# Road to Science-Based Corporate Net-Zero Target Setting

Assessing challenges for Science Based Targets initiative (SBTi) approved net-zero target-setting and emissions reduction processes.

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## Contents

## Executive summary

Reaching net-zero carbon dioxide emissions globally is necessary for limiting global warming, according to the sixth assessment report of the United Nations Intergovernmental Panel on Climate Change (IPCC).[1] The IPCC stated that limiting the global average temperature rise to 1.5°C would require carbon dioxide emissions to peak before 2025 at the latest and fall by 48% below 2019 levels by 2030, reaching net-zero emissions by the early 2050s.[2] Further, the IPCC assessed the deployment of carbon dioxide removal (CDR) to counterbalance hard-to-abate residual emissions was unavoidable if net zero emissions were to be achieved.[3]

These IPCC studies highlighted the importance of reaching peak emissions in the near term, halving them within the next decade and achieving net-zero emissions in the long-term in accordance with 1.5°C-aligned decarbonization pathways. However, some questions remain on how companies develop net-zero emissions targets and ensure their decarbonization strategies are aligned with such ambitious pathways.

The Science Based Target initiative (SBTi), one of the leading global initiatives that help set science-based corporate climate targets aligned with the goals of the Paris Agreement, offers some answers to these questions. SBTi developed a guiding principle called "SBTi corporate net-zero standard", helping to define a common understanding of net-zero emissions in a corporate context.[4] This standard can help companies set net-zero emissions targets in line with the ambitious goals of the Paris Agreement.

In this report, we assessed the challenges that companies may face in the process of setting science-based net-zero targets under the SBTi standard. We consider that the challenges could be categorized into three parts: (1) reporting total value chain emissions from Scope 1, 2 and 3 boundaries; (2) reducing emissions to zero or residual levels; and (3) removing residual emissions.

For these assessments, we used 473 companies, equal to 5% of the constituents of the MSCI ACWI Investable Market Index (IMI), that set or committed to set SBTi-approved net-zero targets as of May 16, 2022.[5] In this research, we also found several companies that could potentially accelerate the development and deployment of CDR technology, using MSCI low carbon patent scores and carbon emissions management metrics.

[1] IPCC. April 2022. Climate Change 2022. Mitigation of Climate Change. Summary for Policy Makers.
[2] IPCC. April 2022. Working Group III Contribution to the IPCC Sixth Assessment Report.
[3] IPCC. April 2022. Climate Change 2022. Mitigation of Climate Change. Summary for Policy Makers.
[4] SBTi. October 2021. SBTi Corporate Net-Zero Standard.
[5] The MSCI ACWI Investable Market Index (IMI) constituents referenced in the report are as of May 16th, 2022.

For institutional investors concerned with the impact of their portfolios on climate change, assessing corporate efforts and progress in setting science-based net-zero targets could help mitigate their portfolios' exposure to carbon risks. The integration of such assessments into climate risk management strategies may help strengthen the resilience of investment portfolios against potential transition risks.

## Key takeaways

- **TARGET SETTING:** The number of companies declaring some type of net-zero targets or "self-declared net-zero targets" increased from 96 in 2015 to 1,121, or about 12% of the MSCI ACWI IMI, in 2021. These had a broad range and divergence in terms of scope, target year and carbon removal policy, however. Narrowing this divergence is the SBTi's main objective, so it published its own net-zero standard to develop a common definition of net-zero emissions for corporates.
- There are, so far, **only seven constituents of the MSCI ACWI IMI that have set SBTi-approved net-zero targets and 473 constituents, or 5%, that have committed to set one in the future, as of May 16, 2022.**[6]
- **TOTAL VALUE CHAIN:** The SBTi net-zero standard aims for net-zero emissions from the total value chain of Scope 1, 2 and 3 boundaries by 2050 at the latest, but it also acknowledges the challenges companies may face with Scope 3 reporting in the next 5-10 years. It therefore follows a gradual approach requiring companies to increase the boundary of targets to cover all material sources of emissions from the total value chain over time by 2050 at the latest.
- Using companies' reported emissions and our estimated emissions data for 2020[7] and the Global Industry Classification Standards (GICS),[8] we found companies in the **utilities, consumer staples and materials sectors have already reported over 75% of their total value chain emissions in line with the greenhouse gas (GHG) protocol. By contrast, other sectors reported 60% or less, which indicates they face a higher bar for Scope 3 reporting** in the future.
- **LONG-TERM TARGETS:** As a core part of its standard, SBTi requires companies to set long-term targets to reduce more than 90% of Scope 1, 2, and 3 total value chain emissions below 2020 levels by 2050 (or by 2040 for the power generation

[6] SBTi. May 2022. Company Taking Action, last accessed on May 15th, 2022.
[7] MSCI. May 8th. 2022. Scope 3 Emissions Estimation Methodology
[8] The Global Industry Classification Standard (GICS) was developed by and is the exclusive property of MSCI and Standard & Poor's. "Global Industry Classification Standard (GICS®)" is a service mark of MSCI and Standard & Poor's.

sector). Companies are also required to set near-term targets aligned with 1.5°C-aligned pathways within the next 10 years.

- Of the 473 constituents of the MSCI ACWI IMI that have already set some climate targets aiming for 2022 and beyond (SBTi validation status pending), about 60% of their total value chain emissions were on average attributed to Scope 3 categories 1 and 11 (i.e., purchased goods and services and use of sold products). **Only 21% of the 473 companies explicitly targeted to reduce emissions from Scope 3 categories 1 and 11, however, indicating that most of the companies may face challenges in reducing emissions from these carbon intensive categories**.
- **RESIDUAL EMISSIONS:** The SBTi net-zero standard allows companies to neutralize residual emissions through carbon dioxide removal (CDR) technology such as carbon capture and sequestration (CCS) and bioenergy with carbon capture and storage (BECCS).
- We identified a list of companies with high quality patents related to CDR technologies, using MSCI low carbon patent scores. Companies such as **General Electric** and **Siemens** committed to set SBTi net-zero targets and researched and developed CCS solutions, so are well positioned to tap the growth potential of CDR technology. We also found 28 companies, or 6%, of the 473 companies that committed to set SBTi-approved net-zero targets are already involved in CDR pilot projects and feasibility studies. **Heidelberg Cement** for instance, launched a demonstration project of industry-scale CCS at its cement plant. These are all anecdotal, but these R&D and pilot projects could help them implement CDR at scale when the technology has matured further.

# Introduction

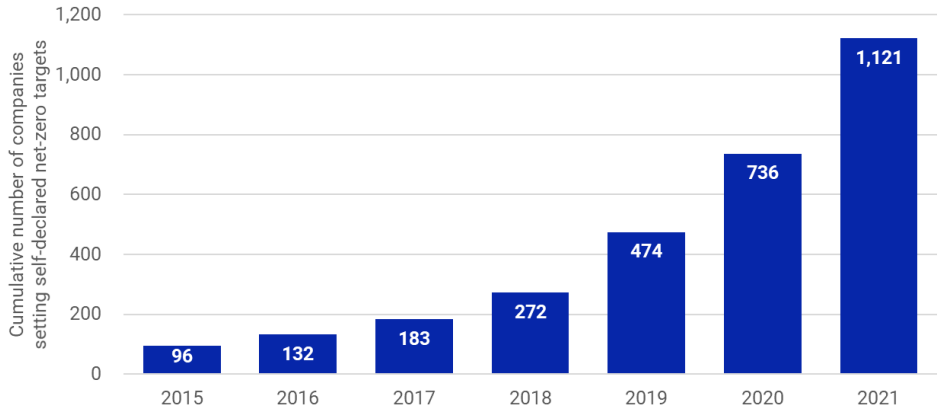
Net-zero targets are a climate target in which a company aims to bring its GHG emissions to zero, on a net basis. The term "net" comes from the fact that most companies cannot operate without emitting at least some GHGs — hence, there is a need to compensate for residual emissions via carbon offset or removal.

We have observed an increase in companies setting some type of net-zero target or aiming for 100% reduction for at least one of Scope 1, 2 or 3 emissions boundaries. The number of such companies has risen from 96 in 2015 to 1,121 — or about 12% of MSCI ACWI Investable Market Index (IMI) — in 2021 (Exhibit 1).

The proliferation of net-zero targets could be a positive development — and yet, the devil is in the details. An analysis of such targets reveals often large differences over the scopes of these net-zero targets and how companies intend to achieve them.[9]

This means **not all net-zero targets are created equal**. Declaring net-zero targets alone may not help companies stop causing climate change. Instead, there needs to be a standard that could help ensure companies' net-zero targets cover their total value chains and monitors emissions reduction in accordance with such targets.

**Exhibit 1: Cumulative number of constituents of the MSCI ACWI IMI with some type of net-zero targets**




*Source: MSCI ESG Research, LLC. Data as of May 16, 2022. Notes: When a target announcement date or target reporting date was not explicitly stated, they were counted in 2021.*

[9] We consider companies' efforts to minimize emissions from production (i.e., Scope 1 and 2) and value chains (i.e., Scope 3) are equally important to limit global average temperature rise below 1.5°C. Many companies set net-zero emissions targets from domestic production in line with the long-term government pledges on carbon neutrality. Net-zero emissions from domestic production alone, however, may not slow temperature rise if companies shift the production abroad or import alternative products from high-carbon-emitting countries and sell them for domestic consumption, generating emissions in the market. This means net-zero emission can be achieved only if companies minimize emissions from production and value chains in a corporate context.

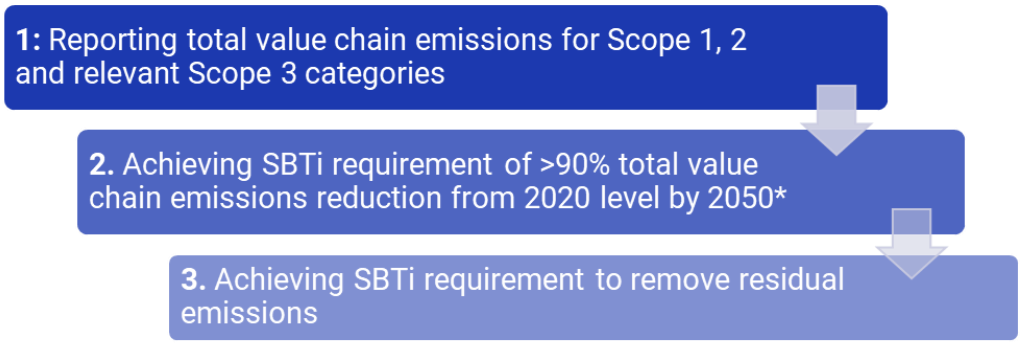
In October 2021, the Science Based Target initiative (SBTi), one of the leading initiatives that set criteria and standards for science-based climate targets, published its own net-zero standard.[10] The SBTi net-zero standard defined corporate net-zero targets as:

- Reducing Scope 1, 2 and 3 emissions to zero or to a residual level that is consistent with reaching net-zero emissions at the global or sector level in one of the eligible 1.5°C-aligned pathways.
- Neutralizing any residual emissions at the net-zero target year and any GHG emissions released into the atmosphere thereafter.

The SBTi net-zero standard is one of the first industry initiatives covering emissions reduction from Scope 1, 2 and 3 boundaries,[11] along with the Net-Zero Asset Owner Alliances (NZAOA)'s target-setting protocol.[12] There are, so far, only seven constituents of the MSCI ACWI IMI that have set SBTi-approved net-zero targets and a total of 473 that have committed to set ones in the future, as of May 16, 2022. [13]

In this report, we assessed the challenges these 473 companies may face in the process of setting and achieving these science-based net-zero targets. We classified them into three parts, namely: (1) reporting total value chain emissions from Scope 1, 2 and 3 boundaries; (2) reducing emissions to zero or residual levels; and (3) removing residual emissions (See Exhibit 2). We examine these three challenges step by step in the following pages.

**Exhibit 2: Three key challenges in the science-based net-zero target-setting process**




*Source: MSCI ESG Research Notes: * Target year is 2040 for power generation sectors.*

[10] SBTi. October 2021. "SBTi Corporate Net-Zero Standard." Notes: SBTi has provided technical assistance and expert resources to companies that set science-based targets in line with the latest climate science since 2015.
[11] SBTi. Last accessed on May 16,.2022. "The Net-zero Standard."
[12] Net Zero Asset Owners Alliance. January 2022. Target-Setting Protocol. Second Edition.
[13] SBTi. Last accessed on May 16, 2022. "Companies taking action." Notes: In the MSCI ACWI IMI universe, the seven companies that set SBTi-approved net-zero targets were Astrazeneca, CVS Health, Wipro, Holcim, Orsted, Jones Lang LaSalle (JLL) and Moody's, as of May 16, 2022.

## Challenge #1: Reporting total value chain emissions

The SBTi net-zero standard requires companies to have a thorough GHG inventory that covers company-wide Scope 1 and 2 emissions per the GHG Protocol. It also requires them to complete a Scope 3 inventory covering all emissions sources per the GHG Protocol Corporate Value Chain Accounting and Reporting Standard.[14]

Reporting Scope 1, 2 and 3 emissions in line with the GHG Protocol therefore plays a key role in the process of setting science-based net-zero targets. We assessed the current states of emissions disclosure among the five constituents of the MSCI ACWI IMI that set SBTi-approved net-zero targets as company examples in Exhibit 3.

**Exhibit 3: Five constituents of the MSCI ACWI IMI with SBTi-based net-zero targets**

| SBTi-Approved Net-Zero Targets | | Astrazeneca | CVS Health | Holcim AG | Orsted A/S | Wipro Ltd |
|---|---|---|---|---|---|---|
| GICS Sector | | Health Care | Health Care | Materials | Utilities | Info Tech |
| Net-Zero Target End Year | | 2045 | 2050 | 2050 | 2040 | 2040 |
| On Track with 2030 Targets | | S2, S3 Cat 1 | S2, S3 Cat 1,6 | Not on track | All on track | S1, S2 |
| # of Reported S3 Categories | | 12 | 7 | 6 | 9 | 7 |
| % of Reported in Total MtCO2e | | 100% | 86% | 95% | 100% | 71% |
| Reported + Estimated MtCO2e | | 8.234 | 13.737 | 153.181 | 27.310 | 0.578 |
| Scope 1 (MtCO2e) | | 0.225 | 0.165 | 110.000 | 1.851 | 0.011 |
| Scope 2 (MtCO2e) | | 0.212 | 0.977 | 7.000 | 0.111 | 0.086 |
| Scope 3 (MtCO2e) | Category 1 | 5.767 | 9.425 | 0.242 | 0.242 | 0.216 |
| | Category 2 | 0.116 | 0.962 | 0.657 | 0.657 | 0.080 |
| | Category 3 | 0.050 | 0.050 | 2.437 | 2.437 | 0.054 |
| | Category 4 | 0.248 | 0.931 | 0.001 | 0.001 | 0.028 |
| | Category 5 | 0.025 | 0.065 | 0.001 | 0.001 | 0.000 |
| | Category 6 | 0.081 | 0.025 | 0.003 | 0.003 | 0.014 |
| | Category 7 | 0.035 | 0.020 | 0.009 | 0.009 | 0.018 |
| | Category 8 | 0.040 | 0.000 | 0.010 | 0.010 | 0.013 |
| | Category 9 | 0.378 | 0.151 | 0.003 | 0.003 | 0.028 |
| | Category 10 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | Category 11 | 0.979 | 0.000 | 21.980 | 21.980 | 0.000 |
| | Category 12 | 0.072 | 0.965 | 0.005 | 0.005 | 0.030 |
| | Category 13 | 0.006 | 0.000 | 0.000 | 0.000 | 0.000 |
| | Category 14 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | Category 15 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

☐=*Reported Emissions per Scope and Category* ■=*Estimated Emissions per Category*

*Source: MSCI ESG Research, CDP, company reports as of May 16, 2022. Note: We estimated zero emissions from specific categories of Scope 3 when they were not relevant for the companies.*

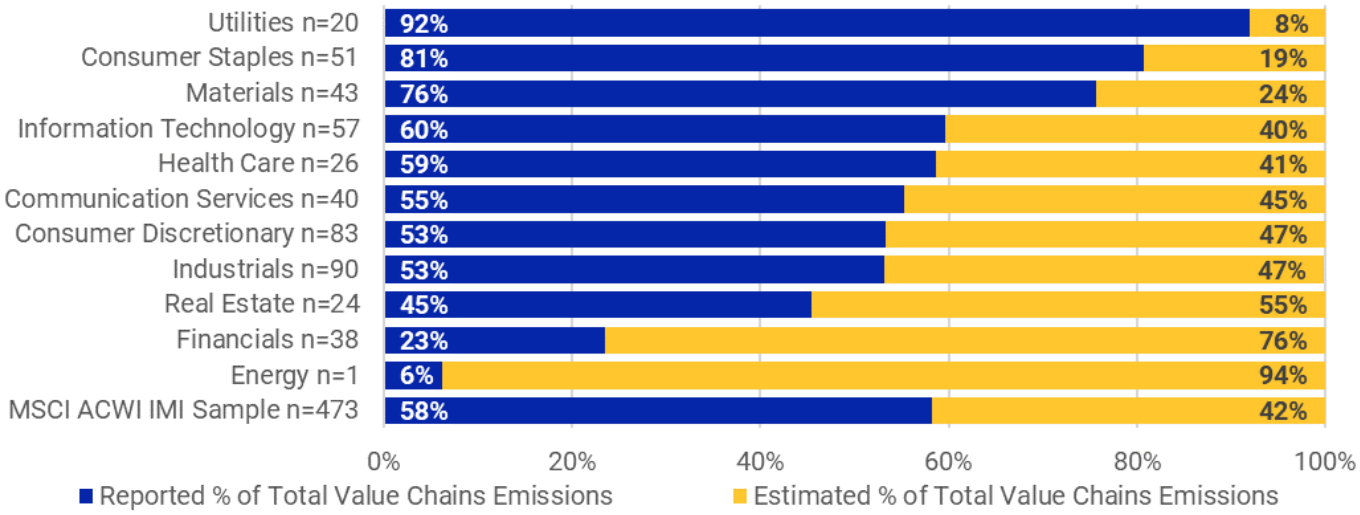
[14] SBTi. October 2021. "SBTi Corporate Net-Zero Standard." Based on SBTi's standard, companies may exclude up to 5% of scope 1 and 2 emissions combined in the boundary of the inventory. For Scope 3, the corporate value chain accounting and reporting standard applied minimum boundaries of scope 3 categories.

In Exhibit 3, we assessed the companies' total value chain emissions by estimating Scope 3 emissions per category when emissions from the category were not reported in their disclosures. Based on our estimates, we found the five companies have already reported on average about 90% of total value chain emissions.

Using the same approach, we also assessed total value chain emissions for the 473 companies that committed to set SBTi approved net-zero targets by GICS sector. We found the utilities, consumer staples and materials sectors reported on average over 75% of their total value chain emissions (Exhibit 4). Other sectors reported 60% or less of their total value chain emissions, indicating that they may face a higher bar for the emission disclosure than the three sectors above. For instance, **Worley**, the energy equipment and services company, reported Scope 1 and 2 emissions, but it did not report Scope 3, possibly facing challenges in Scope 3 reporting from its upstream and downstream sources before setting net-zero targets.

We note that the SBTi net-zero standard acknowledges the challenges that companies may face with Scope 3 reporting. The SBTi standard thus follows an expansive boundary approach and a gradual increase in ambition.[15] This approach requires the companies to increase the boundary of their targets to cover all material sources of emissions in their value chains over time by 2050 at the latest. The 473 companies will therefore be required to report total value chains emissions eventually over time.

**Exhibit 4: Reported and estimated percentages of total value chain emissions**




*Source: MSCI ESG Research, CDP, company reports. Note: We used company reported emissions and MSCI Scope 3 Estimation Model for the assessments of total value chain emissions.*

[15] SBTi. October 2021. "SBTi Corporate Net-Zero Standard." SBTi requires companies to increase the target boundary to cover all material emissions sources in the value chain (materiality threshold of 90%) by 2050.

## Case study 1: Example of near-term climate target assessments using Scope 3 estimation model

**Target Description:** CVS Health committed to a near-term target that aimed to reduce absolute Scope 1, 2 and 3 Cat. 1 emissions by 47% below 2019 by 2030.

**Target Analysis:** The table below summarized CVS Health's near-term targets and progress per scope and category. We assessed the company should reduce its total value chain emissions by 1.61% on average per year in 2020-2030 to achieve the targets. The company is reducing Scope 2 and 3 Cat. 1 emissions on track with the target, but its Scope 1 emissions reduction is not on track as they increased in 2019-2020. The table below could help standardize target-related information and enhance investors' ability to monitor and assess annual emissions reductions.

**Exhibit 5: Summary of CVS Health's target metrics and total value chain emissions**

| CVS Health Absolute Target | Scope of targeted emissions | Current year 2020 | Base year 2019 | Emissions reduction % per scope | Target year 2030 | Normalized reduction % 2020-2030 | Track record of progress |
|---|---|---|---|---|---|---|---|
| Scope 1 (MtCO2e) | | 0.165 | 0.157 | 47% | 0.083 | 4.97% | Not on track |
| Scope 2 (MtCO2e) | | 0.977 | 1.025 | 47% | 0.543 | 4.44% | On track |
| Scope 3 (MtCO2e) | Cat 1 | 9.425 | 14.585 | 47% | 7.730 | 1.80% | On track |
| | Cat 2 | 0.962 | 1.012 | - | 0.962 | - | - |
| | Cat 3 | 0.050 | 0.052 | - | 0.050 | - | - |
| | Cat 4 | 0.931 | 0.931 | - | 0.931 | - | - |
| | Cat 5 | 0.065 | 0.035 | - | 0.065 | - | - |
| | Cat 6 | 0.025 | 0.107 | - | 0.025 | - | - |
| | Cat 7 | 0.020 | 0.020 | - | 0.020 | - | - |
| | Cat 8 | 0.000 | 0.000 | - | 0.000 | - | - |
| | Cat 9 | 0.151 | 0.047 | - | 0.151 | - | - |
| | Cat 10 | 0.000 | 0.000 | - | 0.000 | - | - |
| | Cat 11 | 0.000 | 0.000 | - | 0.000 | - | - |
| | Cat 12 | 0.965 | 0.965 | - | 0.965 | - | - |
| | Cat 13 | 0.000 | 0.000 | - | 0.000 | - | - |
| | Cat 14 | 0.000 | 0.000 | - | 0.000 | - | - |
| | Cat 15 | 0.000 | 0.000 | - | 0.000 | - | - |
| Total (tCO2e) | | 13.737 | 18.936 | - | 11.525 | 1.61% | On track |

☐*=Reported Emissions per Scope and Category* ■*=Estimated Emissions per Category*

*Source: MSCI ESG Research, company disclosure, as of May 16, 2022. Notes: In "Track Record of Progress", we assessed the progress companies made to meet their ongoing targets by benchmarking companies' latest emissions against their targeted trajectory and indicated "On track" if its latest emissions were below the targeted trajectory and "Not on track" if not. We estimated zero emissions from its Scope 3 categories 8, 10, 11, 13, 14 and 15. When a target did not focus on a particular scope or category, the table above assumed that the latest emissions remain constant.*

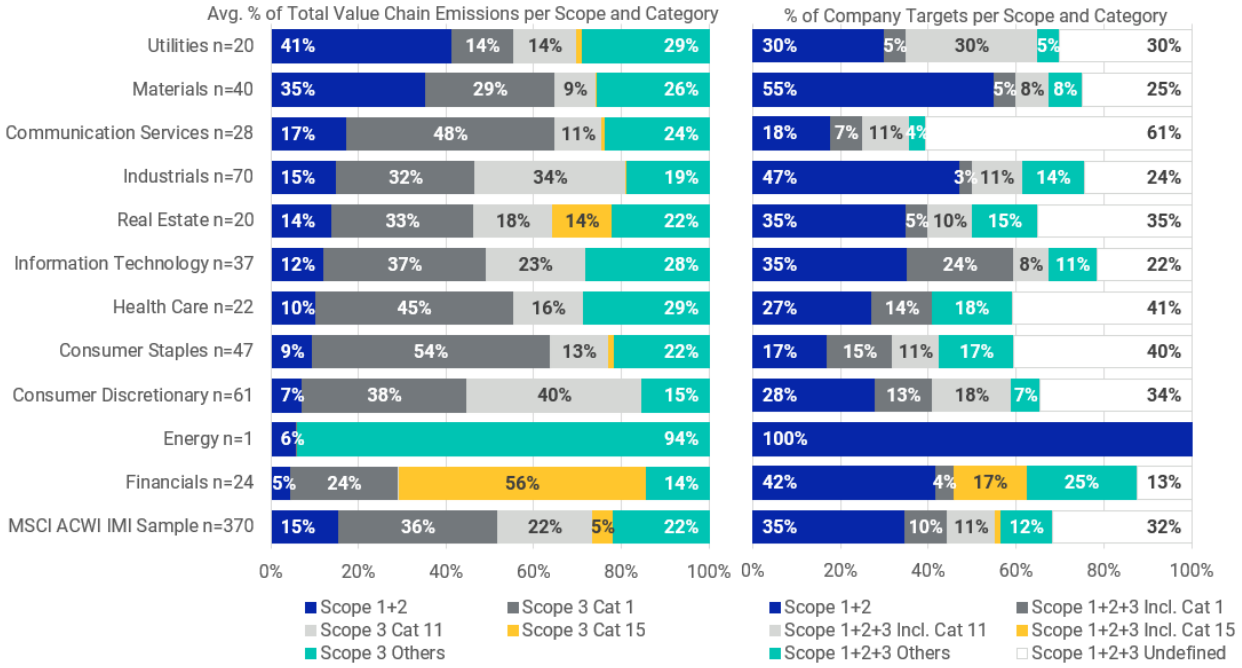
## Challenge #2: Reducing emissions to zero or residual level

The SBTi net-zero standard required companies to set long-term targets to reduce more than 90% of their Scope 1, 2, and 3 total value chain emissions below 2020 levels by 2050 (or by 2040 for the power generation sector). Companies are also required to set near-term (5-10 years) targets aligned with 1.5°C-aligned pathways. This steep long-term reduction required until 2050, combined with the need for near-term targets, forms the core of the expectations for the SBTi.

We found 370, or over 75%, of the 473 constituents of the MSCI ACWI IMI have already set climate targets for 2022 and beyond (SBTi validation status pending). Based on our estimates, about 60% of these companies' total value chain emissions were attributed to Scope 3 categories 1 and 11 (i.e., purchased goods and services and use of sold products) (Exhibit 6).

We therefore consider these companies would face challenges in reducing emissions from Scope 3 categories 1 and 11 in line with the SBTi targets as these are the most carbon intensive parts of their total value chain.

**Exhibit 6: Total emissions and targets per scope and category for constituents of MSCI ACWI IMI with set or committed to set SBTi-approved net-zero targets**




*Source: MSCI ESG Research, CDP, company reports. Note: We used company reported emissions and MSCI Scope 3 Estimation Model for the assessments of total value chain emissions.*

We found about 65% of the 370 companies had targets to reduce Scope 1, 2 and 3 emissions. However, only 21% had explicit targets to reduce emissions from Scope 3 categories 1 and 11. More than half of the Scope 3 emissions reduction targets covered other Scope 3 categories or did not explicitly define which category of Scope 3 they aimed to reduce.

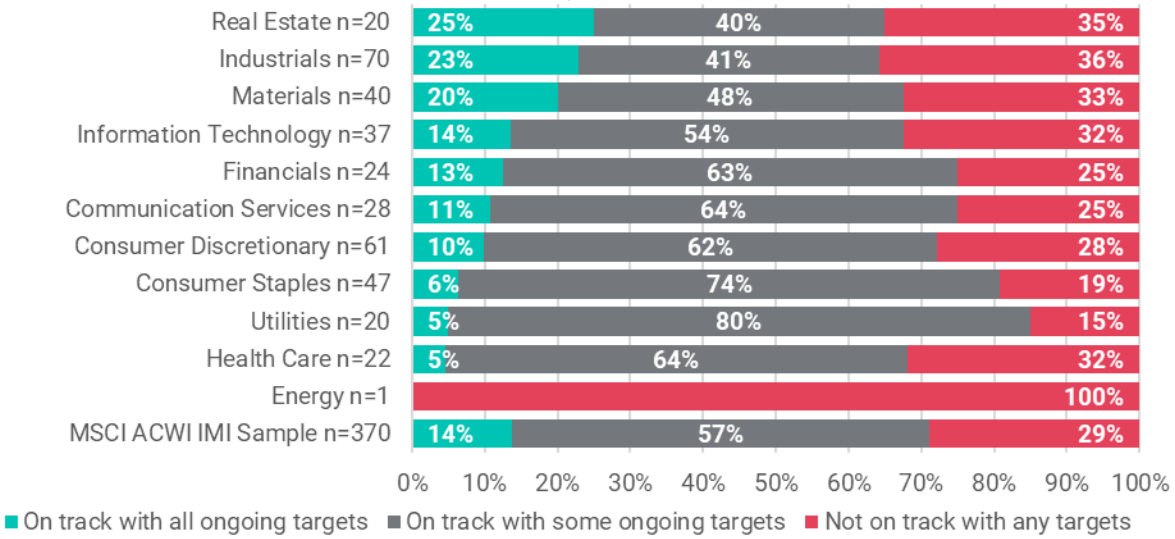
We also found some misalignment between the scope of corporate climate targets and the most carbon intensive scope of their total value chain emissions in the industrials and financials sectors. 47% and 42% of companies in these two sectors focused on Scope 1 and 2 emissions reduction alone, whereas Scope 1 and 2 emissions only accounted for 15% or lower of their total value chain emissions.

Further, a higher proportion of companies in the communication services, health care and consumer staples sectors set Scope 3 targets with undefined categories than in other sectors, indicating they may face pressures from their stakeholders and regulators to report their Scope 3 targets with more clarity and granularity.

## Monitoring emissions reduction per scope

Monitoring whether a company's emissions reduction progress is on track with these ongoing targets could play a key role in understanding whether they have started implementing decarbonization programs in line with their pledges. We found only 14% of the 370 companies reduced emissions on track with all their ongoing targets, while 29% failed to reduce emissions on track with any targets at all (Exhibit 7).

**Exhibit 7: Track record of targets set by 370 MSCI ACWI IMI sample across GICS**



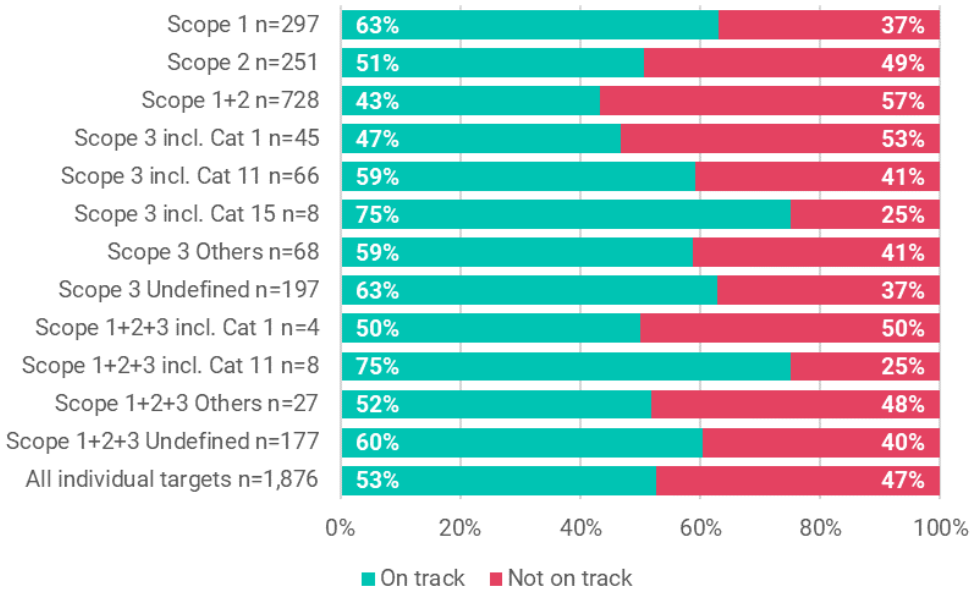

*Source: MSCI ESG Research, CDP, company reports. Notes: Because baseline emissions and target coverage information are not consistently reported by the companies, we used either reported or estimated baseline emissions and target coverage for this analysis.*

Most of the companies showed a mixed result, reducing emissions on track with some ongoing targets but failing to reduce emissions on track with others.

To help understand what scopes of targets the companies are making progress on track with their pledges, we analyzed their target level data. Overall, the 370 companies set 1,876 individual targets for 2022 and beyond. We found that the companies are reducing emissions on track for 53% of all the 1,876 individual targets (Exhibit 8).[16] For instance, **Aviva** set two interim targets aiming to reduce Scope 3 category 15 emissions intensity by 25% by 2025 and by 60% by 2030 below 2019 baseline. Aviva reduced Scope 3 category 15 emissions intensity by 16% below 2019 level by 2020, indicating the company is on track with these two targets.[17]

On the other hand, we observed many companies failed to reduce emissions on track with their Scope 1 and 2 targets. About 15% of the 728 individual Scope 1 & 2 emissions reduction targets are already targeting net-zero emissions or 100% emissions reduction from these scopes by 2050 or before, but many companies have failed to reduce emissions on track with such ambitious targets thus far.

**Exhibit 8: Track record of individual targets set by the 370 MSCI ACWI IMI sample**




*Source: MSCI ESG Research, CDP, company reports. Notes: 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.*

[16] Notes: We acknowledged the limitation of this analysis as we used estimated emissions when key target metrics such as base year emissions and present intensity values were not reported. We assessed the progress companies made to meet their targets by benchmarking their latest emissions against their targeted trajectory and indicated "On track" if their emissions were below the targeted trajectory and "Not on track", if not.
[17] AVIVA PLC. April 2022. Sustainability Report 2021.

## Case study 2: Example of near-term climate target assessments using Implied Temperature Rise (ITR) model

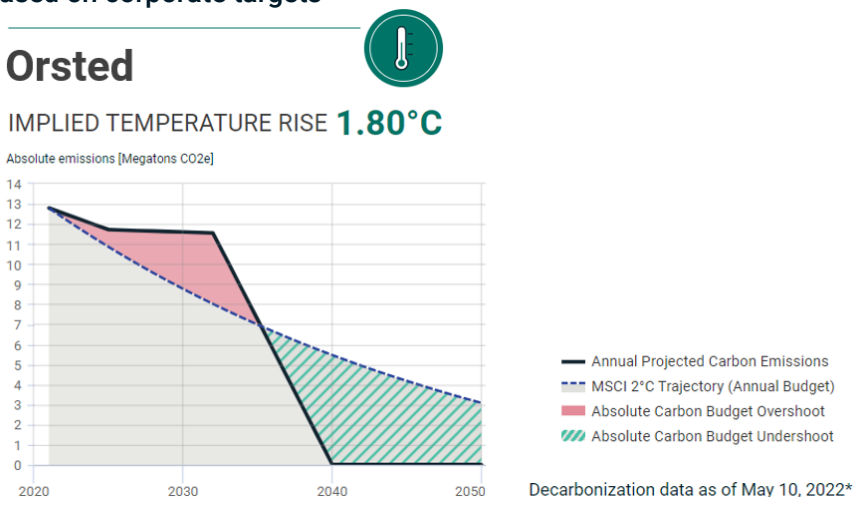
**Target Description**: Orsted committed to a near-term target to reduce Scope 1 and 2 intensity per kWh by 98% below 2006 by 2025 and absolute Scope 3 emissions by 50% below 2018 by 2032.

Orsted committed to a long-term target to reduce Scope 1 and 2 intensity per kWh by 99.8% below 2006 by 2040, and to reduce Scope 1, 2 and 3 intensity per kWh by 99% below 2018 by 2040 (excluding from use of sold products). Orsted also commits to reduce absolute Scope 3 GHG emissions from the use of sold products by 90% below 2018 by 2040, reaching net-zero emissions across the value chain by then.

**Key Results**: MSCI Implied Temperature Rise (ITR) model is an alternative tool to assess the impact of corporate climate targets on potential temperature rises. Our ITR model can assess the cumulative emissions under corporate climate targets and help analyze whether they are aligned with carbon budgets allocated to companies. Our ITR assessments indicated Orsted's cumulative emissions under its near-term targets of 2025 and 2032 may result in overshooting its 2.0°C-aligned carbon budgets allocated to the company based on its business model.

Our model indicated Orsted may reduce significant amounts of emissions between 2032 and 2040 if it achieves the targets following the schedule above. Overall, our ITR model indicated the company's near-term targets may be misaligned with the 2.0°C-pathways till 2032. Its long-term targets can, on the other hand, help get its decarbonization pathway aligned with the 2.0°C-pathways from the following year onward, if Orsted can achieve its net-zero emissions targets by 2040.

**Exhibit 9: Illustration of Orsted's Implied Temperature Rise and emissions projection based on corporate targets**




*Source: MSCI ESG Research*

## Challenge #3: Removing residual emissions

The SBTi net-zero standard allows companies to neutralize residual emissions through carbon dioxide removal (CDR) such as carbon capture and sequestration (CCS) and bioenergy with carbon capture and storage (BECCS).[18] The IPCC reported that alongside rapid emissions reduction, the deployment of CDR to counterbalance hard-to-abate residual emissions was unavoidable if net zero emissions were to be achieved.[19] This suggests that more investment in CDR is required to help achieve net-zero emissions by 2050 and beyond.

In this research, we identified a list of companies with high quality patents related to CDR technologies, using MSCI low carbon patent scores.[20] Companies such as **Exxon** and **Mitsubishi Heavy Industries** appeared to be leaders in CCS technology development. **General Electric** and **Siemens** committed to set SBTi net-zero targets and researched and developed CCS solutions, so are well positioned to tap the growth potential of CDR technology.

**Exhibit 10: Top 10 constituents of MSCI ACWI IMI with high patent scores on CCS**

| Company | GICS Sector | SBTi Status | Low Carbon Patent Scores on CCS | Descriptions of CCS Project |
|---|---|---|---|---|
| Exxon Mobil | Energy | n.a. | 92.47 | Its CCS captured 500,000 tCO2e in Australia and Qatar in 2019 |
| Mitsubishi Heavy Industries | Industrials | n.a. | 84.58 | Implementing a joint BECCS (bio energy) project in UK |
| Toshiba | Industrials | SBTi-approved 2030 targets | 68.63 | Demonstrating a joint BECCS (bio energy) project in Japan |
| Air Products and Chemicals | Materials | n.a. | 43.26 | Its CCS in Texas captured about 7 million tCO2 in 2020 |
| General Electric | Industrials | Committed to SBTi Net-zero | 42.53 | Developing CCS solutions for natural gas combined cycles |
| BASF | Materials | n.a. | 24.51 | Partnership with Shell and Air Liquide to implement CCS projects |
| Siemens | Industrials | Committed to SBTi Net-zero | 22.71 | CCS for combined cycle and steam power plant applications |
| Chevron | Energy | n.a. | 19.91 | USD 1 bn investment in CCS projects in Canada and Australia |
| Korea Electric Power | Utilities | n.a. | 19.69 | Plan to commercialize CCS solutions by 2030 |
| Fujifilm | Information Technology | SBTi-approved 2030 targets | 16.64 | R&D on CCS solutions at hydrogen manufacturing plants |

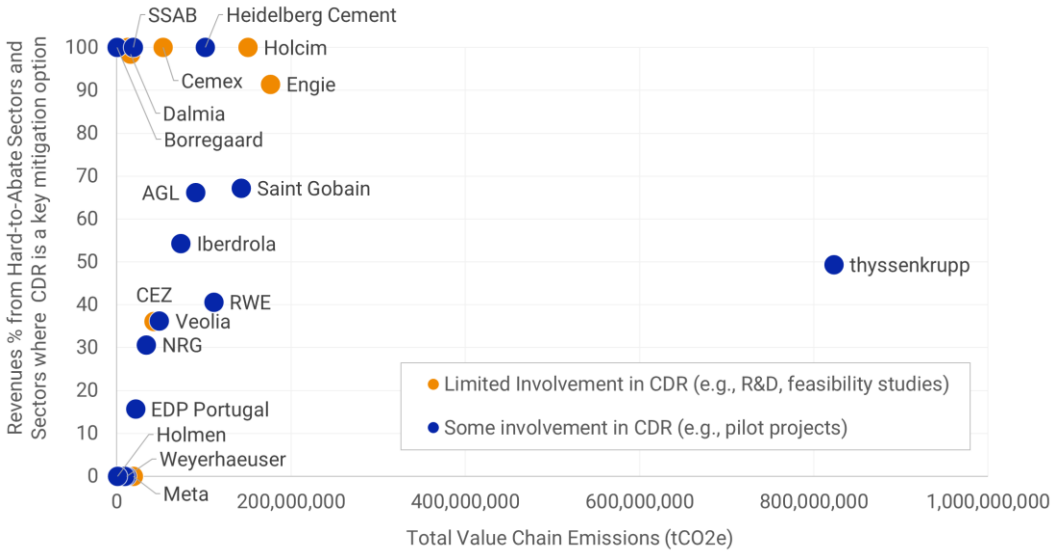
*Source: MSCI ESG Research as of May 16, 2022. Notes: Please see Technology Opportunity CVaR methodology for more detail about low carbon patent scores.*

[18] SBTi. October 2021. "SBTi Corporate Net-Zero Standard." Notes: CDR refers to anthropogenic activities that remove carbon dioxide from the atmosphere and store it durably in geological, terrestrial, ocean reservoirs, or in products. SBTi net-zero standard does not consider carbon offsets or avoided emissions as part of CDR above.
[19] IPCC. April 2022. Working Group III Contribution to the IPCC Sixth Assessment Report.
[20] MSCI. June 2020. MSCI Climate VaR methodology part 3: Technology opportunities

Further, for hard-to-abate sectors such as cement, chemical and steel industries, emissions reduction costs can be substantially higher than other sectors without the use of CDR.[21] The IPCC reported that CCS is a mature technology for gas processing and enhanced oil recovery (EOR) in energy sector. [22] For instance, the United States has injected over 850 million tons of carbon dioxide into the ground mainly through EOR since 1972.[23] On the other hand, CCS is a less mature technology for power generation, cement and chemical production, where it is a critical mitigation option.[24]

Our database indicated 28 companies, or 6%, of the 473 companies that committed to set SBTi-approved net-zero targets are already involved in CDR pilot projects and feasibility studies. For instance, **AGL Energy** ran a research and development (R&D) project on carbon capture at its coal-fired power plant in Australia. **Heidelberg Cement** launched a demonstration project of industry-scale CCS at its cement plant in Norway. These are all anecdotal, but these R&D and pilot projects could help them implement CDR at scale when the technology has matured further.

**Exhibit 11: Companies with SBTi net-zero commitments involved with CDR**




*Source: MSCI ESG Research. Notes: Other companies involved in CDR deployment include: Wacker Chemie, Empresas, Novozymes, Titan Cement, Johnson Cement, ACC, SSE, Mondi, Svenska Cellulosa. Their bubble icons were overlapped with other companies on the map.*

[21] S. Paltsev, et al. 2021. Hard-to-Abate Sectors: The role of industrial CCS in emission mitigation
[22] IPCC. April 2022. Working Group III Contribution to the IPCC Sixth Assessment Report.
[23] U.S. Department of Energy. January 2017. Siting and Regulating Carbon Capture, Utilization, and Storage Infrastructure. All see M. Faure. 2017. Carbon Capture and Storage: Efficient legal policies for risk governance and compensation. Notes: While the vast bulk of that injection activity is enhanced oil recovery related, about 50% of those injected volumes are never recovered and they become permanently sequestered.
[24] IPCC. April 2022. Working Group III Contribution to the IPCC Sixth Assessment Report.

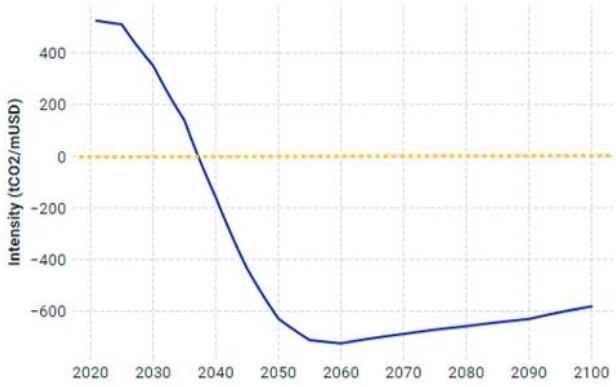
## Case Study 3: The use of Carbon Dioxide Removal (CDR) in the energy sector under 1.5°C-aligned scenario

The Network of Central Banks and Supervisors for Greening the Financial System (NGFS) is a group of 91 central banks and supervisors committed to contributing to the development of climate-related scenarios and data for the financial sector.[25] Here, to help illustrate the use of CDR technology, we created emissions intensity per GDP benchmark for the energy sector under a 1.5°C-aligned scenario based on the NGFS data as an example of sectoral decarbonization pathway (Exhibit 9).

Exhibit 9 shows that the 1.5°C-aligned scenario requires the energy sector's emissions intensity to decrease below zero before 2040. Only the use of CDR technology would enable such negative emissions. The benchmark indicated the highest carbon-emitting energy companies can transform into carbon-sequestrating heroes if their carbon removal business generates more revenues than fossil-fuel production. This highlights the need to build a new market for carbon removal credits and catalyze such markets for carbon removal in line with the 1.5°C pathway.

For technical aspects, the IPCC estimated the geological carbon storage capacity to be in the order of 1,000 GtCO2e, which was more than the carbon storage requirements through 2100 to limit the global average temperature rise to 1.5°C.[26] However, implementation of CCS would face limiting factors such as geological storage site selection and management, technological and economic barriers. At present, global rates of CCS deployment are far below those in 1.5°C pathways.[27] The IPCC reported the projected cumulative emissions from existing and planned fossil fuel infrastructure over their lifetime would exceed the 1.5°C pathway. [28]

**Exhibit 9: Illustration of global net-zero 2050 intensity pathway for the energy sector under NGFS 1.5°C-aligned scenario**




*Source: MSCI ESG Research, NGFS.*

[25] NGFS. June 2021. NGFS Climate Scenarios for central banks and supervisors
[26] IPCC. April 2022. Working Group III Contribution to the IPCC Sixth Assessment Report.
[27] IPCC. April 2022. Working Group III Contribution to the IPCC Sixth Assessment Report.
[28] IPCC. April 2022. Working Group III Contribution to the IPCC Sixth Assessment Report.

## Conclusion

The SBTi net-zero standard has established a standard-setting framework for net-zero emissions targets in a corporate context. The SBTi standard will be important to an increasing number of companies in their climate target-setting process as it provides a sanity check and a recognized approval process for their targets using ones of the best available scientific evidence.

In this report, we assessed three types of challenges companies may face in the process of setting science-based net-zero targets, using as a proxy the 473 constituents of the MSCI ACWI IMI that have committed to set SBTi-approved net-zero targets. Our assessments indicate that most of these companies will face a high hurdle in reporting total value chain emissions. The majority of them will be required to develop strategies to reduce emissions from carbon intensive sources, such as Scope 3 categories 1 and 11, in order to minimize their value chain emissions to zero or residual levels. We also assessed a critical need to invest in CDR technology. We found several companies that can potentially accelerate the deployment of CDR technologies at scale to neutralize residual emissions and achieve net-zero emissions by 2050 and thereafter.

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