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RESEARCH INSIGHT

Assessing Science-Based Corporate Climate Target-Setting

June 2023

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Contents

Executive summary

At the COP 27 climate conference in Egypt in November 2022, the United Nations' High-Level Expert Group on the Net-Zero Emissions Commitments of Non-State Entities (Expert Group) underscored the need for action on corporate climate pledges, calling for companies and financial institutions to back up their climate commitments with action and investment.[1] The Expert Group recommended the use of third-party verification, such as Science-Based Target Initiatives (SBTi), to set climate targets and reduce total value-chain emissions in line with the ambitious 1.5°C goal of the Paris Agreement.[2]

Using MSCI's climate metrics, we have outlined a framework for assessing climate-change targets to determine what steps companies have taken to achieve their climate targets, ranging from the disclosure of greenhouse-gas (GHG) emissions to investment in climate solutions. This assessment draws on foundational principles from SBTi and the Glasgow Financial Alliance for Net Zero (GFANZ). SBTi is a leading global initiative to promote science-based climate target-setting and may be a common reference point for investors focused on climate targets that are aligned with the goals of the Paris Agreement.[3] GFANZ has similarly provided guidance for investors to scrutinize the robustness of corporate climate targets and cautioned against taking them at face value.[4]

This assessment covers several key indicators recommended by both the SBTi and GFANZ and analyzes disclosures of value-chain emissions, target-level data, emission-reduction activities and solutions for carbon-dioxide removal (CDR).

Corporate climate target assessment framework for investors

1. **Corporate climate disclosures by target status**
   a. Corporate emissions disclosure and track-record analysis
   b. Target-setting practice and progress by different time horizons
   c. Assessing climate governance using GFANZ criteria
2. **Assessing corporate initiatives in emissions reduction**
   a. Emissions-reduction technologies with GHG-mitigation potential
   b. Emissions-reduction in a company's products
   c. Emissions-reduction in a company's operations
3. **Assessing corporate initiatives in CDR**

Source: MSCI ESG Research

[1] "Integrity Matters: Net Zero Commitments by Businesses, Financial Institutions, Cities and Regions." United Nations' Expert Group, November 2022.

[2] Ibid.

[3] "SBTi launches world-first net-zero corporate standard." SBTi, October 2021.

"Setting science-based emission reduction targets through the Science Based Targets initiative (SBTi)." CDP (accessed on Jan. 5, 2023).

[4] "Measuring Portfolio Alignment." GFANZ, August 2022.

Through this paper, we assessed specific aspects of corporate climate targets and initiatives by comparing companies that have committed to the SBTi's target standards with those that had not. We saw more transparent target-setting practices and initiatives among those companies with SBTi commitments than those without.

Ultimately, as investors intensify their efforts to lower their portfolio and real-economy emissions, whether companies can achieve the targets will take on increasing importance, both for those investors and the companies themselves.

Key findings

- Approximately 40% of the 9,171 constituents in the MSCI ACWI Investable Market Index (IMI) had set climate targets,[5] but only about 15% had committed to SBTi standards. It was found that **companies that had committed to SBTi standards were more likely to report their GHG emissions**, especially Scope 3, and also tended to score better in GFANZ's framework that recommended the assessments of corporate climate governance.

- **Transition to a lower-carbon business model is core to a company's business strategy and its capital allocation**.[6] It is also a long-term risk management issue that belongs in the boardroom and the C-suite.[7] Assessment of the above corporate climate governance metrics could help supplement the analysis of whether companies can achieve their climate targets.

- Investors may be watching how companies incorporate technologies such as alternative energy, energy efficiency and natural capital to address their Scope 3 downstream emissions. Using MSCI's Low Carbon Patent Scores,[8] we found **companies that had committed to SBTi standards tended to have higher patent-quality scores** when it came to these technologies.

- CDR technologies remain relatively nascent but are a key component under the SBTi corporate net-zero standards as a way to neutralize residual emissions.[9] Our climate-change metrics showed that **only 22 companies in our analysis had begun implementing CDR approaches** (although commitment to SBTi standards were not necessarily a strong predictor of these efforts yet). Establishing a head start in this currently neglected mitigation segment may ultimately strengthen a company's long-term positioning to meet its climate commitments.

[5] The MSCI ACWI IMI constituents referenced in the report are as of March 1, 2023.

[6] John Montgomery and Mark Van Clieaf. 2023. *Net Zero Business Models: Winning in the Global Net Zero Economy*. Hoboken: Wiley.

[7] Ibid.

[8] The low-carbon-patent scores are assessed based on four statistical measures to determine the relative level of quality of patents.

[9] "SBTi Corporate Net-Zero Standard." SBTi, October 2021.

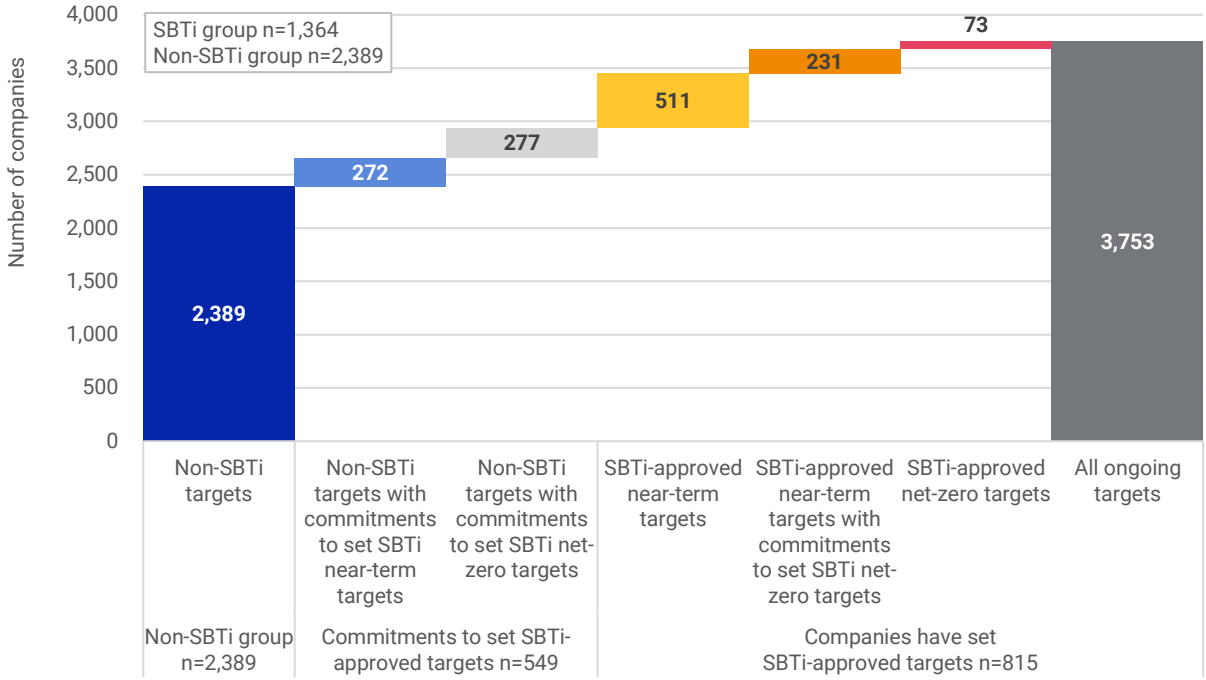
Introduction

Assessing whether companies can achieve their climate targets is increasingly relevant for institutional investors aiming to decarbonize investment portfolios and reduce real-economy GHG emissions. Although more and more companies are setting climate targets, including science-based emissions-reduction targets (see Appendix 1), the likelihood that these targets will be met is not always evident.

Of the 9,171 constituents in the MSCI ACWI IMI, approximately 40% (3,753 companies) had set climate targets as of March 2023. Of these, 1,364 companies had committed to SBTi standards, with 815 having set targets already approved by the SBTi and 549 having committed to setting SBTi-approved targets in the future (Exhibit 1).[10]

Yet questions remain as to whether companies can achieve these ambitious targets. Using several key indicators recommended by the SBTi and GFANZ,[11] we have built our own framework to assist investors in assessing whether companies have taken necessary steps to achieve their targets by analyzing the status of corporate climate disclosure and their initiatives to reduce and remove value-chain emissions.

Exhibit 1: Variation in climate targets across a global sample of companies



Based on constituents of the MSCI ACWI IMI as of March 1, 2023. Source: MSCI ESG Research

[10] We focused on the SBTi standard as the most commonly used global standard for company target-setting.

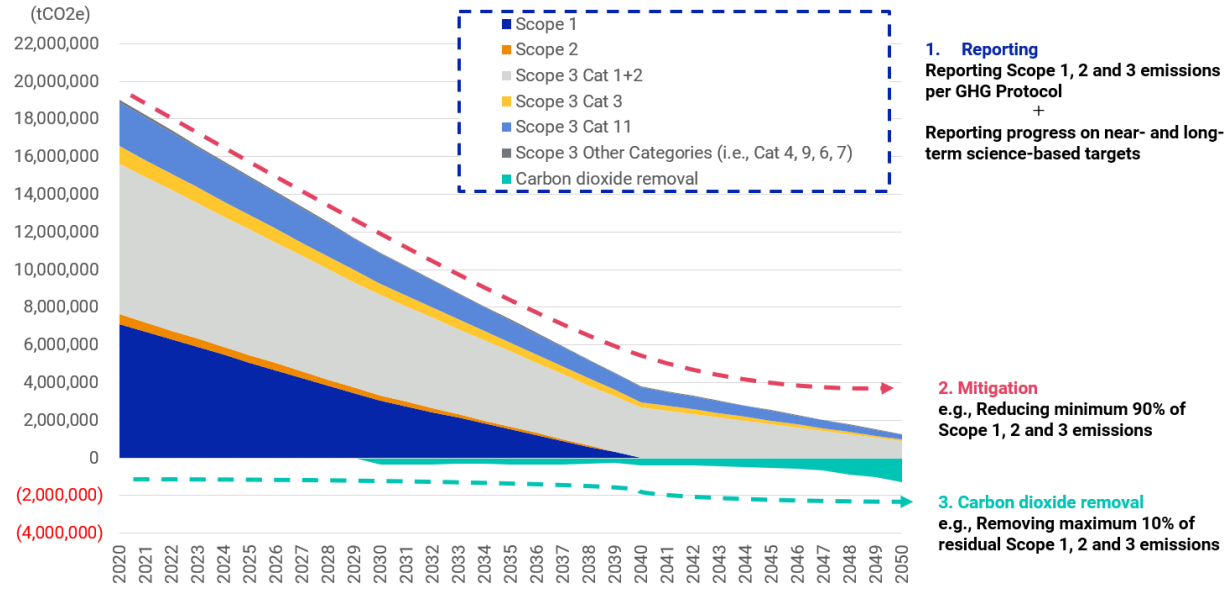
[11] We analyzed company reporting of value-chain emissions and target data.

SBTi perspectives of mitigation hierarchy

Our target assessment framework has referred to the SBTi's mitigation hierarchy or prioritization of mitigation actions (Exhibit 2).[12] Under this hierarchy, companies are expected to report emissions in line with the GHG Protocol, set near- and long-term science-based targets, implement a strategy to achieve these targets and disclose target progress annually.[13] Companies are also expected to invest in CDR in the near term and neutralize residual emissions in the long term.[14]

Transparency and reporting under such a framework will not only offer companies a standardized means to communicate their initiatives or roadblocks against progress, but potentially strengthen the likelihood that those climate targets will be met. To see if aiming for this type of global standard might strengthen the likelihood that companies will achieve their targets, we compared the differences between the targets of companies that had committed to the SBTi standards (SBTi group), and those that had not done so (non-SBTi group).

Exhibit 2: Illustration of the mitigation hierarchy under the SBTi's corporate net-zero standard



Under the mitigation hierarchy, companies are expected to report emissions while they define a target to reduce and remove them. See the expansive-boundary approach in the SBTi corporate net-zero standard. Exhibit based on a hypothetical company. Source: MSCI ESG Research

[12] "SBTi Corporate Net-Zero Standard." SBTi, October 2021.

[13] Ibid.

[14] Ibid. Under the SBTi's corporate net-zero standard, for instance, companies are required to report value-chain emissions from Scope 1, 2 and 3 boundaries in line with the GHG Protocol, reduce them by more than 90% by 2050 (from a 2020 baseline) and remove residual emissions through CDR.

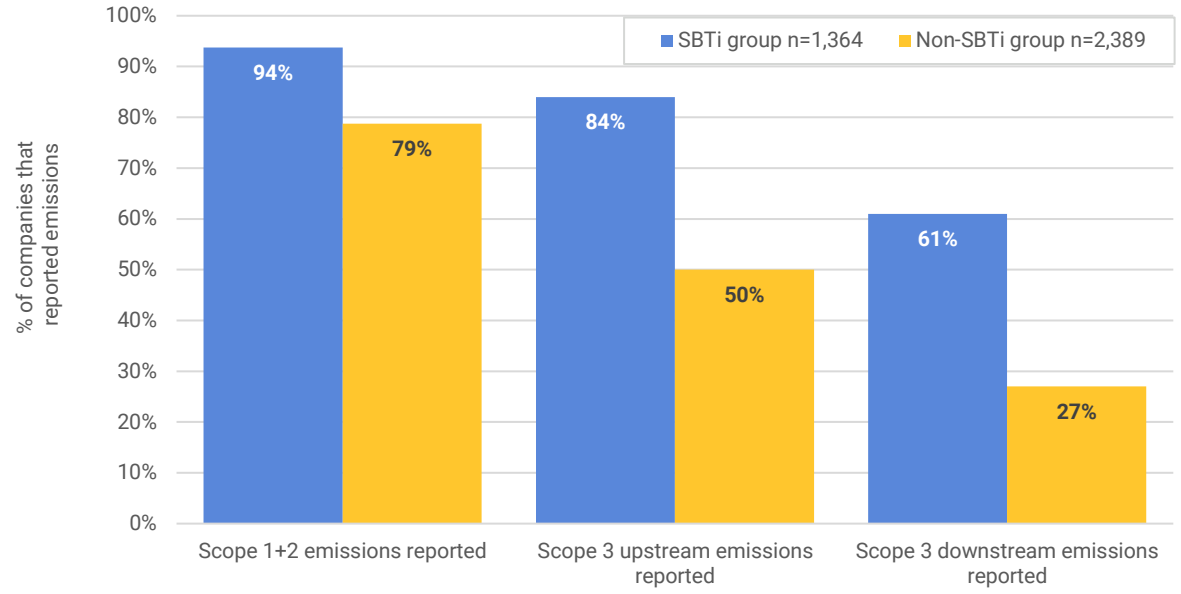
Assessing corporate climate disclosures by target status

For the first step of our target assessment, we analyzed how many companies have reported emissions in line with the GHG Protocol — a fundamental first step toward planning decarbonization strategies and measuring progress.[15]

Of the 1,364 companies in the MSCI ACWI IMI (as of March 2023) that had committed to SBTi standards (SBTi group), we found about 95% had disclosed emissions from Scope 1 and 2 boundaries in line with the GHG Protocol. By comparison, 80% of the 2,389 companies that had not committed to the standards (non-SBTi group) had reported on their Scope 1 and 2 emissions.

The difference between the SBTi and non-SBTi groups was more apparent in their Scope 3 reporting. We found about 85% of the SBTi group disclosed at least some categories of Scope 3 upstream emissions compared to only 50% of the non-SBTi group. Scope 3 downstream-emission disclosure proved more elusive, despite their contribution to overall company emissions — about 60% of the SBTi group reported on them, compared with only about 25% of the non-SBTi group (Exhibit 3). While GHG-emissions estimation models are available (see Appendixes 2 and 3), better corporate reporting on relevant scopes and categories of emissions may be a telling differentiator in the likelihood that companies can achieve their climate targets.

Exhibit 3: Corporate emissions disclosure per scope in line with the GHG Protocol



Based on constituents of the MSCI ACWI IMI. Of the 9,171 constituents in the MSCI ACWI IMI, 3,753 companies had set ongoing climate targets for target years of 2023 and beyond as of March 3, 2023. This analysis excluded the double counting of companies that issued multiple classes of share types and/or were listed in multiple stock exchanges. We have observed several companies in the SBTi group that have recently committed to set SBTi-approved targets in the future had not disclosed emissions from either Scope 1, 2 or 3 boundaries, at the time of this research. Source: CDP, MSCI ESG Research

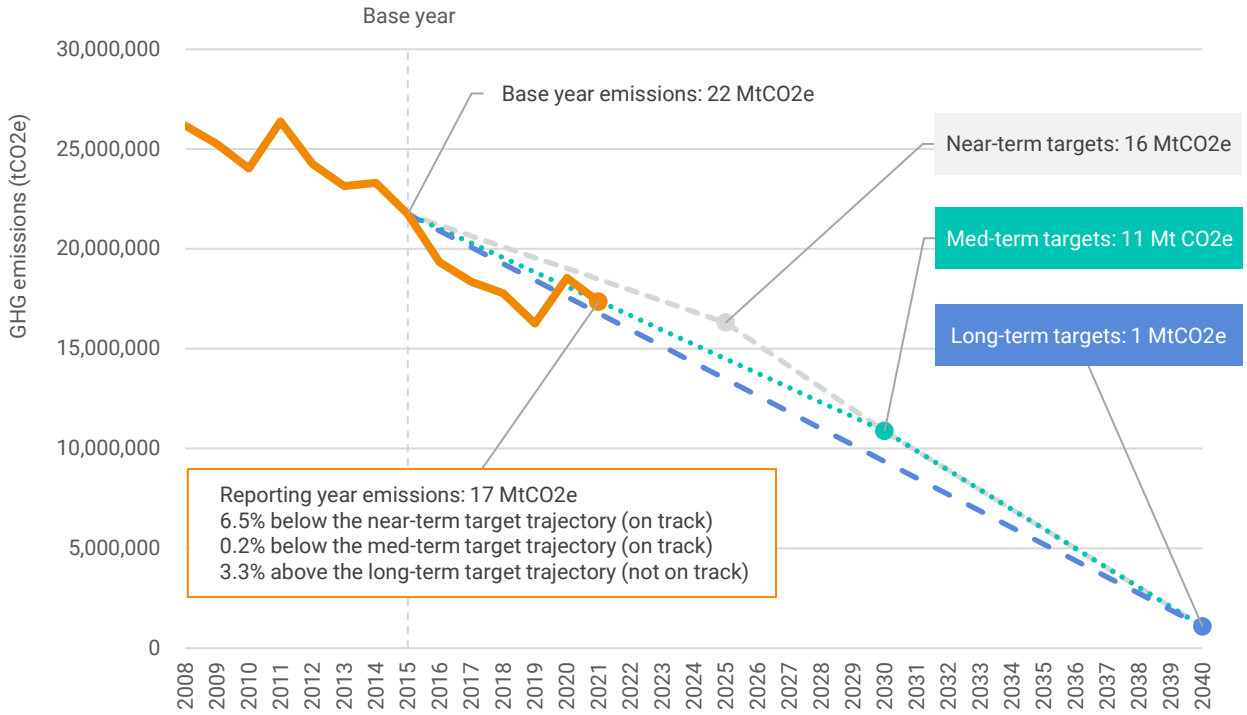
[15] We note that company-reported emissions data is integral for accurate assessments of target progress.

Corporate emissions disclosure and track record

How successful a company has been in reducing its emissions relative to its ongoing targets may also add useful context. Specifically, taking historical emissions performance and benchmarking it against a company's targeted trajectory can offer a helpful sense check. In this track-record analysis, we drew a linear target trajectory, linking base-year emissions to target-year emissions. By comparing a company's reporting-year emissions with its target trajectory, we assumed that companies were on track to meet their climate targets if their reporting-year emissions were below its target trajectory in the reporting year. By contrast, the steeper a company's target trajectory relative to its base-year emissions trend, the more drastic its future mitigation efforts will need to be to meet its targets (Exhibit 4).

In our assessment, we did not rely solely on company-reported data; the diverse reporting styles for corporate climate targets and company-reported target-level data were significantly divergent and limited the scope of our analysis (see Appendix 4). Where necessary we therefore used estimates to fill the absence of specific target details and emissions data in our analysis for this report.

Exhibit 4: Illustration of track-record analysis using a hypothetical company



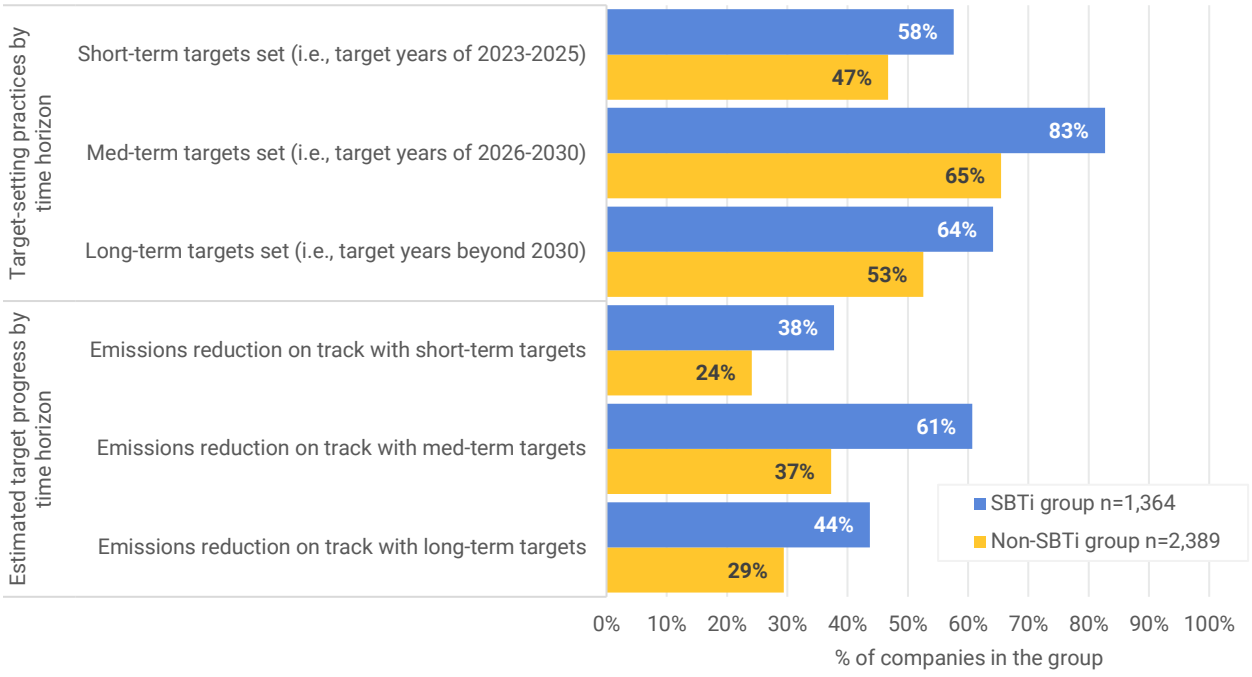
The SBTi was developing a guide on what companies are required to report for target progress at the time of this research. The Progress Framework on measurement, reporting and verification (MRV) of science-based targets is expected to be completed by the time of COP 28 in late 2023. We used either reported or estimated baseline emissions and target coverage for this analysis because baseline emissions and target coverage information are not consistently reported by companies. Exhibit based on a hypothetical company. Source: MSCI ESG Research

Target-setting practice and progress by different time horizons

GFANZ has emphasized the importance of assessing the likelihood that those targets will be met because investors may increasingly be using these targets to project the future emissions of their portfolios.[16] GFANZ recommended the analysis of target-setting practices under short-, medium- and long-term horizons. We supplemented this framework with our own track-record analysis by assessing whether companies had made target progress under the different time horizons.

In our analysis, we defined short-term targets as ones with target years between 2023 and 2025, medium-term targets as ones with target years between 2026 and 2030 and long-term targets as ones with target years beyond 2030. Using these definitions, we found that companies had most frequently set medium-term targets. This was true for both companies that had committed to SBTi standards (SBTi group) and those that had not (non-SBTi group). All companies, irrespective of their SBTi commitments, were also most frequently on track to achieve these medium-term targets compared with both their short- and long-term targets (Exhibit 5). But we did note differentiation between the SBTi and non-SBTi groups: The former tended to have better alignment between their track record of emission reductions and their future targets, across all time horizons (see Appendix 5).

Exhibit 5: Target-setting practices and estimated progress by time horizon



Based on constituents of the MSCI ACWI IMI. This analysis covered those targets set by the companies in the SBTi group that were approved by the SBTi and that were not approved as such as of March 1, 2023. We used either reported or estimated baseline emissions and target coverage for this analysis because baseline emissions and target coverage information are not consistently reported by the companies. Source: MSCI ESG Research

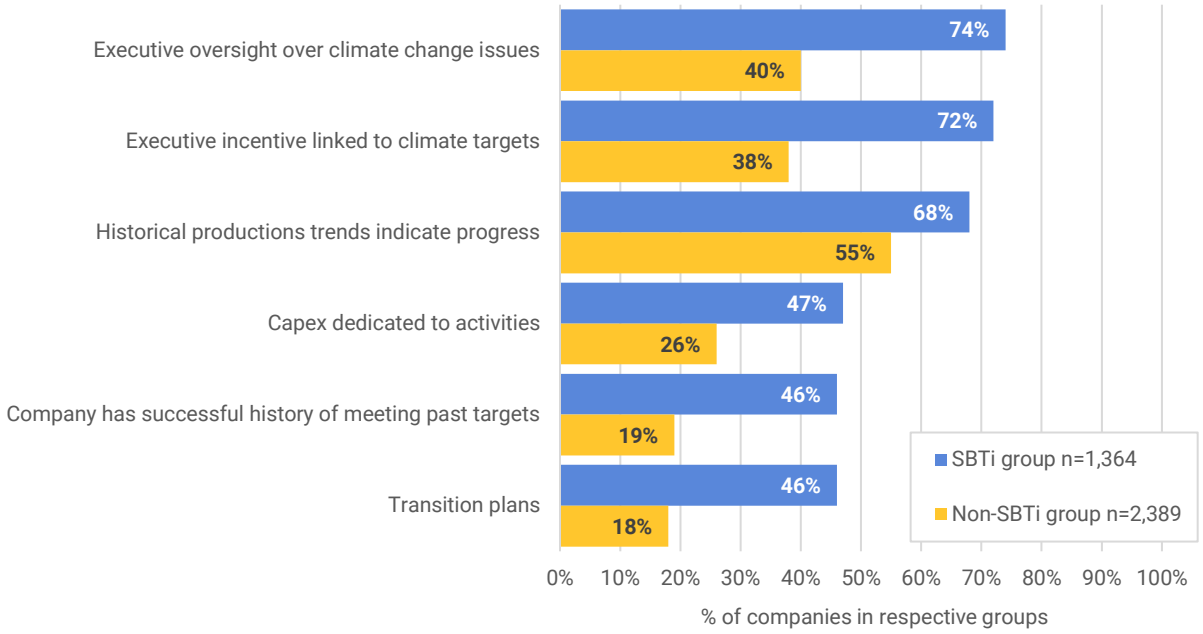
[16] "Measuring Portfolio Alignment." GFANZ, August 2022.

Assessing climate governance using GFANZ criteria

In addition to looking at target time horizons, GFANZ also recommended the use of qualitative and quantitative indicators to assess the likelihood that those targets will be met.[17] Such indicators included binary assessments of qualitative metrics related to climate governance such as executive oversight over climate issues, executive incentives linked to climate targets, transition plans and capital expenditure dedicated to climate activities and quantitative metrics such as historical trends of emissions from productions and the success of the company in meeting historical targets.

Transition to a lower-carbon business model is core to a company's fundamental business strategy and its capital allocation.[18] It is also a long-term risk management issue that belongs in the boardroom and C-suite.[19] Assessment of the above GFANZ-recommended metrics related to climate governance could, thus, help support the analysis of whether companies can implement initiatives to achieve their climate targets. We found companies in the SBTi group typically scored better in the GFANZ-recommended metrics than those in the non-SBTi group (Exhibit 6). This may suggest that companies that went through a rigorous third-party target validation under the SBTi standards were more likely to have disclosed transition planning, increasing the transparency of their emissions-reduction strategies.

Exhibit 6: Assessments of GFANZ-recommended metrics



Data as of March 1, 2023. We assessed historical production trends based on emissions intensity from productions such as power generation, steel and cement when reported data were available. When data was not available, emissions per sales were used as a proxy for this assessment. Progress indicated emissions-intensity reduction during 2015 and 2020. Source: CDP, MSCI ESG Research

[17] "Measuring Portfolio Alignment." GFANZ, August 2022.

[18] Montgomery and Van Clieaf. *Net Zero Business Models: Winning in the Global Net Zero Economy*.

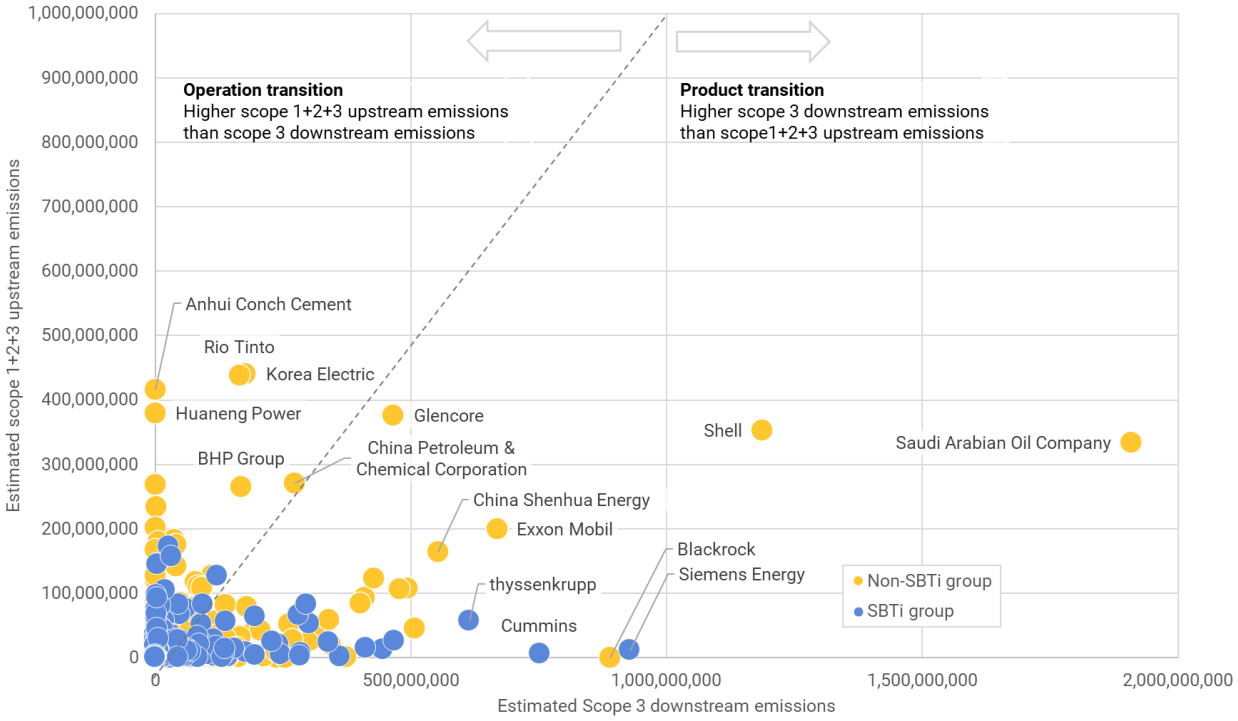
[19] Ibid.

Assessing corporate initiatives in emissions reduction

While climate targets, a track record of reducing emissions and climate governance may comfort investors, a company's initiatives to reduce emissions is what really matters. And the more ambitious the target, the more robust a company's initiatives will need to be. For example, under the SBTi corporate net-zero standard, companies must reduce 90% of total value-chain emissions by 2050, from a 2020 baseline.[20]

Choosing appropriate emission-reduction initiatives requires an understanding of a company's emission sources. For each company in our analysis, we identified the largest sources of value-chain emissions. Approximately 70% of all companies in our assessment emitted more GHGs through company operations (i.e., Scope 1, 2 and 3 upstream boundaries) and 30% through products and services (i.e., Scope 3 downstream boundaries) for both the SBTi and non-SBTi groups (Exhibit 7).

Exhibit 7: Identification of the biggest sources of emissions in value chain



Based on constituents of the MSCI ACWI IMI. Of the 3,753 companies with climate targets, 1,081 companies faced product-transition risks and 2,672 faced operational transition risks as of March 1, 2023. Source: MSCI ESG Research

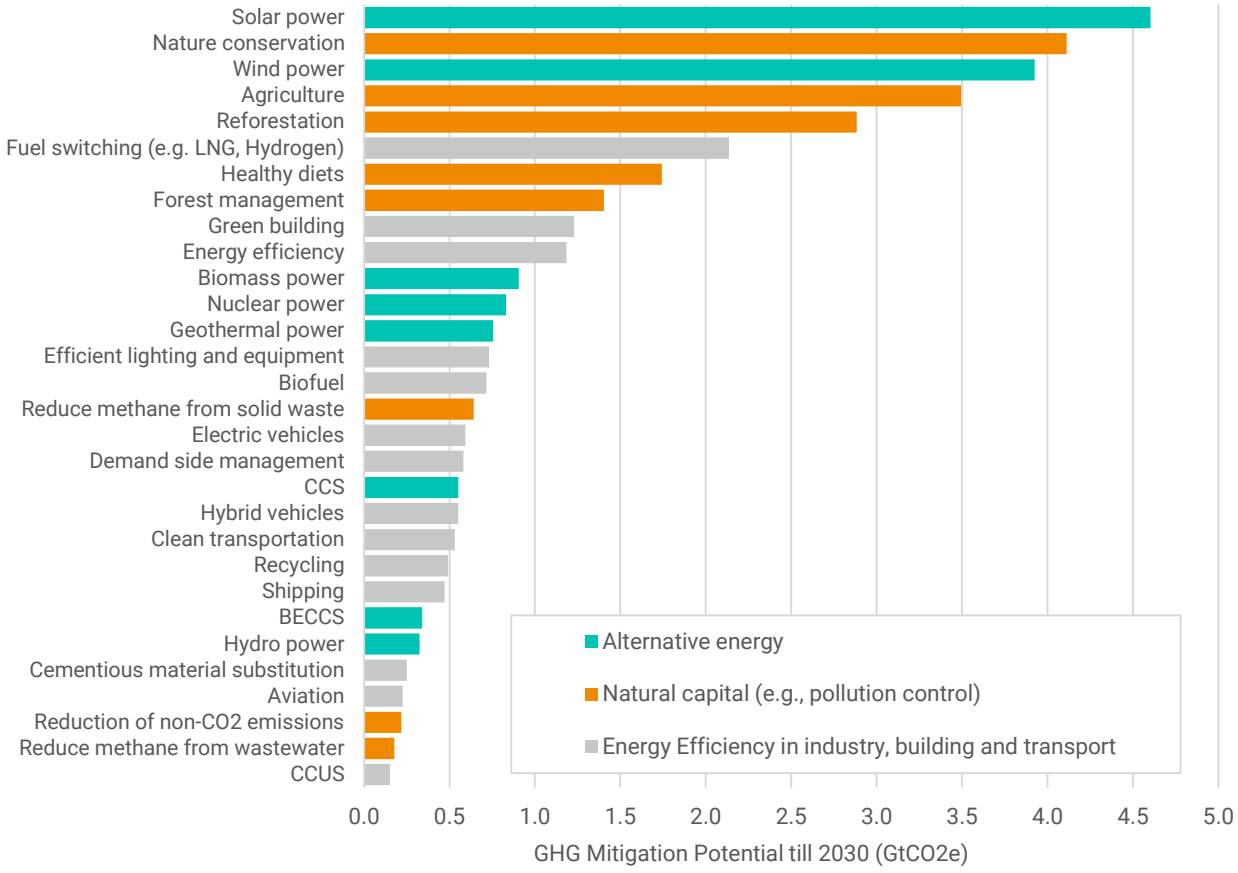
[20] "SBTi Corporate Net-Zero Standard." SBTi, October 2021.

Technologies with GHG-mitigation potential

We considered that companies could reduce upstream emissions by installing emissions-reduction technologies in their operations, while they could reduce downstream emissions by integrating such technologies into their product portfolios. We thus researched emissions-reduction technologies with the highest potential for GHG mitigation up until 2030 based on the Intergovernmental Panel on Climate Change's (IPCC) Sixth Assessment Report (AR6) (Exhibit 8).[21] Using the definitions from the MSCI Sustainable Impact Metrics, we classified these emissions-reduction technologies and practices into the following three types: alternative energy, energy efficiency and natural capital. Such classifications helped us identify companies that derived revenues and held patents on these emission-reduction technologies and practices.

Among the technologies and practices, solar and wind power showed some of the highest GHG-mitigation potential up to 2030. Nature conservation (i.e., reducing conversion of the ecosystem), carbon sequestration in agriculture and reforestation also showed some of the highest mitigation potentials. Electric cars will have slightly higher GHG-mitigation potentials than fuel-efficient cars like hybrid cars, but in the short term, many EV charging stations might still be powered by fossil fuels.

Exhibit 8: Emissions-reduction technology and GHG-mitigation potential up to 2030



Source: IPCC, MSCI ESG Research

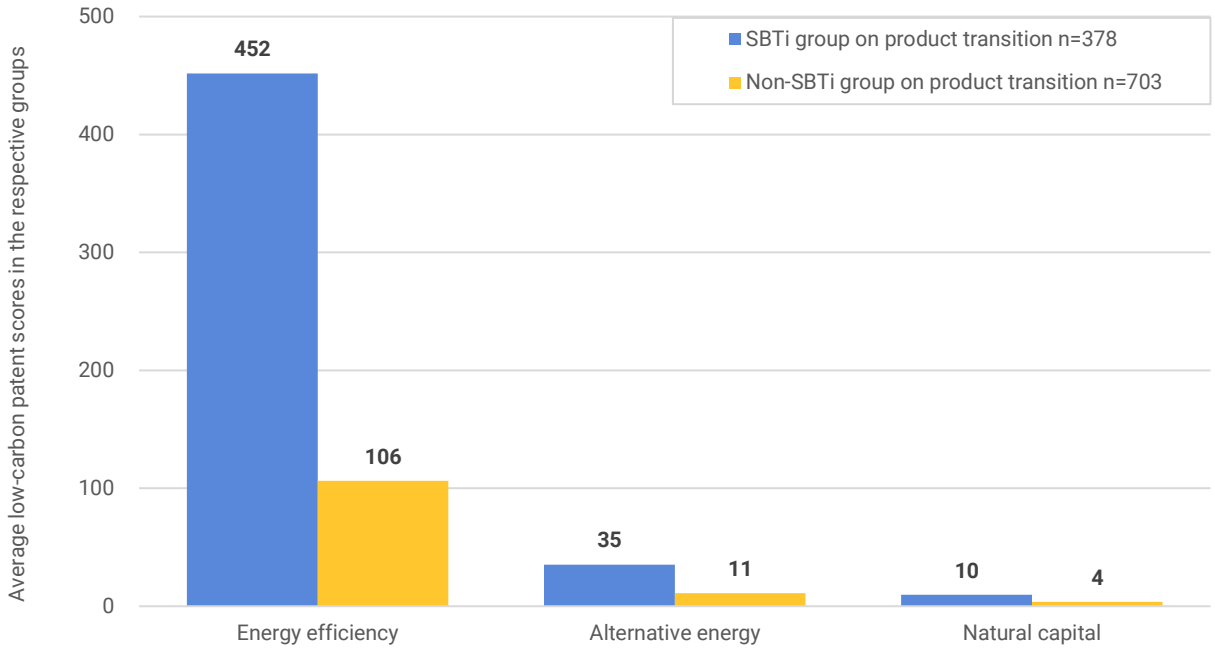
[21] "Working Group III Contribution to the IPCC Sixth Assessment Report." IPCC, April 2022.

Emissions reduction in a company's products

We looked at companies in both the SBTi and non-SBTi groups that faced product transition risks (approximately 30% of each group). In this analysis we used the MSCI Low Carbon Patent Scores as a proxy for future innovation potential and included patents in alternative energy, energy efficiency and natural capital.[22] We considered companies with higher patent quality scores to be better prepared to integrate some of the above emissions reduction technologies into their product portfolios, compared with companies with lower patent-quality scores from the perspective of technology development.

Companies in the SBTi group had, on average, higher patent-quality scores on all three types of emissions reduction technologies than those in the non-SBTi group (Exhibit 9). This difference was most noticeable in the energy-efficiency category. In the IPCC research above, energy-efficiency technologies showed lower GHG-mitigation potentials relative to alternative energy and natural capital. To make more drastic emission reductions in their Scope 3 downstream emissions, companies may therefore need to combine energy-efficiency technologies with either or both of the other two categories.[23]

Exhibit 9: Companies facing product-transition risks had varying patent-quality scores



Based on constituents of the MSCI ACWI IMI. Of the 3,753 companies with climate targets, 1,086 companies faced product-transition risks, as of March 1, 2023. Source: MSCI ESG Research

[22] CCS on fossil-fired generation and BECCS were classified as alternative energy and considered parts of GHG-mitigation solutions for the utilities sector in the IPCC AR6.

[23] Michael Lenox and Rebecca Duff. October 2021. "The Decarbonization Imperative: Transforming the Global Economy by 2050." Note: Net-zero-carbon buildings, for instance, institute energy efficiency measures and produce enough renewable energy on site, or procure elsewhere, to meet annual energy consumption.

Emissions reduction in a company's operations

We estimated that about 70% of companies in both the SBTi and non-SBTi groups faced operational transition risks. In assessing corporate initiatives to reduce operational emissions, we classified activities using the taxonomy in the Oxford Principle for Net-Zero Aligned Carbon Offsetting (Exhibit 10).[24] This taxonomy bifurcates activities into either emissions reduction (limiting operational emissions) or CDR.

Adoption of renewable energy into operations, for instance, can contribute to emissions reduction when such carbon-neutral energy replaced fossil-fired power, even though such reductions can be temporary.[25] Carbon capture and storage (CCS) can be classified into either emissions reduction or CDR with long-lived storage depending on the application.

Exhibit 10: Definitions of emissions reduction and CDR

Types	Is carbon stored?	Time horizon	Classifications	Examples of applications
Emissions reduction	Yes	Short-term	Emissions reduction with short-lived storage	Avoided damages to ecosystems
		Long-term	Emissions reduction with long-lived storage	CCS on industrial process CCS on fossil-fuel fired plants
	No	N/A	Emissions reduction without storage	Renewable energy Methane abatement
CDR	Yes	Short-term	CDR with short-lived storage	Afforestation, reforestation Soil sequestration
		Long-term	CDR with long-lived storage	DACCS, BECCS, Mineralization

Turquoise-shaded boxes indicate emissions-reduction activities included in our analysis in Exhibit 11. Red-shaded boxes indicate CDR activities included in our analysis in Exhibit 12. Source: University of Oxford, MSCI ESG Research

CCS is an option to reduce emissions from large-scale fossil-fired energy and industrial sources, provided geological storage is available.[26] CCS can reduce emissions by separating carbon dioxide from other gases and compressing them for storage, but its application on industrial and fossil fuels

[24] "The Oxford Principles for Net Zero Aligned Carbon Offsetting." University of Oxford, September 2020.

[25] Ibid.

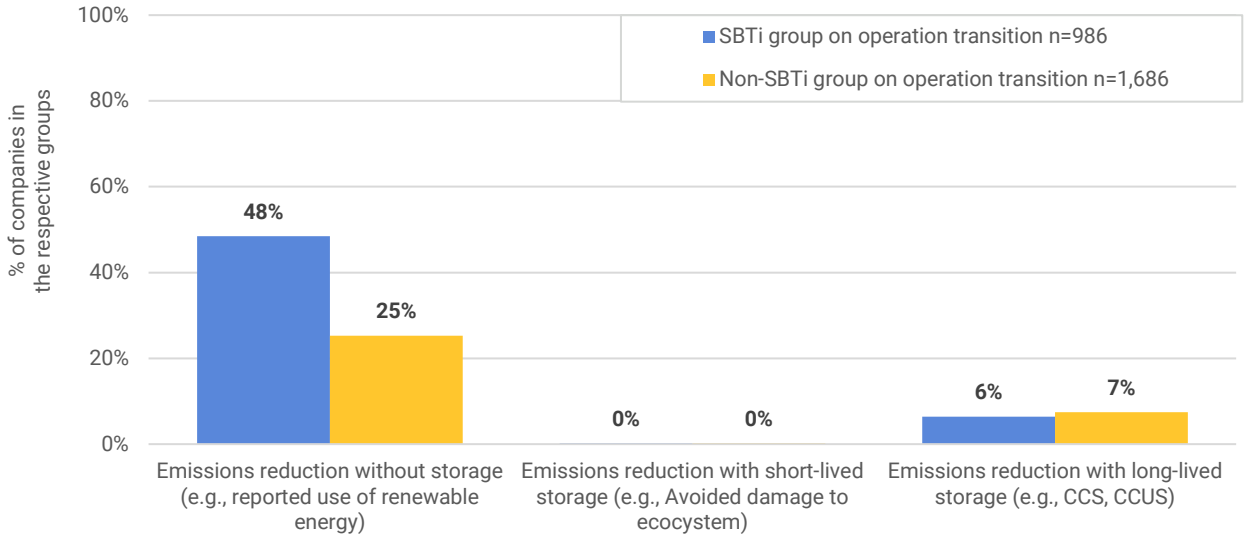
[26] "Working Group III Contribution to the IPCC Sixth Assessment Report." IPCC, April 2022.

cannot contribute to net emissions removal from the atmosphere.[27] When carbon dioxide is captured directly from the atmosphere, or from biomass energy, CCS can provide the storage component and contribute to net negative emissions removal.[28]

Avoided damages to ecosystems can be considered as emissions reduction with short-term storage as such practices can help retain already stored carbon. On the other hand, afforestation can be considered as CDR with short-term storage as it can help remove emissions from the air. Biological storage represents short-term removal due to high risks of being reversed within decades.[29]

Using MSCI's climate-change metrics, we assessed corporate initiatives in the three emission-reduction activities highlighted in Exhibit 10. We undertook this analysis for both the SBTi and non-SBTi groups that faced operational transition risks (Exhibit 11).

Exhibit 11: Companies facing operational transition risks reported varied initiatives to reduce emissions



Based on constituents of the MSCI ACWI IMI. Of the 3,753 companies with climate targets, 2,672 companies faced operational transition risks as of March 1, 2023. Source: MSCI ESG Research

We found about half of the companies in the SBTi group reported the use of renewable energy in their total power consumption compared to about a quarter of the non-SBTi group. We did not find notable differences in corporate initiatives for emission reduction with short-lived storage (e.g., avoided damage to ecosystem) and long-lived storage such as CCS and carbon capture, utilization and storage (CCUS). More than 5% of the companies in the SBTi and non-SBTi groups have implemented or planned to implement CCS and CCUS solutions for their operation.

[27] "CDR v. CCS." Kleinman Center for Energy Policy at the University of Pennsylvania, 2022.

[28] "The Oxford Principles for Net Zero Aligned Carbon Offsetting." University of Oxford, September 2020.

[29] Ibid. "Biological storage is theoretically capable of storing carbon for millennia, provided that land use does not change. Challenging conditions such as economic pressure, wildfire and risks associated with climate change, all conspire to increase the risk that this trapped carbon would be re-emitted in the near-to-medium term."

These results indicated that companies in both groups were more likely to rely on renewable energy as part of their emissions-reduction strategies than CCS (see Appendix 6). For further assessments of whether companies can achieve their climate targets from the perspectives of emissions-reduction initiatives, we proposed to assess individual company initiatives by standardizing their emissions-reduction targets, progress and applicable emissions-reduction technology per scope and category (see Appendix 7).

Assessing corporate initiatives in carbon-dioxide removal

The SBTi corporate net-zero standard envisions that companies will invest in CDR technologies such as direct air carbon capture and storage (DACCS) and bioenergy with CCS (BECCS) in the near term and implement such technologies to neutralize residual emissions from the value chain in the long term.[30]

In this report, we defined CDR as anthropogenic activities that remove carbon dioxide from the atmosphere and store it durably geologically, terrestrially or in products based on the definitions used in the IPCC AR6[31] and the Oxford Principles for Net-Zero Aligned Carbon Offsetting.[32] DACCS and BECCS are considered as part of CDR as they can achieve negative emissions when conditions are met. As mentioned above, the use of CCS on fossil fuels and industrial sources is considered emissions-reducing, rather than CDR, as they do not result in net emissions removal.

Corporate initiatives in carbon-dioxide removal

While CDR will play an increasingly important role for companies looking to meet net-zero targets, these applications have both limits and risks for negative side-effects.[33] For instance, the implementation of DACCS would have limited economic incentives unless carbon prices were set at least around USD 100 per ton of carbon-dioxide removed (see Appendixes 8, 9 and 10). There are also risks of biodiversity loss and reversal of carbon removal, if BECCS were unsustainably managed (e.g., converting arable land to monoculture plantation).[34]

But similarly, CDR applications can also generate co-benefits — afforestation, soil sequestration and biochar can result in improved biodiversity, enhanced soil quality and increased plant growth for further carbon sequestration to biological storage. Implementing BECCS can also enhance biodiversity. Companies that have started implementing these CDR solutions may have advantages over peers in better understanding the potential risks and co-benefits of various CDR applications.

To understand corporate initiatives in CDR, we illustrated a list of CDR solutions the companies could invest in for the development of such solutions and described the characteristics of each, outlining its pros and cons by referring to research in the IPCC AR6 (see Appendixes 8, 9 and 10).

[30] "SBTi Corporate Net-Zero Standard." SBTi, October 2021.

[31] "Working Group III Contribution to the IPCC Sixth Assessment Report." IPCC, April 2022.

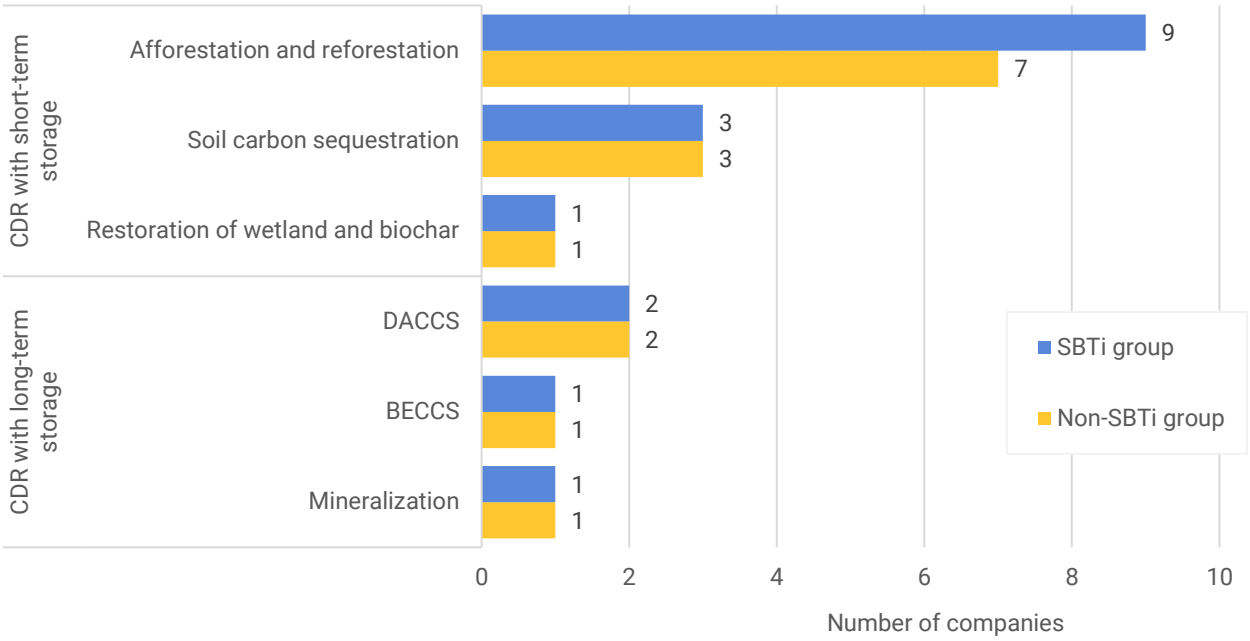
[32] "The Oxford Principles for Net Zero Aligned Carbon Offsetting." University of Oxford, September 2020.

[33] Andy Reisinger. November 2020. "Understanding carbon dioxide removal (CDR) for net-zero."

[34] "A Leap in the Dark: The Dangers of Bioenergy with Carbon Capture and Storage (BECCS)." Friends of Earth, April 2021.

Using the MSCI climate-change metrics, we identified 17 companies in the SBTi group and 15 companies in the non-SBTi group that have started to implement CDR activities to neutralize parts of their emissions from the value chain (Exhibit 12).

Exhibit 12: Company involvement in ongoing CDR activities



Data as of March 1, 2023. The SBTi group comprised of 1,364 companies and the non-SBTi group was comprised of 2,389 companies. Source: MSCI ESG Research

Given how few companies have disclosed CDR activities, it would be difficult to draw out any meaningful trends. Companies tended to favor afforestation and reforestation, such as agroforestry, regenerative agriculture and carbon sinks in soil. Companies can implement these nature-based CDR solutions at relatively reasonable costs compared to other technology-based solutions (see Appendixes 8, 9 and 10). Co-benefits of such solutions come with enhanced soil conditions, improved biodiversity and sustainable harvest. Companies may, nonetheless, still face high risks of reversal of carbon sequestration.

There are also several companies that are involved in research and development and demonstration projects of the DACCS and BECCS in both the SBTi and non-SBTi groups. For instance, Drax Group PLC disclosed a roadmap to install BECCS with its two biomass-fired power units to achieve its SBTi-approved net-zero targets by 2030.[35] WorleyParsons Limited is also engineering DACCS in partnership with a third-party organization.[36] These long-term CDR solutions might be all anecdotal, but these research and development and pilot projects could help them implement CDR at scale when the technology develops further and becomes a viable solution for corporate decarbonization strategies.

[35] "BECCS and negative emissions." Drax Group PLC (accessed Dec. 15, 2022).

[36] "1PointFive selects Worley to engineer direct air capture facility." WorleyParsons Limited, February 2021.

Conclusion

Our analysis indicates that the SBTi standards serve as a useful indicator for investors looking to assess the likelihood that those climate targets will be met. The target-validation process under these SBTi standards could help address growing concerns of greenwashing, in line with the mandate of the United Nations' Expert Group.[37]

In this report, we found that, on average, companies that had committed to SBTi standards were more likely to have disclosed value-chain emissions, target-level data and GFANZ-recommended metrics than companies that had not. Companies with SBTi commitments also appeared to have made further progress on integrating emissions-reduction technologies into their product portfolios and accelerating the use of renewable energy.

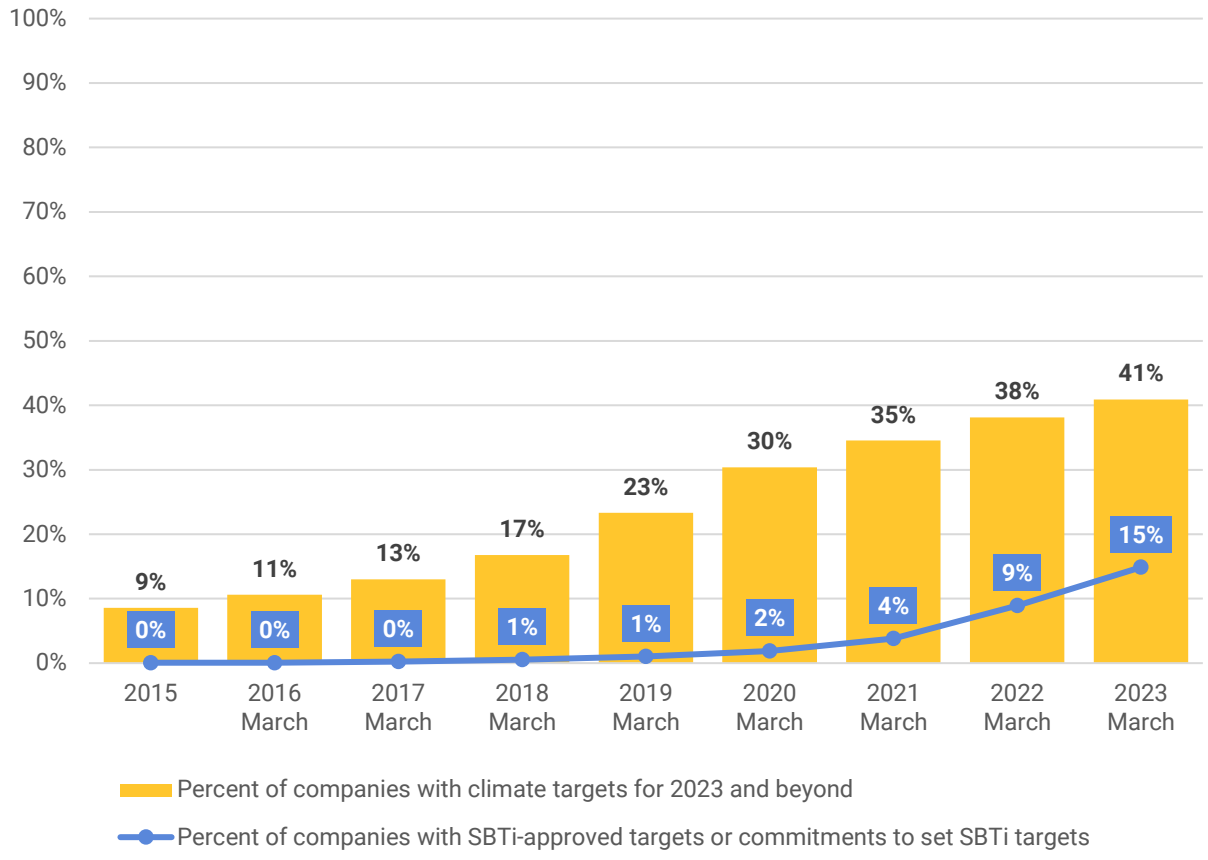
Achieving climate targets remains a more demanding prospect than setting them. However, the results of this assessment highlight how rigorous third-party validation processes (like those under SBTi) offer scope to enhance the transparency of corporate decarbonization strategies and to improve the likelihood that the companies can achieve such climate targets.

[37] "Integrity Matters: Net Zero Commitments by Businesses, Financial Institutions, Cities and Regions." United Nations' Expert Group, November 2022.

Appendix 1: Cumulative number of listed companies with climate targets

Of the 9,171 constituents in the MSCI ACWI IMI, approximately 40% (3,753 companies) had set climate targets and approximately 15% (1,364 companies) had set or committed to set SBTi-approved targets, as of March 2023 (Exhibit 13). Between 2022 and 2023, the number of companies with SBTi commitments rose from approximately 9% of constituents to 15%. Validating climate targets through the SBTi standard could signal a company's commitments to aligning its targets with the Paris Agreement.[38]

Exhibit 13: Percent of companies in the MSCI ACWI IMI with climate targets



Based on constituents of the MSCI ACWI IMI. Of the 9,171 constituents in the MSCI ACWI IMI, 3,753 companies had set ongoing climate targets for target years of 2023 and beyond as of March 1, 2023. Source: SBTi, MSCI ESG Research

[38] "SBTi Corporate Net-Zero Standard." SBTi, October 2021.

Montgomery and Van Clieaf. *Net Zero Business Models: Winning in the Global Net Zero Economy*.

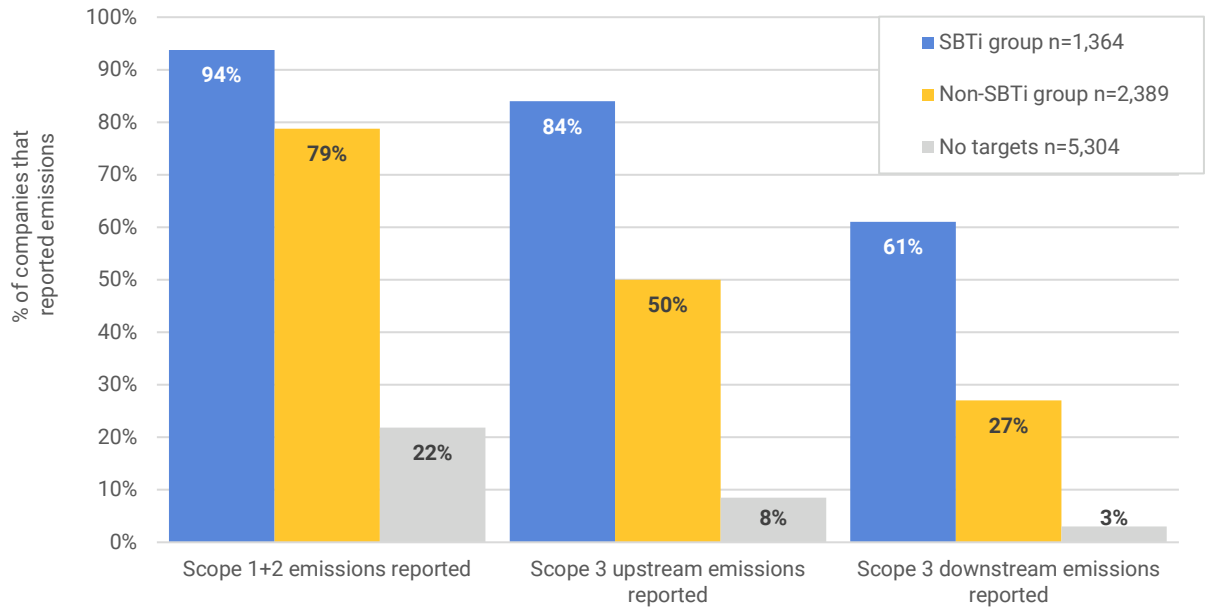
Appendix 2: Company emissions reporting per GHG Protocol

To better understand the overall picture of corporate emissions-reporting practices in line with the GHG Protocol, we analyzed the rate of emissions disclosure made by those companies that have not set any climate targets and compared them with the companies in the SBTi and non-SBTi groups (Exhibit 14).

We found only 20% of those companies that set no climate targets have reported Scope 1 and 2 emissions compared to about 95% and 80% of the companies in the SBTi and non-SBTi groups, respectively. The rate of Scope 3 emissions disclosure dropped to less than 10% among those companies that set no targets compared to 85% and 50% of the companies in the SBTi and non-SBTi groups, respectively.

These results may suggest that setting climate targets was naturally a next step for those companies that reported emissions in line with the GHG Protocol. Companies may start monitoring and managing emissions only after they measure emissions from their business activities.

Exhibit 14: Corporate Scope 1, 2 and 3 emissions disclosure in line with the GHG Protocol



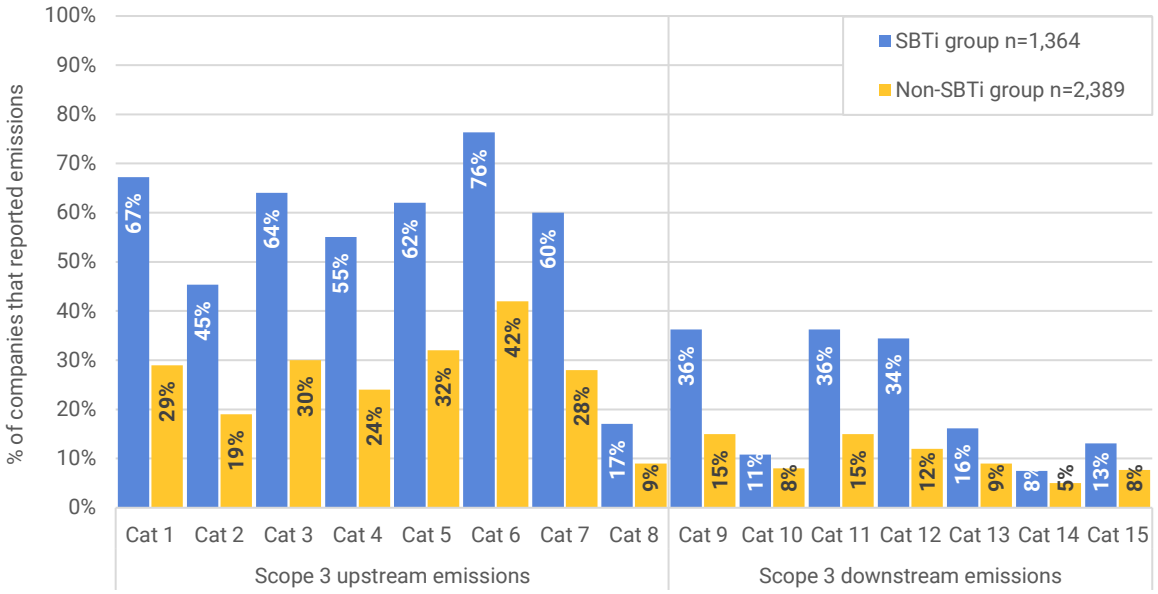
Based on constituents of the MSCI ACWI IMI. Of the 9,171 constituents in the MSCI ACWI IMI, 3,753 companies had set ongoing climate targets for target years of 2023 and beyond as of March 1, 2023. This analysis excludes the double counting of issuers that are listed in multiple stock exchanges or issued multiple classes of share types. Source: CDP, MSCI ESG Research

Appendix 3: Scope 3 reporting per category

Disclosure of Scope 3 emissions per category can help companies create a strategy to reduce emissions from the particular category. Such strategies will be critical when they have committed to net-zero targets under the SBTi standards. Companies cannot create emissions-reduction strategies without measuring base emissions. Corporate reporting of Scope 3 emissions can, thus, boost investor trust in the information companies disclose and improve the transparency of their climate targets.

We found disclosure rates for Scope 3 upstream emissions were higher than for downstream emissions. Our analysis shows that Scope 3/Category 6 (emissions from business travel), which contributes to a small portion of carbon footprint for many companies, showed the highest disclosure rates of about 75% and 40% for the SBTi and non-SBTi groups, respectively (Exhibit 15). Scope 3/Category 1 (emissions from purchased goods and services), which often make up the largest share of Scope 3 upstream emissions for most companies, showed one of the highest disclosure rates of about 65% for the SBTi group and 30% for the non-SBTi group. On the contrary, Scope 3/Category 11 (emissions from the use of sold products), which make up the largest share of Scope 3 downstream emissions, showed much lower disclosure rates of about 35% and 15% for the SBTi and non-SBTi groups, respectively.

Exhibit 15: Corporate Scope 3 disclosure per category in line with the GHG Protocol



Based on constituents of the MSCI ACWI IMI as of March 1, 2023. Source: CDP, MSCI ESG Research

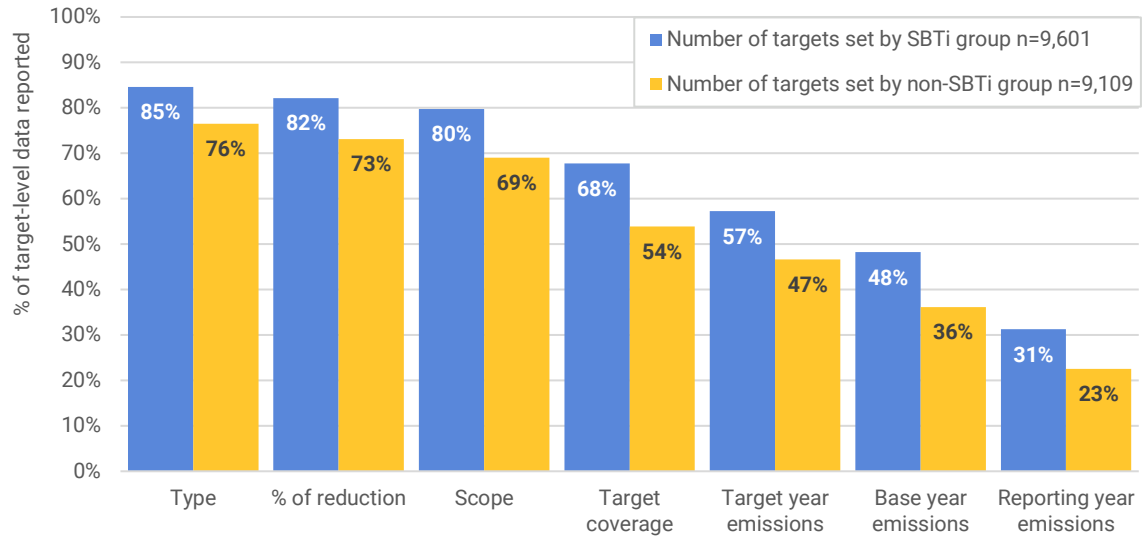
Appendix 4: Target-level data reported by companies

For our target assessments, we analyzed the progress companies have made to meet their targets using target-based emissions projections. Such projections required a threshold level of specific target details alongside company-reported emissions for accurate assessments.[39] Such details are made up of seven target-level metrics: emissions-reduction percentages, target types, scopes, coverages, base year, target year and reporting-year emissions. Company reporting of these seven metrics can help increase the accuracy of emissions projections and target progress analysis.

We observed not all target-level data reported by the companies met the minimum level of details. We thus assessed what specific details were missing for the accurate projection of target-based emissions before we filled the gap with our estimates when company reporting did not meet the threshold. We analyzed more than 18,710 target-level data reported by the 3,753 companies in the MSCI ACWI IMI universe. Of these, 1,364 companies in the SBTi group reported a total of 9,601 targets, indicating each company set on average seven different targets, and 2,389 companies in the non-SBTi group reported a total of 9,109 targets, setting more than three different targets on average (Exhibit 16).

Overall, we observed similar trends for the SBTi and non-SBTi groups with different levels of corporate target reporting. All in all, the SBTi group reported target-level data in a clearer manner than the non-SBTi group. This may indicate that the third-party target-validation process under the SBTi standards can improve the transparency of corporate climate targets and help estimate target-based emissions projections more accurately than others.

Exhibit 16: Corporate disclosure of target-level data required for estimating target-based emissions projections



Based on constituents of the MSCI ACWI IMI as of March 1, 2023. Source: MSCI ESG Research

[39] "Targeting Clearer Climate Targets." MSCI ESG Research, September 2022 (Client access only)

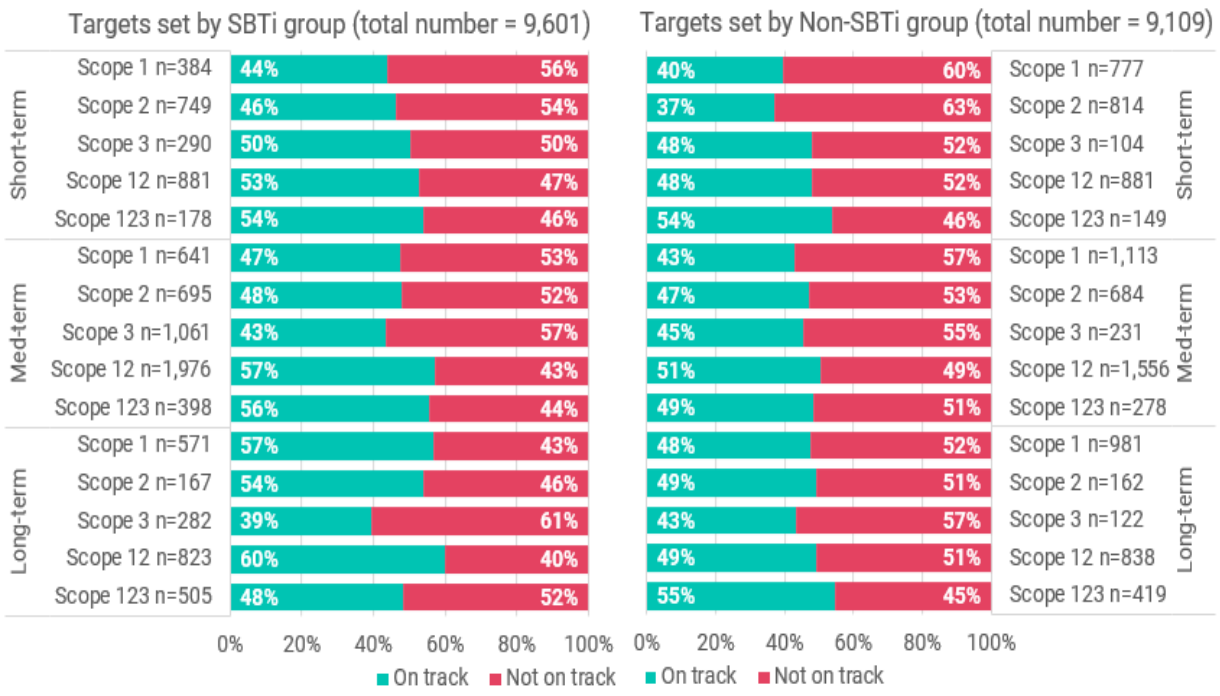
Appendix 5: Track record of target-level data reported by companies

We analyzed the track record of companies' individual target-level data to understand which targets they were making progress on and where they were not (Exhibit 17). We observed more than half of Scope 1 and 2 emissions reduction targets set by the companies in the SBTi group showed emissions reduction progress on track with the targets across all time horizons. For this group, we also observed a similar trend for Scope 1, 2 and 3 emissions reduction targets. The SBTi group have shown more consistent reporting of Scope 1, 2 and 3 emissions and target-level data than the non-SBTi group, which may have contributed to these results (see Appendix 4).

We found many companies have failed to reduce their emissions on track with their separate scope 1, 2 and 3 reduction targets under the short- and medium-term horizons. We identified many companies have already set net-zero or 100% emissions reduction targets from these separate scopes across all time horizons. Such targets required higher emissions reduction rates per year under the short-term horizons than medium-term, and under medium-term horizons than long-term, posing a higher bar for companies to reduce emissions on track with such ambitious targets.

While setting ambitious targets and achieving them are two different things, these results indicated that the companies in the SBTi group showed a more successful track record than the non-SBTi group across almost all target scopes and time horizons.

Exhibit 17: Track-record analysis of target level data per scope



Based on constituents of the MSCI ACWI IMI. Of the 9,171 constituents in the MSCI ACWI IMI, 3,753 companies had set ongoing climate targets for target years of 2023 and beyond as of March 1, 2023. Because baseline emissions and target coverage information are not consistently reported by the companies, we used either reported or estimated baseline emissions and target coverage for this analysis. Source: MSCI ESG Research

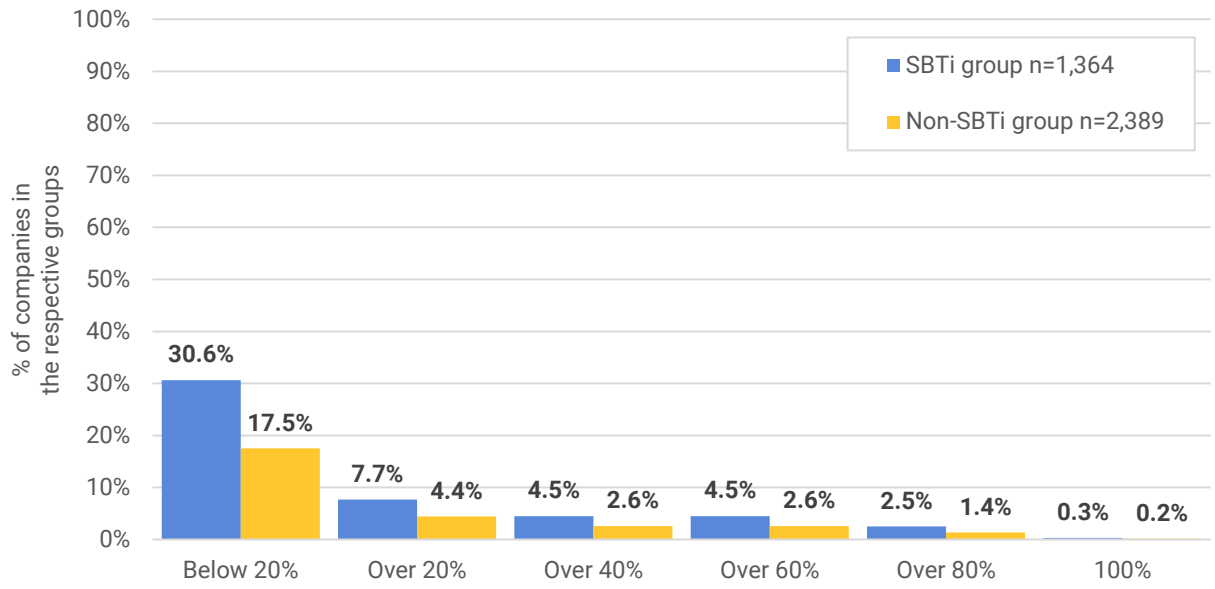
Appendix 6: Corporate initiatives in renewable energy

For the further assessments of corporate initiatives in emissions reduction, we looked at the proportion of the companies' reported use of renewable energy in their total power consumption during their operations (Exhibit 18). The highest percentages of companies in both the SBTi and non-SBTi groups reported less than 20% of total energy consumption through renewable energy. Less than 1% of companies in both groups reported 100% use of renewable energy for their operations during 2020 and 2021.

Overall, more companies in the SBTi group were better positioned than in the non-SBTi group to accelerate the use of renewable energy as part of emissions-reduction strategies to achieve their climate targets. We considered reporting the proportion of renewable energy out of total energy consumption can be a first step for companies to reduce emissions from Scope 2 boundaries on market-basis.[40]

Companies' involvement in RE100 initiatives can also help improve the likelihood of meeting their climate targets as such initiatives require them, for example, to share roadmaps and timelines to achieve 100% use of renewable energy in their operations.[41] The SBTi also uses the renewable energy method, which is applicable only to Scope 2 emissions, requiring companies to set targets to procure 80% of renewable energy by 2025 and 100% renewable energy by 2030, in line with RE100 initiatives.[42]

Exhibit 18: Company initiatives in the reported percentages of renewable-energy consumption



Based on constituents of the MSCI ACWI IMI as of March 1, 2023. Source: CDP, MSCI ESG Research.

[40] The GHG Protocol provides two methods for tracking Scope 2 emissions — location-based and market-based. The location-based method calculates emissions based on the emissions intensity of the local grid area where the electricity usage occurs, while a market-based approach calculates emissions based on the electricity that organizations have chosen to purchase.

[41] "Guidance & FAQ." RE100 (accessed Jan. 5, 2023).

[42] "SBTi Corporate Net-Zero Standard." SBTi, October 2021.

Appendix 7: Target-level data reported by companies

We considered the assessments of whether companies can achieve their climate target would ultimately come down to individual companies' emissions-reduction initiatives and strategies. Here, we proposed to assess an individual company's emissions-reduction initiatives by standardizing their emissions-reduction targets, progress and applicable emissions-reduction strategies and technology per scope and category.

Standardizing corporate emissions-reduction strategies can help improve the transparency of companies' emissions-reduction initiatives from their operations and products and services. Such standardization can also help investors monitor whether companies are making progress toward achieving net-zero emissions as per the SBTi standards (Exhibit 18).[43]

Exhibit 19: Illustration of standardizing corporate initiatives in emissions reduction

Company A		Reporting year	Base year	Target year				GHG mitigation options
Absolute target		2020	2019	Reduction by 2035	Target coverage	2035	Track record	Examples of corporate disclosure for applicable transition technology
Scope 1 (MtCO2e)		0.19	0.19	70%	95%	0.06	Not on track	Install energy efficient equipment
Scope 2 (MtCO2e)		1.19	1.28	70%	95%	0.43	On track	Install solar power per RE100
Scope 3 (MtCO2e)	Cat 1	4.23	3.79	45%	90%	2.26	Not on track	Engage suppliers to set SBTi targets
	Cat 2	0.78	1.20	45%	90%	0.71	On track	Install energy efficient lighting
	Cat 3	0.09	0.17	45%	90%	0.10	On track	Fuel switching to low-carbon boilers
	Cat 4	0.22	0.27	45%	90%	0.16	On track	Modal shift from trucks to railways
	Cat 5	0.04	0.04	45%	90%	0.02	Not on track	Reduce waste from production
	Cat 6	0.09	0.01	45%	90%	0.01	Not on track	Use energy-efficient aviation
	Cat 7	0.10	0.05	45%	90%	0.03	Not on track	Use hybrid cars and electric vehicles
	Cat 8	0.00	0.00	-	-	-	-	-
	Cat 9	0.00	0.00	45%	90%	0.00	Not on track	Modal shift from trucks to railways
	Cat 10	0.00	0.01	45%	90%	0.01	On track	Reduce product life-cycle emissions
	Cat 11	10.64	11.40	45%	90%	6.78	On track	Develop electric vehicles and battery
	Cat 12	0.18	0.12	45%	90%	0.07	Not on track	Recycle products per WEEE directive
	Cat 13	0.00	0.00	-	-	-	-	-
	Cat 14	0.00	0.00	-	-	-	-	-
	Cat 15	0.02	0.02	45%	90%	0.01	Not on track	Finance environmental innovations
Total (tCO2e)		17.78	18.55	-	-	10.66	On track	-

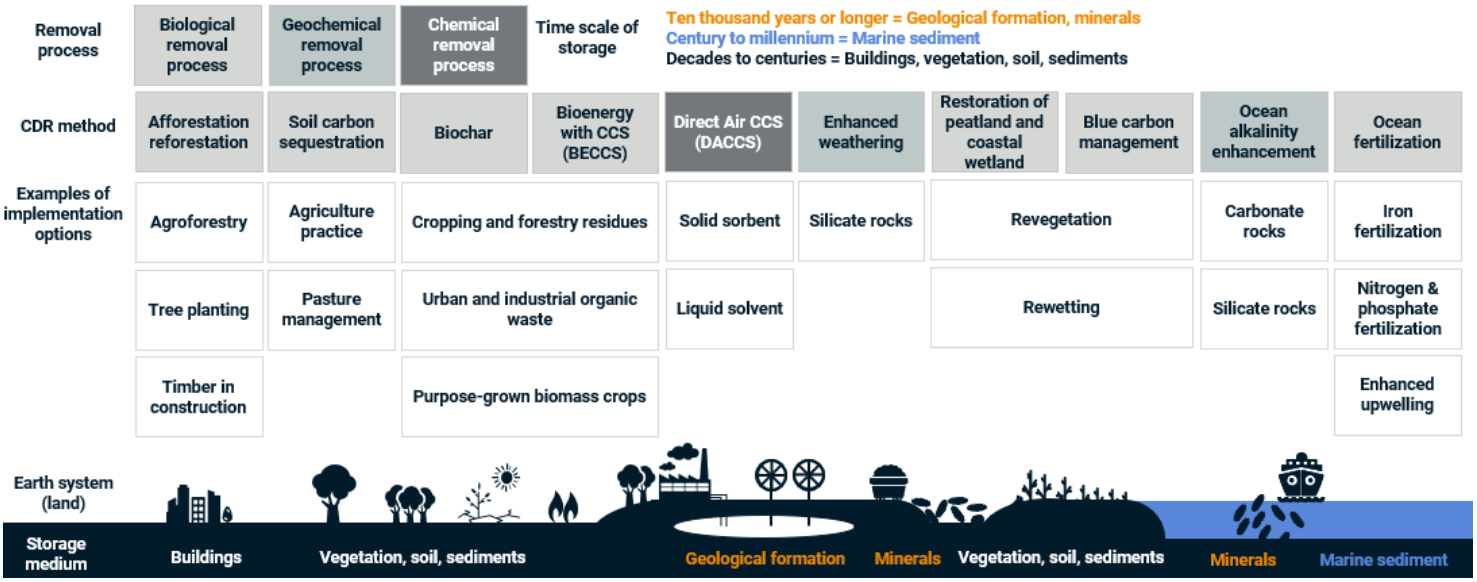
Based on a hypothetical company. Source: MSCI ESG Research

[43] "SBTi Corporate Net-Zero Standard." SBTi, October 2021.

Appendix 8: Types of CDR solutions as per the IPCC AR6

To understand corporate initiatives in CDR, we illustrated a list of CDR solutions that companies could invest in for the development of such technology in the near term under the SBTi standards (Exhibit 20). We also described the characteristics of each CDR solution and summarized their pros and cons by referring to CDR research in the IPCC AR6 (see Appendixes 9 and 10).

Exhibit 20: Illustration of CDR-technology solutions



Source: IPCC, MSCI ESG Research

Appendix 9: Characteristics of CDR solutions as per the IPCC AR6

Type of CDR	Descriptions from the IPCC Sixth Assessment Report	Examples
Afforestation and reforestation	Forests established for ecological restoration, plantations grown for forest products and agroforestry, where biomass may also be a co-product.	Agroforestry, tree planting
Soil carbon Sequestration	Fixing atmospheric carbon in biomass.	Agriculture, pasture management
Biochar	Converting biomass to biochar and using it as a soil amendment.	Forestry residue
Bio energy with carbon capture and storage (BECCS)	The application of carbon dioxide capture and storage technology to bioenergy conversion processes. Depending on the total lifecycle emissions, BECCS has the potential for net CDR from the atmosphere. BECCS works where biomass is burned for energy and the resulting carbon dioxide is captured.	Biomass crops
Direct air carbon dioxide capture and storage (DACCS)	Chemical process by which carbon dioxide is captured directly from the ambient air, with subsequent storage. DACCS typically employ a chemical capture system to separate carbon dioxide from ambient air, add energy to separate the captured carbon dioxide from the chemical substrate, and remove the purified carbon dioxide to be stored permanently or utilized for other purposes.	Solid sorbent, liquid solvent
Enhanced weathering	Enhanced weathering is designed to remove carbon dioxide by spreading large quantities of selected and finely ground rock material onto extensive land areas, beaches or the sea surface. This technology aims to accelerate the natural weathering processes of silicate and carbonate rocks to absorb about one billion tons of carbon dioxide from the atmosphere every year.	Silicate rocks
Restoration of peatland and coastal wetland	Restoring degraded and damaged peatlands and wetland, for example, through rewetting and revegetation, which both increases carbon accumulation in vegetation and soils and avoids ongoing carbon dioxide emissions.	Revegetation, rewetting
Blue carbon management	Biological carbon sequestration in all marine ecosystems, but it is increasingly applied to carbon dioxide removal associated with rooted vegetation in the coastal zone, such as tidal marshes, mangroves, and seagrasses.	Revegetation, rewetting
Ocean alkalinity Enhancement	The extraction, processing, and dissolution of minerals and addition to the ocean where they enhance sequestration of carbon dioxide as bicarbonate and carbonate ions in the ocean.	Carbonate rocks, silicate rocks
Ocean fertilization	One natural mechanism of carbon transfer from the atmosphere to the deep ocean is the ocean biological pump, driven by the sinking of organic particles from the upper ocean. Increasing nutrient availability would stimulate uptake of carbon dioxide through phytoplankton photosynthesis producing organic matter, some of which would be exported into the deep ocean, sequestering carbon.	Iron fertilization, nitrogen and phosphorus fertilization

Source: IPCC, MSCI ESG Research

Appendix 10: Pros and cons of CDR solutions as per the IPCC AR6

CDR	Cost (USD per tCO2e)	Mitigation potentials (GtCO2e per year)	Risks (examples)	Co-benefits (examples)
Afforestation and reforestation	0 – 240	0.5 to 10	Reversal of carbon removal through wildfire. Outbreak of disease.	Improved biodiversity.
Soil carbon sequestration	45 – 100	0.6 to 9.3	Hard to monitor status. Risk of increased nitric oxide due to high levels of organic nitrogen in soil. Reversal of carbon sequestration.	Improved soil quality, resilience and agricultural productivity.
Biochar	10 – 345	0.3 to 6.6	Biodiversity and carbon-stock loss from unsustainable biomass harvest. Particulate and GHG emissions from production.	Increased crop yields and reduced non-CO2 emissions from soil. Resilience to drought.
Bio energy with carbon capture and storage (BECCS)	15 – 400	0.5 to 11	Competition for land and water to grow biomass feedback. Biodiversity and carbon-stock loss from unstainable biomass harvest.	Enhanced biodiversity and soil conditions if implemented well. Reduction of air pollutants and optimal use of residues.
Direct air carbon dioxide capture and storage (DACCS)	100 – 300	5 to 40	Increased use of energy and water. Potential increase of emissions from water supply and energy generation.	Water-produced.
Enhanced weathering	50 – 200	2.0 to 4.0	Potential increase of emissions from water supply and energy generation. Impact on air quality when rock dust is spread on soil.	Enhanced plant growth. Enhanced soil carbon sequestration. Reduced erosion. Improved retention of soil water.
Restoration of peatland and coastal wetland	N/A	0.5 to 2.1	Reversal of carbon removal in drought or future disturbance. Risk of increased methane emissions. Competition for land for food production on some peatlands.	Enhanced employment and local livelihoods, increased productivity of fisheries, improved biodiversity, soil carbon and nutrient cycling.
Blue carbon management	N/A	1.0	Coastal blue carbon ecosystems are expected to release most of their carbon back to the ambient air, if degraded or lost.	Blue carbon management can contribute to ecosystem-based adaptation, coastal protection, and increased biodiversity.
Ocean alkalinity enhancement	40 – 260	1.0 to 100	Increased seawater pH may impact marine biota. Potential increase of carbon dioxide from mining, transport and deployment.	Limiting ocean acidification.
Ocean fertilization	50 – 500	1.0 to 3.0	Fundamental alteration of food webs and biodiversity. Risks for decadal-to-millennial-scale return to the atmosphere of nearly all the extra carbon removed.	Increased productivity and fisheries. Reduced upper-ocean acidification.

Source: IPCC, MSCI ESG Research

Appendix 11: Data used for this report

ESG Factor name in ESG Manager	Short Name	Exhibits
Company has committed to adopt science-based targets Company has science based approved emissions targets	HAS_COMMITTED_TO_SBTI_TARGETS HAS_SBTI_APPROVED_TARGET	1
Carbon Emissions Time Series – Scope 1 (metric tons) FY 2020 Carbon Emissions Time Series – Scope 2 (metric tons) FY 2020 Carbon Emissions Time Series – Scope 3 (metric tons) FY 2020 Annual Projected Scope 1 Emissions [tCO2e/yr][time series] Annual Projected Scope 2 Emissions [tCO2e/yr][time series] Annual Projected Scope 3 Emissions [tCO2e/yr][time series]	CARBON_EMISSIONS_SCOPE_1_FY20 CARBON_EMISSIONS_SCOPE_2_FY20 CARBON_EMISSIONS_SCOPE_3_FY20 S1_ANNUAL_PROJECTED_EMISSIONS_TS S2_ANNUAL_PROJECTED_EMISSIONS_TS S3_ANNUAL_PROJECTED_EMISSIONS_TS	2
Carbon Emissions Time Series – Scope 1 (metric tons) FY 2020 KEY Carbon Emissions Time Series – Scope 2 (metric tons) FY 2020 KEY Carbon Emissions Time Series – Scope 3 (metric tons) FY 2020 KEY	CARBON_EMISSIONS_SCOPE_1_KEY_FY20 CARBON_EMISSIONS_SCOPE_2_KEY_FY20 CARBON_EMISSIONS_SCOPE_3_KEY_FY20	3
Carbon Emissions Time Series – Scope 1 (metric tons) FY 2008-2020 Carbon Emissions Time Series – Scope 2 (metric tons) FY 2008-2020 Carbon Emissions Time Series – Scope 3 (metric tons) FY 2008-2020	CARBON_EMISSIONS_SCOPE_1_FY08 – FY20 CARBON_EMISSIONS_SCOPE_2_FY08 – FY20 CARBON_EMISSIONS_SCOPE_3_FY08 – FY20	4
Targeted change (% vs. baseline) Target value Target year Target baseline Target base year Progress against target – last reported values Progress against target – last reported year Target coverage (%)	TARGET_CARBON_CHANGE_PCT CBN_TARGET_YEAR_VAL CBN_TARGET_YEAR CBN_TARGET_BASE_YEAR_VAL CBN_TARGET_BASE_YEAR TARGET_CARBON_PROGRESS_VALUE TARGET_CARBON_CURRENT_REPORTING_YEAR	5

	TARGET_CARBON_COVERAGE_PCT	
Carbon Emissions Time Series – Scope 1 (metric tons) FY 2008-2020 Carbon Emissions Time Series – Scope 2 (metric tons) FY 2008-2020 Carbon Emissions Time Series – Scope 3 (metric tons) FY 2008-2020 Sales (USD) FY2008-2020	CARBON_EMISSIONS_SCOPE_1_FY08 – FY20 CARBON_EMISSIONS_SCOPE_2_FY08 – FY20 CARBON_EMISSIONS_SCOPE_3_FY08 – FY20 SALES_USD_FY08 – FY20	6
Carbon Emissions Time Series – Scope 1 (metric tons) FY 2020 Carbon Emissions Time Series – Scope 2 (metric tons) FY 2020 Carbon Emissions Time Series – Scope 3 (metric tons) FY 2020 Scope 3 – Categories 01 & 02 – 15 (all)	CARBON_EMISSIONS_SCOPE_1_ FY20 CARBON_EMISSIONS_SCOPE_2_ FY20 CARBON_EMISSIONS_SCOPE_3_ FY20 CARBON_EMISSIONS_SCOPE3_CAT_1_2 – CAT_15_ALL	7
Low Carbon Patent Score in Wind Low Carbon Patent Score in Photovoltaic Low Carbon Patent Score in Nuclear Low Carbon Patent Score in Hydro Low Carbon Patent Score in CCS	GREEN_PAT_VAL_WIND GREEN_PAT_VAL_PHOTOVOLTAIC GREEN_PAT_VAL_NUCLEAR GREEN_PAT_VAL_HYDRO GREEN_PAT_VAL_CCS	10
Low Carbon Patent Score in Batteries Low Carbon Patent Score in Automobiles Low Carbon Patent Score in Electric Vehicles Low Carbon Patent Score in Hydrogen	GREEN_PAT_VAL_BATTERIES GREEN_PAT_VAL_AUTO GREEN_PAT_VAL_ELECTRIC_VEHICLES GREEN_PAT_VAL_HYDROGEN	11
Low Carbon Patent Score in Agriculture Low Carbon Patent Score in Agrochemical Low Carbon Patent Score in Livestock Low Carbon Patent Score in Desalination	GREEN_PAT_VAL_AGRICULTURE GREEN_PAT_VAL_AGROCHEMICAL GREEN_PAT_VAL_ELECTRIC_LIVESTOCK GREEN_PAT_VAL_DESALINATION	12

Source: MSCI ESG Research

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