodities: The new frontier?

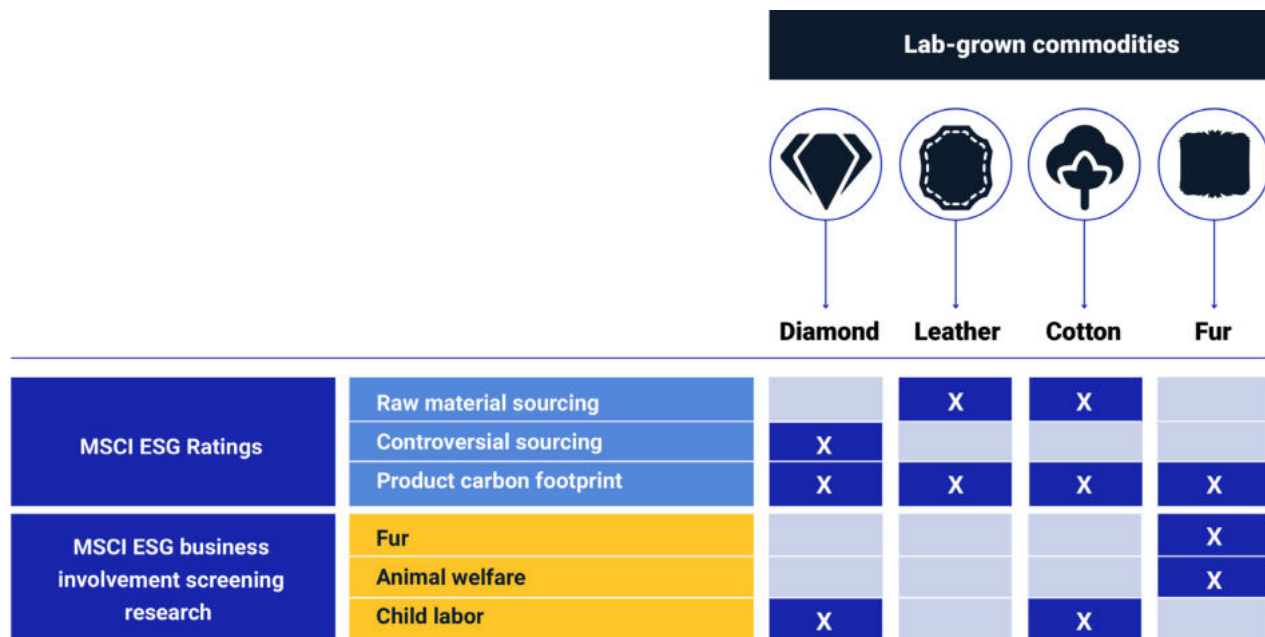
Lab-grown diamonds have moved firmly into the mainstream, and leather, cotton and even fur could be next. For companies facing controversy or criticism over the environmental or human-rights impacts of their raw materials, this could look like a game-changer. **In 2023, we will be watching industry investments in lab-grown commodities to see which companies are looking at potential environmental and social benefits as reason enough to spend while consumer appetite is still, for the most part, untested.**

It is arguably much easier to monitor your full supply chain when the raw materials start in a nearby lab than if they are coming from multiple locations across the globe, passing through many hands before they reach you. No more worries about conflict diamonds, deforestation or animal welfare.⁸⁸ It is also much easier to track and manage your environmental risks and impacts such as carbon emissions or the use of dangerous chemicals.⁸⁹ Companies may see this as an easier way to navigate incoming supply-chain regulations such as the German Supply Chain Act (due to come into effect in 2023) or the European Supply Chain Act (currently in consultation).⁹⁰

Evidence of industry interest is already beginning to emerge with recent investments in lab-grown leather. Gucci parent company Kering, for example, has invested in VitroLabs Inc., and expects to start pilot-level production in 2023. Additionally, LVMH Moët Hennessy Louis Vuitton invested in the Israeli lab-grown diamond startup Lusix in June 2022 and Fendi (part of LVMH) partnered with Imperial College London and Central Saint Martins in 2022 to experiment with lab-grown fur.⁹¹

Initial industry concerns may be more focused on questions of consumer preference and pricing – and the latter is currently a barrier to entry for many of these lab-grown alternatives. But the real-world impact of these new processes at scale is yet to be seen, as are the unintended consequences for companies that embrace this brave, new, lab-grown world.

Lab-grown commodities may reshape the risk and impact landscape for certain industries



The exhibit shows potential areas of overlap between the growth of lab-grown commodities and key issues within the MSCI ESG Ratings model, as well as MSCI ESG Business Involvement Screening Research. “X” indicates the relevance of each commodity to either a key issue (under the MSCI ESG Ratings model, in dark blue) or business activity (in yellow). Data as of October 2022. Source: MSCI ESG Research

88 Constable, Harriet. “The Sparkling Rise of the Lab-Grown Diamond.” BBC Future, Feb. 10, 2020.
Pitcher, Laura. “Leather is bad for animals and the planet – but what if we made it in a lab?” TED, April 7, 2022.

89 Kart, Jeff. “Galy Grows Greener Cotton In A Lab, 10 Times Faster Than The Farm Variety.” *Forbes*, April 14, 2020.

90 Here, and elsewhere in this analysis the information is provided “as is” and does not constitute legal advice or any binding interpretation. Any approach to comply with legal, regulatory or policy initiatives should be discussed with your own legal counsel and/or the relevant competent authority, as needed.

91 Mundell, Ian. “Fashion industry collaboration to create lab-grown fur.” Imperial College London, July 25, 2022.



Climate

TABLE OF CONTENTS



Sam Block

New York

Turning steel green(er) with blast-furnace upgrades

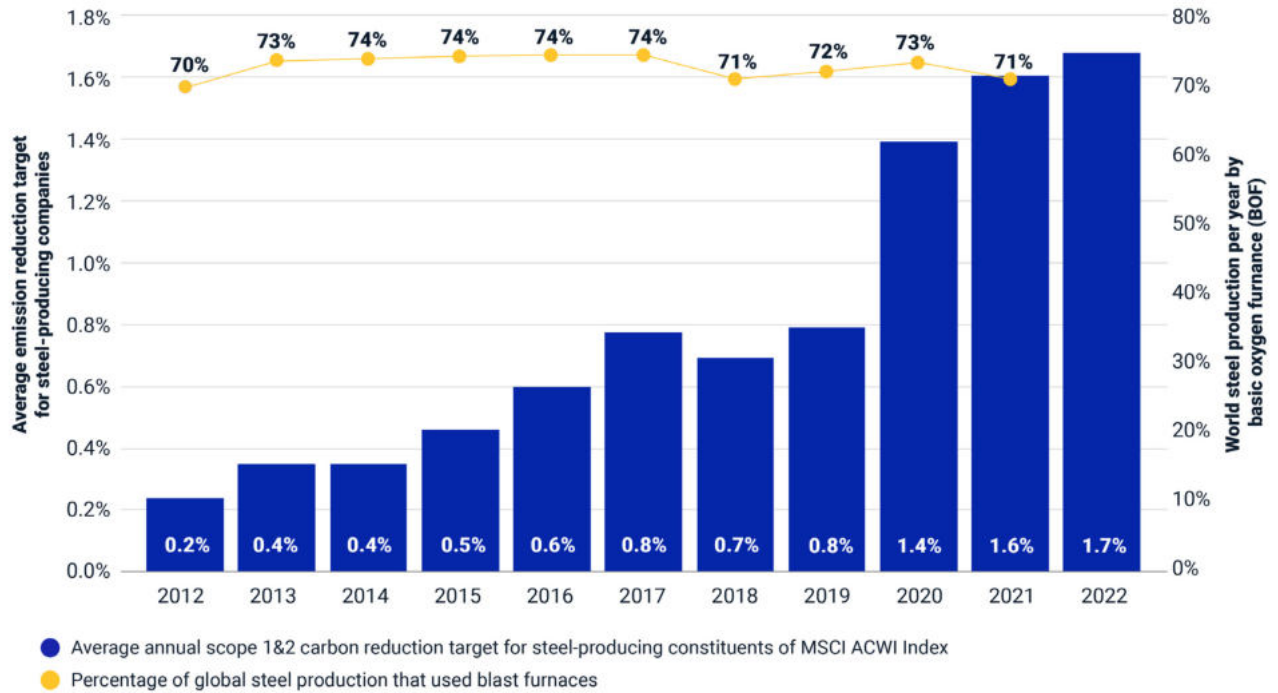
Global steel production is dominated by carbon-spewing blast-furnace technology that relies on coking coal, a key ingredient of the manufacturing process. Yet the steel industry has gotten more aggressive than ever in its carbon-reduction commitments. By October 2022, 17 companies (51.6% of the steel Global Industry Classification Standard (GICS®)⁹² sub-industry in the MSCI ACWI Index) had stated their commitment to reach net-zero or carbon neutrality by 2050 or before. It is an important step for an industry that accounts for some 8% of the world's carbon emissions, but large economic and technological obstacles remain in meeting these targets. **In 2023, we will be watching how many steel producers tackle the significant hurdles facing them to take concrete steps toward low-carbon steel production.**

Steel is considered a hard-to-abate industry because of the conventional blast-furnace/basic-oxygen-furnace (BF/BOF) steelmaking process, which accounts for about 70% of global production. The resultant carbon emissions are not simply from coal combustion for energy, but also an inherent result of the chemical process to reduce iron ore to molten iron.

Low-carbon alternative methods to produce steel do exist. Some have started commercialization in the past few years, while others are still in development. However, the cost to convert global steel production to lower-carbon processes is estimated at around USD 4.4 trillion over the next 30 years,⁹³ including USD 435 billion in Europe alone.⁹⁴

The industry is becoming increasingly committed to improving its carbon emissions, but key questions remain: How aggressive will the industry be in achieving its targets and how will this transition be financed? If progress remain slow, wider efforts to limit global warming may be undermined.

Increased carbon-reduction commitments from the steel industry



Peer set consisted of steel-producing constituents of the MSCI ACWI Index steel GICS sub-industry (n=33), as of Oct. 21, 2022. Target data refers to average annual carbon-reduction target for these companies, specifically the most aggressive Scope 1 & 2 targets for each company, assuming linear reductions. Source: MSCI ESG Research

92 GICS is the industry-classification standard jointly developed by MSCI and S&P Global Market Intelligence.

93 "The net-zero transition: What it would cost, what it could bring." McKinsey & Co., January 2022.

94 Butterworth, Paul. "The cost of decarbonising European steel is high." CRU, Dec. 13, 2021.



Climate

TABLE OF CONTENTS



Mark Bessoudo

London

Greening industrial real estate one warehouse at a time

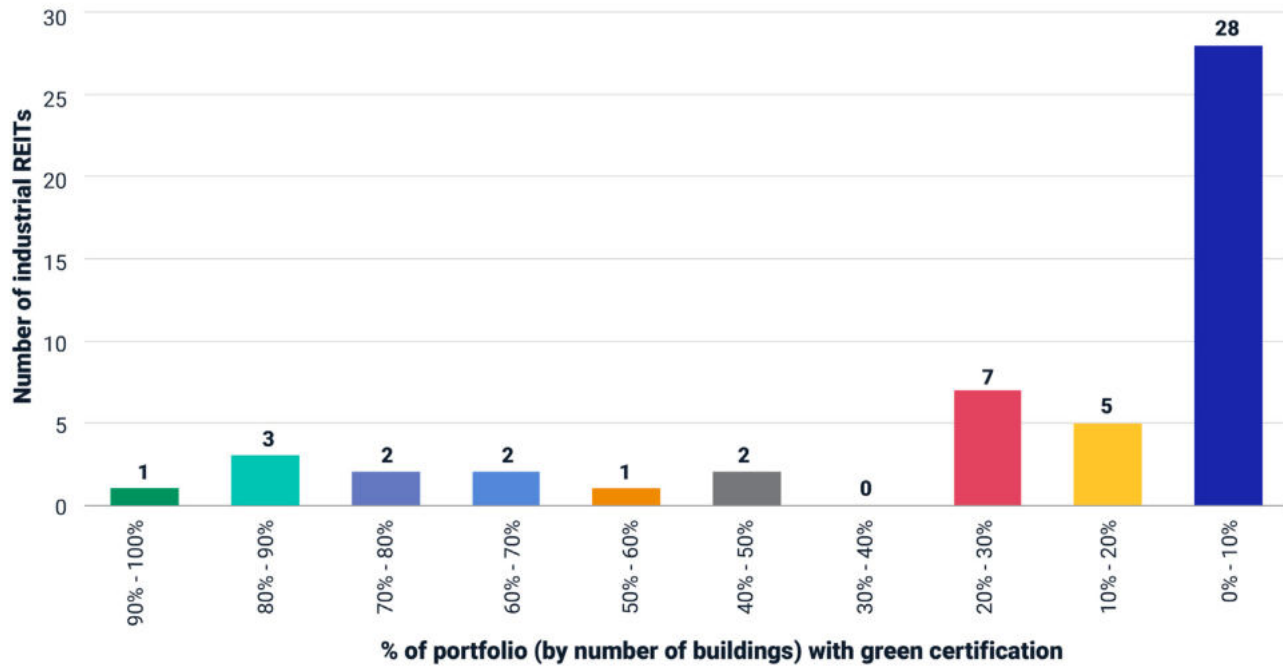
Industrial real estate has long been a neglected segment of the green-building market. But a COVID-19 e-commerce boom has put warehouses front and center, with stakeholders ramping up efforts to better manage their portfolios' environmental and social risks. A new generation of industrial facilities that emit less carbon and need less energy to build and operate are beginning to emerge. **In 2023, we will be watching to see which new leaders in green building emerge amid a confluence of forces including building performance benchmarking, electrification and financial incentives for decarbonization.**

Energy demand for industrial buildings is expected to continue growing.⁹⁵ In the U.S., for example, it is projected to grow at more than twice the rate of any other sector in real estate over the coming decade.⁹⁵ This is due to a confluence of factors: an expansion of both established (warehouses, logistics and distribution centers) and emerging (urban agriculture and advanced manufacturing) industrial sectors; advances in specialized robotics and automation systems that require more power than traditional industrial operations; and an increased demand for fleet electrification and charging infrastructure.

Investors in real estate investment trusts (REITs) have added substantial industrial holdings to their portfolios in recent years.⁹⁵ Although one-third of all industrial space in the U.S. is more than 50 years old,⁹⁶ REITs are now eligible for new rebates and incentives afforded under the U.S. Inflation Reduction Act (IRA) to help retrofit and refurbish these aging assets. The IRA also provides financial incentives for brownfield redevelopment, renewable energy and electric-vehicle infrastructure — something that every warehouse will need as the freight sector shifts to electric.

Furthermore, new industrial-specific green-building programs and benchmarking tools that have been recently launched — including those as part of the Fitwel, WELL and NABERS rating systems — may help attract more attention to the benefits of green certification in a sector that has historically overlooked them.

Most industrial REITs had few or no green-certified buildings in their portfolio



Data reflects the proportion of green-certified buildings (e.g., LEED and BREEAM) in the portfolios of industrial REIT constituents of the MSCI ACWI Index, as of Oct. 18, 2022. The percentage values refer to the proportion of a company's portfolio (by number of buildings) with a green certification. Source: MSCI ESG Research

95 "Power Play: How Evolving Energy Needs Will Shape the Industrial Market." Newmark, April 2022.

96 Margolies, Jane. "Amid Soaring Demand for Warehouses, an Effort to Make Them Greener." *New York Times*, April 12, 2022.



Climate

TABLE OF CONTENTS



Patric Kellermann
Potsdam



Jascha Lehmann
Potsdam



Katie Towe
New York

New risks and opportunities in climate adaptation

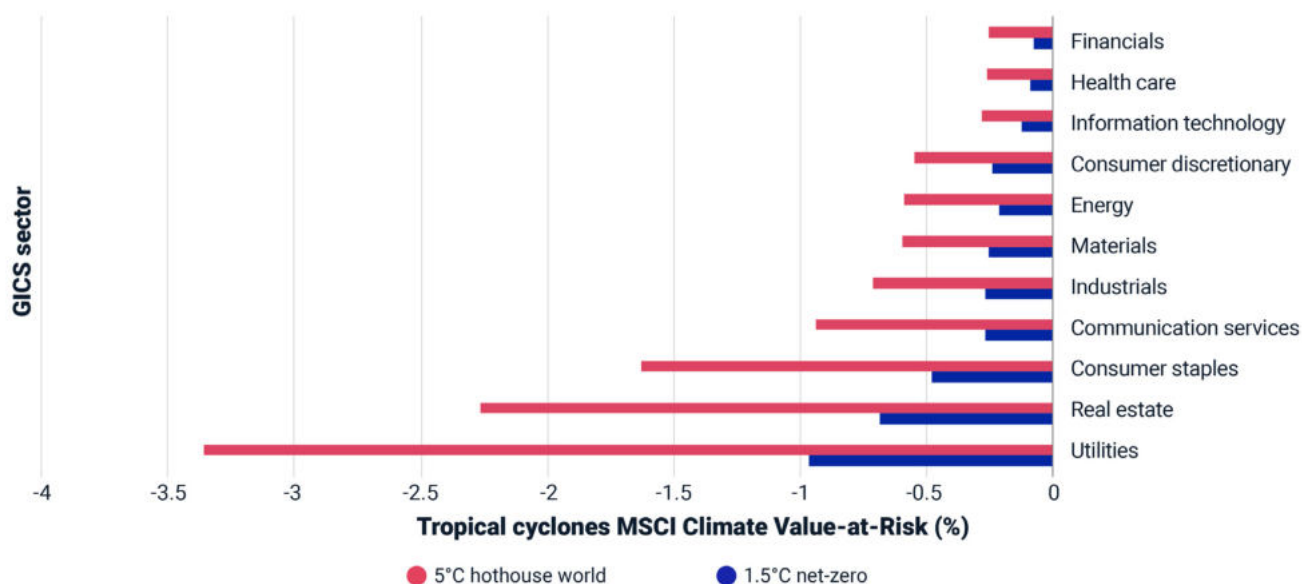
Even if global warming is limited to below 2°C, the world will still face rising weather extremes, such as heat waves, heavy precipitation and intense tropical cyclones.⁹⁷ It’s already happening. Yet less than one-quarter of firms are estimated to have adaptation plans.⁹⁸ **In 2023, as operational risks rise – along with opportunities for those providing solutions – we’ll be watching companies and investors to spot the early movers looking to seize a climate-adaptation advantage.**

The socioeconomic impacts from extreme weather will be felt differently across different sectors. Tropical cyclones, some of the costliest disasters, are expected to have the strongest impact on utilities, real estate and consumer staples. The projected market value losses in these sectors could rise by more than 200% if warming reaches 5°C as compared to 1.5°C (see exhibit below).

Despite its rising importance, the shortfall in funds to help reduce such weather-related disasters – the “adaptation finance gap” – is growing.⁹⁹ There are, however, some large investors, like the World Bank and Bill Gates’ energy venture fund, committed to funding adaptation measures, such as desalination technologies and dynamic mooring systems.^{100,101}

Research suggests that every dollar invested in climate adaptation could result in USD 2 to USD 10 of net economic benefit.¹⁰² Effective adaptation strategies may combine structural measures (e.g., flood protection), nature-based solutions and risk-transfer schemes (e.g., insurance products). While the first two may be dependent on political will and momentum, risk transfer can be a powerful mechanism for companies to buffer against economic impacts of extreme weather and may even incentivize companies to invest in further climate adaptation through discounted premiums.¹⁰³

Utilities, real estate and consumer staples face the biggest risk from tropical cyclones



The exhibit shows the sector-average impact of tropical cyclones on the market value of companies in the MSCI ACWI Investable Markets Index, expressed as MSCI Climate Value-at-Risk (Climate VaR). Sectors are defined according to the Global Industry Classification Standard (GICS®). GICS is the global industry-classification standard jointly developed by MSCI and S&P Global Market Intelligence. Data as of Sept. 12, 2022. Source: MSCI ESG Research

- 97 “The Physical Science Basis.” Intergovernmental Panel on Climate Change, 2021.
- 98 Li, Xia. “Physical Climate Risk and Firms’ Adaptation Strategy.” SSRN, June 22, 2022.
- 99 “Adaptation Gap Report 2021.” United Nations Environment Programme, Nov. 1, 2021.
- 100 “The World Bank Group’s Action Plan on Climate Change Adaptation and Resilience.” World Bank Group, Jan. 14, 2019.
- 101 Temple, James. “Bill Gates’ energy venture fund is expanding to climate adaptation and later-stage investments.” *MIT Technology Review*, Oct. 19, 2022.
- 102 “Adapt now: A global call for leadership on climate resilience.” Global Commission of Adaptation Report, Sept. 13, 2019.
- 103 Jongman, Brenden. “Effective adaptation to rising flood risk.” *Nature Communications*, May 29, 2018.



Climate



Investment

TABLE OF CONTENTS



Rumi Mahmood

London

Investing in emissions: Carbon as a new asset class?

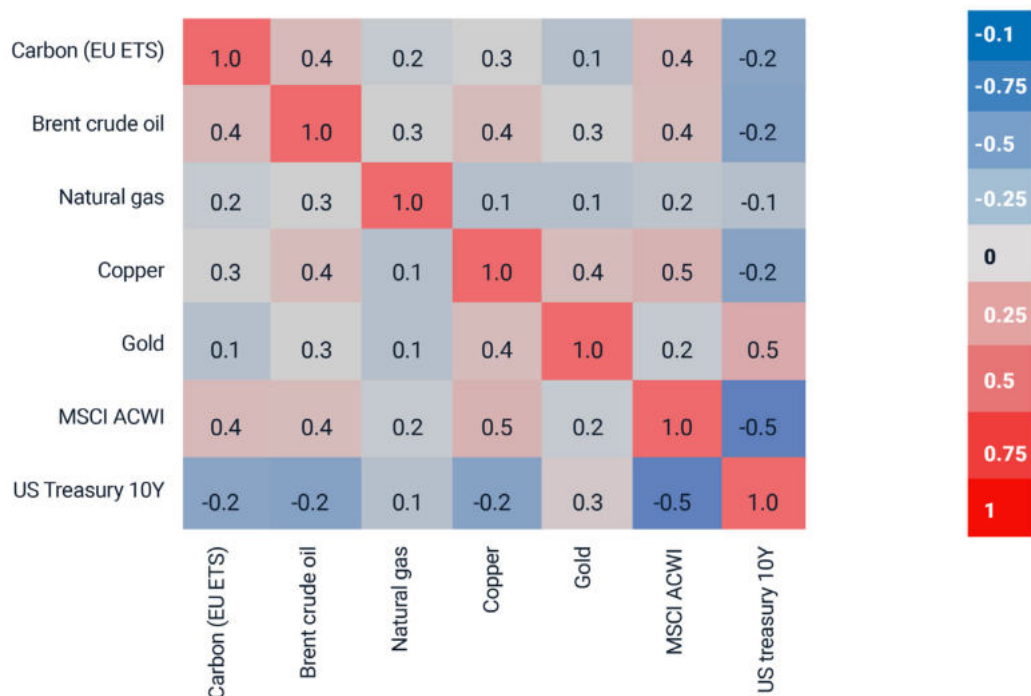
In earlier research, we discussed [the coming of age of carbon markets](#), which have grown to over USD 300 billion, placing them on the radar of many investors. And, indeed, we've seen the emergence of a new subset of funds that focus specifically on exposure to the price of carbon over the last year. **In 2023, we'll be watching whether the novelty of investing in emissions gains enough momentum to influence decarbonization or is undone by unintended side effects.**

Carbon-credit funds vary in their approaches, but most enable investors to access emission credits via futures contracts or through physical credits of various emissions-trading systems (ETS).¹⁰⁴ The investment thesis behind these new funds is that these exposures can act as portfolio diversifiers, analogous to commodity exposure, allowing investors a way to price carbon risks in their portfolios. If the world fails to drive down temperature change to below 2°C, such as in a “disorderly” or “too little, too late” transition scenario,¹⁰⁵ direct exposure to carbon allowances might offer downside protection, as carbon prices would have to rise to compensate for the lack of policy actions. Our research showed that carbon assets provided comparable risk-adjusted returns and exhibited low correlations to global equity and other commodities over the long term (see exhibit).

If the interest in such funds continues to mount, investors would be withdrawing carbon allowances from the market, potentially driving up the cost of the remaining allowances, which may accelerate decarbonization efforts. However, if the supply of emissions allowances is restricted through mass investor participation, there could be unintended social outcomes such as rising energy prices. Companies could pass on incremental costs to their customers, further adding to inflation. Furthermore, high carbon prices may deter high emitters from participating in a market that was primarily intended for their use. Also, where these funds fall under various global sustainable-fund classifications remain unclear. For example, carbon-credit funds are currently unclassified under the EU's Sustainable Finance Disclosure Regulation fund-labeling scheme.¹⁰⁶

In the past 12 months, several carbon-credit ETFs have been launched, with a focus on EU and North American allowances exposure.¹⁰⁷ As emissions-trading systems continue to expand, so too may the breadth of choice among this subset of funds. Additionally, as governments escalate climate policymaking, carbon pricing and the performance of carbon-credit funds may be a gauge of the stringency and efficacy of such policies.

Carbon (EU ETS) largely uncorrelated with other assets, offering diversification



Data from Jan. 1, 2012, to Sept. 30, 2022. One-month constant-maturity commodity future prices were used for Brent Crude, natural gas, copper and gold. For carbon (EU ETS), 12-month constant-maturity future prices were used. Source: MSCI ESG Research LLC

104 To incentivize firms to reduce their carbon emissions, a government may set a cap on the maximum level of emissions and create permits, or allowances, for each unit of emissions allowed under the cap. Emitting firms must obtain and surrender a permit for each unit of their emissions, from/to the government or through trading with other firms within an emissions trading system. Governments may choose to give the permits away for free or to auction them. The EU Emissions Trading System (EU ETS), comprised approximately 90% of the entire global carbon credits turnover in 2022, making it the world’s most liquid and developed ETS. Carbon credit funds provide exposure to carbon credits such as EU allowances (or EUAs), otherwise known as pollution permits from regulated carbon markets. EUA means the tradable unit under the European Union Emissions Trading Scheme (EU ETS), giving the holder the right to emit one tonne of carbon dioxide (CO₂).

105 A disorderly/delayed transition involves higher transition risk due to policies being delayed or divergent across countries and sectors, resulting in higher Carbon prices for a given temperature outcome. The Network of Central Banks and Supervisors for Greening the Financial System (NGFS), 2022.

106 “Regulation (EU) 2019/2088 of the European Parliament and of the Council of 27 November 2019 on sustainability-related disclosures in the financial services sector.” *Official Journal of the European Union*, Dec. 9, 2019.

107 Schlesinger, Joel. “ETFs for investors looking to profit off the growing carbon credit market.” *Globe and Mail*, Oct. 24, 2022.

Contact us

msci.com/contact-us

AMERICAS

Americas 1 888 588 4567 *
 Atlanta + 1 404 551 3212
 Boston + 1 617 532 0920
 Chicago + 1 312 675 0545
 Monterrey + 52 81 1253 4020
 New York + 1 212 804 3901
 San Francisco + 1 415 836 8800
 São Paulo + 55 11 3706 1360
 Toronto + 1 416 628 1007

EUROPE, MIDDLE EAST & AFRICA

Cape Town + 27 21 673 0100
 Frankfurt+ 49 69 133 859 00
 Geneva + 41 22 817 9777
 London + 44 20 7618 2222
 Milan + 39 02 5849 0415
 Paris 0800 91 59 17 *

ASIA PACIFIC

China North 10800 852 1032 *
 China South 10800 152 1032 *
 Hong Kong + 852 2844 9333
 Mumbai + 91 22 6784 9160
 Seoul 00798 8521 3392 *
 Singapore 800 852 3749 *
 Sydney + 61 2 9033 9333
 Taipei 008 0112 7513 *
 Thailand 0018 0015 6207 7181 *
 Tokyo + 81 3 5290 1555

* toll-free

About MSCI

MSCI is a leading provider of critical decision support tools and services for the global investment community. With over 50 years of expertise in research, data and technology, we power better investment decisions by enabling clients to understand and analyze key drivers of risk and return and confidently build more effective portfolios. We create industry-leading research-enhanced solutions that clients use to gain insight into and improve transparency across the investment process.

About MSCI ESG Research Products and Services

MSCI ESG Research products and services are provided by MSCI ESG Research LLC, and are designed to provide in-depth research, ratings and analysis of environmental, social and governance-related business practices to companies worldwide. ESG ratings, data and analysis from MSCI ESG Research LLC. Are also used in the construction of the MSCI ESG Indexes. MSCI ESG Research LLC is a Registered Investment Adviser under the Investment Advisers Act of 1940 and a subsidiary of MSCI Inc.

To learn more, please visit www.msci.com.

Notice and disclaimer

This document and all of the information contained in it, including without limitation all text, data, graphs, charts (collectively, the "Information") is the property of MSCI Inc. or its subsidiaries (collectively, "MSCI"), or MSCI's licensors, direct or indirect suppliers or any third party involved in making or compiling any Information (collectively, with MSCI, the "Information Providers") and is provided for informational purposes only. The Information may not be modified, reverse-engineered, reproduced or redisseminated in whole or in part without prior written permission from MSCI. All rights in the Information are reserved by MSCI and/or its Information Providers.

The Information may not be used to create derivative works or to verify or correct other data or information. For example (but without limitation), the Information may not be used to create indexes, databases, risk models, analytics, software, or in connection with the issuing, offering, sponsoring, managing or marketing of any securities, portfolios, financial products or other investment vehicles utilizing or based on, linked to, tracking or otherwise derived from the Information or any other MSCI data, information, products or services.

The user of the Information assumes the entire risk of any use it may make or permit to be made of the Information. NONE OF THE INFORMATION PROVIDERS MAKES ANY EXPRESS OR IMPLIED WARRANTIES OR REPRESENTATIONS WITH RESPECT TO THE INFORMATION (OR THE RESULTS TO BE OBTAINED BY THE USE THEREOF), AND TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, EACH INFORMATION PROVIDER EXPRESSLY DISCLAIMS ALL IMPLIED WARRANTIES (INCLUDING, WITHOUT LIMITATION, ANY IMPLIED WARRANTIES OF ORIGINALITY, ACCURACY, TIMELINESS, NON-INFRINGEMENT, COMPLETENESS, MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE) WITH RESPECT TO ANY OF THE INFORMATION.

Without limiting any of the foregoing and to the maximum extent permitted by applicable law, in no event shall any Information Provider have any liability regarding any of the Information for any direct, indirect, special, punitive, consequential (including lost profits) or any other damages even if notified of the possibility of such damages. The foregoing shall not exclude or limit any liability that may not by applicable law be excluded or limited, including without limitation (as applicable), any liability for death or personal injury to the extent that such injury results from the negligence or willful default of itself, its servants, agents or sub-contractors.

Information containing any historical information, data or analysis should not be taken as an indication or guarantee of any future performance, analysis, forecast or prediction. Past performance does not guarantee future results.

The Information should not be relied on and is not a substitute for the skill, judgment and experience of the user, its management, employees, advisors and/or clients when making investment and other business decisions. All Information is impersonal and not tailored to the needs of any person, entity or group of persons.

None of the Information constitutes an offer to sell (or a solicitation of an offer to buy), any security, financial product or other investment vehicle or any trading strategy.

It is not possible to invest directly in an index. Exposure to an asset class or trading strategy or other category represented by an index is only available through third party investable instruments (if any) based on that index. MSCI does not issue, sponsor, endorse, market, offer, review or otherwise express any opinion regarding any fund, ETF, derivative or other security, investment, financial product or trading strategy that is based on, linked to or seeks to provide an investment return related to the performance of any MSCI index (collectively, "Index Linked Investments"). MSCI makes no assurance that any Index Linked Investments will accurately track index performance or provide positive investment returns. MSCI Inc. is not an investment adviser or fiduciary and MSCI makes no representation regarding the advisability of investing in any Index Linked Investments.

Index returns do not represent the results of actual trading of investible assets/securities. MSCI maintains and calculates indexes, but does not manage actual assets. Index returns do not reflect payment of any sales charges or fees an investor may pay to purchase the securities underlying the index or Index Linked Investments. The imposition of these fees and charges would cause the performance of an Index Linked Investment to be different than the MSCI index performance.

The Information may contain back tested data. Back-tested performance is not actual performance, but is hypothetical. There are frequently material differences between back tested performance results and actual results subsequently achieved by any investment strategy.

Constituents of MSCI equity indexes are listed companies, which are included in or excluded from the indexes according to the application of the relevant index methodologies. Accordingly, constituents in MSCI equity indexes may include MSCI Inc., clients of MSCI or suppliers to MSCI. Inclusion of a security within an MSCI index is not a recommendation by MSCI to buy, sell, or hold such security, nor is it considered to be investment advice.

Data and information produced by various affiliates of MSCI Inc., including MSCI ESG Research LLC and Barra LLC, may be used in calculating certain MSCI indexes. More information can be found in the relevant index methodologies on www.msci.com.

MSCI receives compensation in connection with licensing its indexes to third parties. MSCI Inc.'s revenue includes fees based on assets in Index Linked Investments. Information can be found in MSCI Inc.'s company filings on the Investor Relations section of www.msci.com.

MSCI ESG Research LLC is a Registered Investment Adviser under the Investment Advisers Act of 1940 and a subsidiary of MSCI Inc. Except with respect to any applicable products or services from MSCI ESG Research, neither MSCI nor any of its products or services recommends, endorses, approves or otherwise expresses any opinion regarding any issuer, securities, financial products or instruments or trading strategies and MSCI's products or services are not intended to constitute investment advice or a recommendation to make (or refrain from making) any kind of investment decision and may not be relied on as such. Issuers mentioned or included in any MSCI ESG Research materials may include MSCI Inc., clients of MSCI or suppliers to MSCI, and may also purchase research or other products or services from MSCI ESG Research. MSCI ESG Research materials, including materials utilized in any MSCI ESG Indexes or other products, have not been submitted to, nor received approval from, the United States Securities and Exchange Commission or any other regulatory body.

Any use of or access to products, services or information of MSCI requires a license from MSCI. MSCI, Barra, RiskMetrics, IPD and other MSCI brands and product names are the trademarks, service marks, or registered trademarks of MSCI or its subsidiaries in the United States and other jurisdictions. The Global Industry Classification Standard (GICS) was developed by and is the exclusive property of MSCI and S&P Global Market Intelligence. "Global Industry Classification Standard (GICS)" is a service mark of MSCI and S&P Global Market Intelligence.

MIFID2/MIFIR notice: MSCI ESG Research LLC does not distribute or act as an intermediary for financial instruments or structured deposits, nor does it deal on its own account, provide execution services for others or manage client accounts. No MSCI ESG Research product or service supports, promotes or is intended to support or promote any such activity. MSCI ESG Research is an independent provider of ESG data, reports and ratings based on published methodologies and available to clients on a subscription basis. We do not provide custom or one-off ratings or recommendations of securities or other financial instruments upon request.

Privacy notice: For information about how MSCI collects and uses personal data, please refer to our Privacy Notice at <https://www.msci.com/privacy-pledge>.