SCIENCE BASED TARGETS

DRIVING AMBITIOUS CORPORATE CLIMATE ACTION

CEMENT SCIENCE BASED TARGET SETTING GUIDANCE

DRAFT FOR PUBLIC CONSULTATION

March 2022

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***Disclaimer**: this guidance document is released for public consultation as a draft. It therefore reflects the thinking of the project team at the time of release, but the content is subject to change, and methods or choices proposed here will not necessarily all be reflected in the final publication signed off by the Science Based Targets initiative (SBTi).*

1 EXECUTIVE SUMMARY

Science-based targets specify how much and how quickly a company would need to reduce its greenhouse gas (GHG) emissions in order to align with the goals of the Paris Agreement. The cement sector is the third-largest industrial energy consumer and the second-largest industrial CO_2 emitter and represents about 7% of CO_2 emissions globally. Through this guidance document and accompanying tools, the SBTi aims to provide companies in the sector with the resources they need to set 1.5ºC-aligned near- and long-term climate targets. This document provides the scientific basis for sector-specific 1.5ºC decarbonisation pathways, as well as guidance on target setting, including detailed guidance on how to deal with processes that are specific to the cement and concrete sector, GHG accounting criteria and recommendations, guidance for submitting a target for validation, and examples on how different types of companies can use the tools.

2 INTRODUCTION

Through the 2015 Paris Agreement, world governments committed to limiting global temperature rise to well-below 2°C above pre-industrial levels and pursuing efforts to limit warming to 1.5°C. In 2018, the Intergovernmental Panel on Climate Change (IPCC) warned that global warming must not exceed 1.5°C above pre-industrial temperatures to avoid the catastrophic impacts of climate change. To achieve this, greenhouse gas emissions must halve by 2030 – and drop to net-zero by 2050.

Business has a vital role to play in driving down greenhouse gas emissions and building the resilient, zero-emissions economy we urgently need. This action must be grounded in science.

Over the last several years, there has been increasing interest from the cement industry in setting science-based emissions reduction targets. This is because many companies understand that GHG emissions are significant for the sector across the value chain and will likely increase given industry growth - unless the sector changes course.

We need a race to the top, led by pioneering companies across the industry. This will empower peers, suppliers and customers to follow suit and drive governments to take bolder action.

The SBTi mobilizes the private sector to take the lead on urgent climate action. Science-based targets show companies how much and how quickly businesses need to reduce their GHG emissions to prevent the worst impacts of climate change - leading them on a clear path towards decarbonization.

By guiding companies in science-based target setting, we enable them to tackle climate change while seizing the benefits and boosting their competitiveness in the transition to a net-zero economy.

Science-based targets specify how much and how quickly a company would need to reduce its greenhouse gas emissions in order to align with the goals of the Paris Agreement - to limit warming to well-below 2°C above pre-industrial levels (WB-2°C) and pursue efforts to further limit warming to 1.5°C.

The cement sector is the third-largest industrial energy consumer and the second-largest industrial CO_2 emitter and represents about 7% of CO_2 emissions globally (IEA 2018, IEA 2020). Cement demand is projected to continue rising and would be some 20% higher than today by 2050 in the absence of efforts to optimize its use in buildings and construction (IEA 2020).

For this reason, urgent action is needed by cement and concrete companies to decarbonise. Science-based targets allow companies to show that their plans align with the latest climate science.

2.1 Overview of the development process

An Expert Advisory Group (EAG) of dedicated experts from industry, NGOs and academia provided detailed input during the development of this cement science-based target setting guidance and tool. EAG members were selected and invited to join the expert group based on their expertise, geographic location, relationship to the sector and, as regards companies, ambition to align their organization with the latest climate science.

EAG member organizations:

- Bellona
- Cementos Argos
- Cemex
- CRH
- Dangote Cement Plc
- European Climate Foundation
- Global Cement & Concrete Association (GCCA)
- Grupo Cementos Chihuahua
- HeidelbergCement
- Holcim Ltd.
- Institute for European Environmental Policy (IEEP)

- Potsdam Institute for Climate Impact Research
- RMI
- Siam Cement Public Company Limited (SCG)
- UltraTech Cement Limited
- VDZ/ECRA
- Votorantim Cimentos
- WWF

We are very grateful for the input and engagement from all our EAG members and project support teams. The Expert Advisory Group's role is advisory: final sign-off for deliverables is by the SBTi Steering Committee. Opinions expressed within this document may not represent the views of every EAG organization.

Funding for this project was provided by Holcim Ltd. Providing funding does not confer on Holcim Ltd. any special position in the governance of the project.

A public consultation was organized from 16 March to 15 April 2022 to get input from industry and civil society stakeholders on this guidance document and accompanying target setting tool. Feedback from (NUMBER) stakeholders was received through an online survey and public consultation webinars were held on 16 March 2022 to launch this review period.

3 DEVELOPMENT OF CEMENT DECARBONIZATION PATHWAYS

To create tools that companies can use to calculate science-based targets, three steps are followed:

- The global carbon budget and its allocation to the sector in question is determined
- An emissions scenario describing a plausible decarbonisation trajectory that fits within the sector budget is chosen
- Target setting methods such as the Sectoral Decarbonization Approach are used to translate the sector pathway into company targets.

Why does cement warrant a dedicated pathway and tools?

Allocation of the global carbon budget to sectors through bottom-up models such as IEA's Net Zero pathway aims to arrive at a cost-optimal scenario for emissions reductions across sectors. Therefore, the size of the allocation to each sector depends partially on the decarbonisation levers available and their cost. Cement is a large industrial sector and a significant source of GHG emissions. Unlike some other sectors, modeling and data on cement is available in literature on emissions scenarios. Furthermore, due to its process (geogenic) emissions from limestone calcination in clinker production, the rate at which the sector can decarbonise may differ from the overall rate of decarbonisation possible by society as a whole. For these reasons a dedicated cement pathway and specific guidance to allow companies to set science-based targets (SBTs) is justified, rather than only cross-sector methods.

3.1 Overview of the Sectoral Decarbonization Approach (SDA)

The Sectoral Decarbonization Approach (SDA) is a target-setting methodology allowing companies to set science-based greenhouse gas intensity targets aligned with a well-below 2°C scenario[1]. Essentially, the SDA attempts to address a fundamental tension in corporate target setting: that rapid decarbonization is incongruent with industry growth. For cement, this uncertainty could be framed as:

"How much would the cement sector's average carbon intensity need to decrease in order to achieve Paris-aligned decarbonization goals whilst also allowing for projected industry growth?"

The SDA answers this question by helping companies model physical intensity GHG reduction targets that align with the sector-specific pathway of an underlying climate scenario. The rate of decarbonization needed to meet the Paris goals is defined by scientific findings from Integrated

[1] Sectoral Decarbonization Approach Report, 2015

Assessment Models (IAMs). These models detail how a global carbon budget should be spent over time and divided by sector based on a number of factors, including: sector mitigation potential, socio-economic drivers, regional factors and technological availability. One of the outputs of IAMs is an annual emissions pathway i.e., an illustration of the necessary emissions each sector can emit in every future year in order to be consistent with a specific temperature outcome.

In the SDA, annual emissions pathways are divided by forecasted industry activity to define a carbon intensity curve. These curves can help compare the carbon intensity of an individual company and the sector overall. For example, if a company has a higher carbon intensity than the sector average it is considered to have less carbon-efficient operations than its sector peers.

The SDA builds upon the comparison between sector-wide and company intensities. Targets are set by assuming that all companies converge to the same intensity level as the sector by the year 2050. Science-based targets are set in the short to medium term (5 to 10 years) along this convergence path, the steepness of which is defined by the relative intensity of the company compared to the sector in the base year and the rate of forecasted company activity growth. The larger the relative difference, and the faster the growth, the more stringent the intensity target for an individual company.

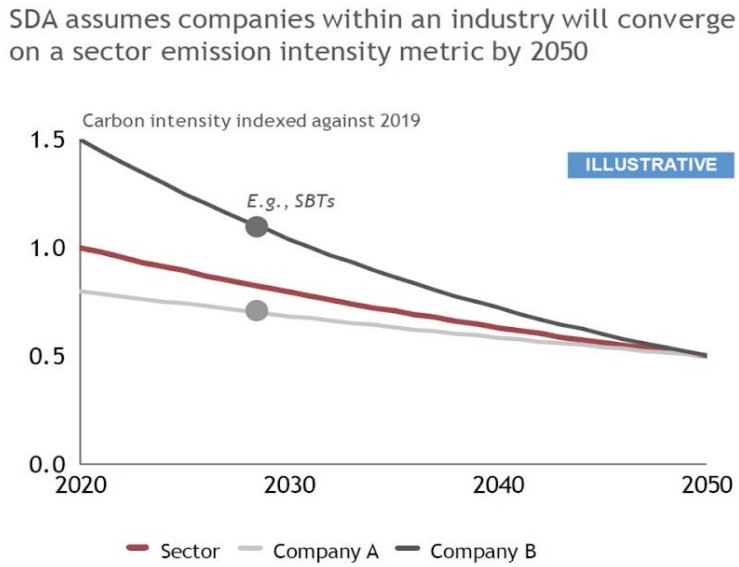

Figure 1: Illustration of an intensity convergence pathway - companies should converge to the sector average intensity (red line) by 2050, setting short-mid-term targets along the way

3.2 Choice of emissions scenarios for 1.5ºC

The SBTi published an assessment of possible 1.5ºC emissions scenarios for all sectors in its Pathways to Net-Zero: SBTi Technical Summary (2021). This reviewed estimates of the remaining emissions budget, top-down mitigation scenarios, and sectoral studies to determine 1.5ºC-aligned pathways at the global and sectoral level. According to the IPCC, the remaining budget to limit global warming to 1.5ºC with a 50% probability is about 500 GT of CO_2 (IPCC 2021). In aggregate, 1.5ºC-aligned pathways used by the SBTi stay within the 500 GT carbon budget and reach net-zero CO_2 at the global level by 2050, under the assumption of at least 1-4 GT CO_2 removal per year by 2050. Within this framework, the SBTi developed a cross-sector emissions corridor that covers CO_2, CH_4, and N_2O emissions from energy supply, buildings, industry, and transport based on published studies and expert judgment.

The Pathways to Net-Zero: SBTi Technical Summary determines that the range of 1.5ºC-algined cumulative 2020-2050 emissions for cement in the literature is 35-41 GT CO_2. Therefore, emissions scenarios with these cumulative emissions (or lower) could be considered as a potential scenario for 1.5ºC SBT-setting by the SBTi.

Emissions scenarios for science-based target setting should meet the criteria of plausibility (credibility of narrative), responsibility (reduced risk of not meeting the 1.5ºC goal), objectivity (not biased towards any particular industry or organization) and consistency (they should have a strong internal logic)[2].

Two sources of emissions scenarios for the cement sector that meet the requirements discussed in the Pathways to Net-Zero: SBTi Technical Summary are the One Earth Climate Model (Teske et al. 2020) and the IEA Net Zero report (2021). Of these two, the IEA Net Zero report was chosen as the most suitable scenario for 1.5ºC science-based target setting for cement as it provides a more detailed narrative for how emissions reductions might be achieved, lower residual emissions in 2050 and more up-to-date base year data.

Details underlying emissions scenario: sector activity, decarbonisation levers

The IEA Net Zero report provides data for direct CO_2 emissions from the cement industry globally, as well as for cement production.

[2] Foundations of Science Based Target Setting

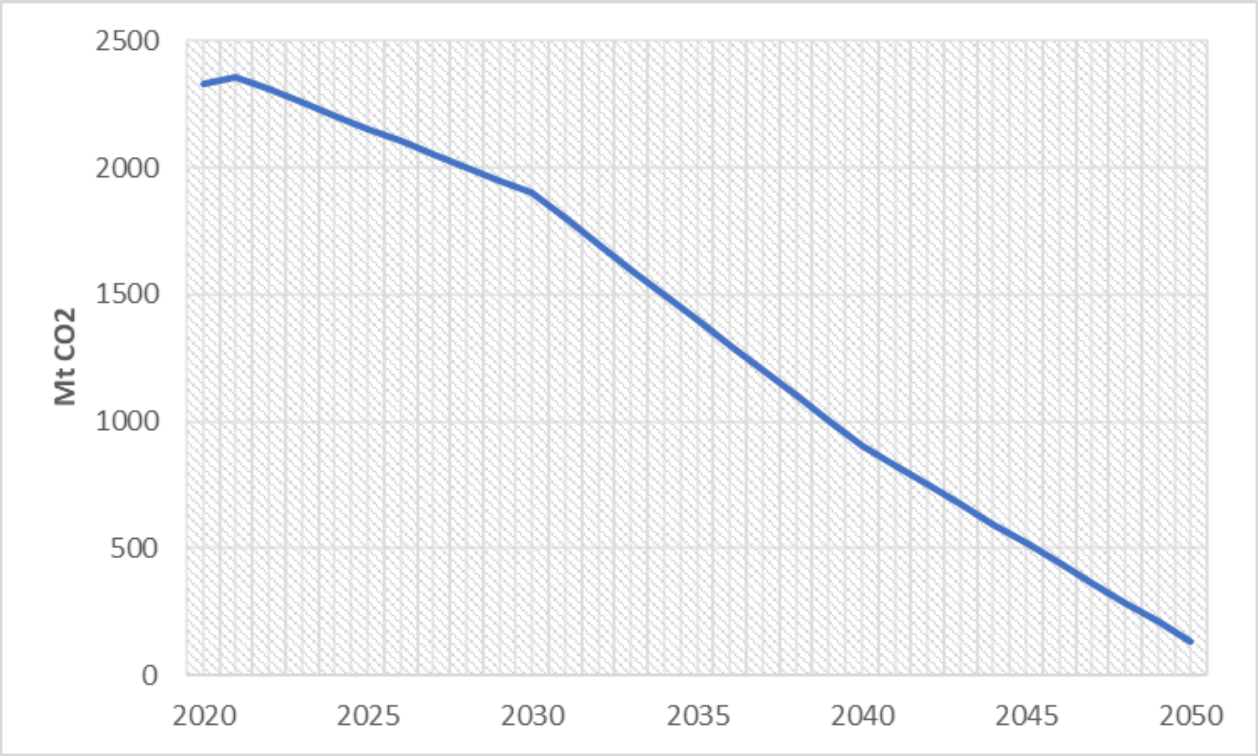

Figure 2: Absolute scope 1 emissions according to IEA Net Zero 1.5ºC pathway for the global cement industry

This scenario for cement from IEA assumes that optimisation of the use of cement and concrete is a key lever to achieve absolute emissions reductions in the sector. Therefore, demand for cement stays roughly flat over 2020-2050, despite large growth in building floor area.

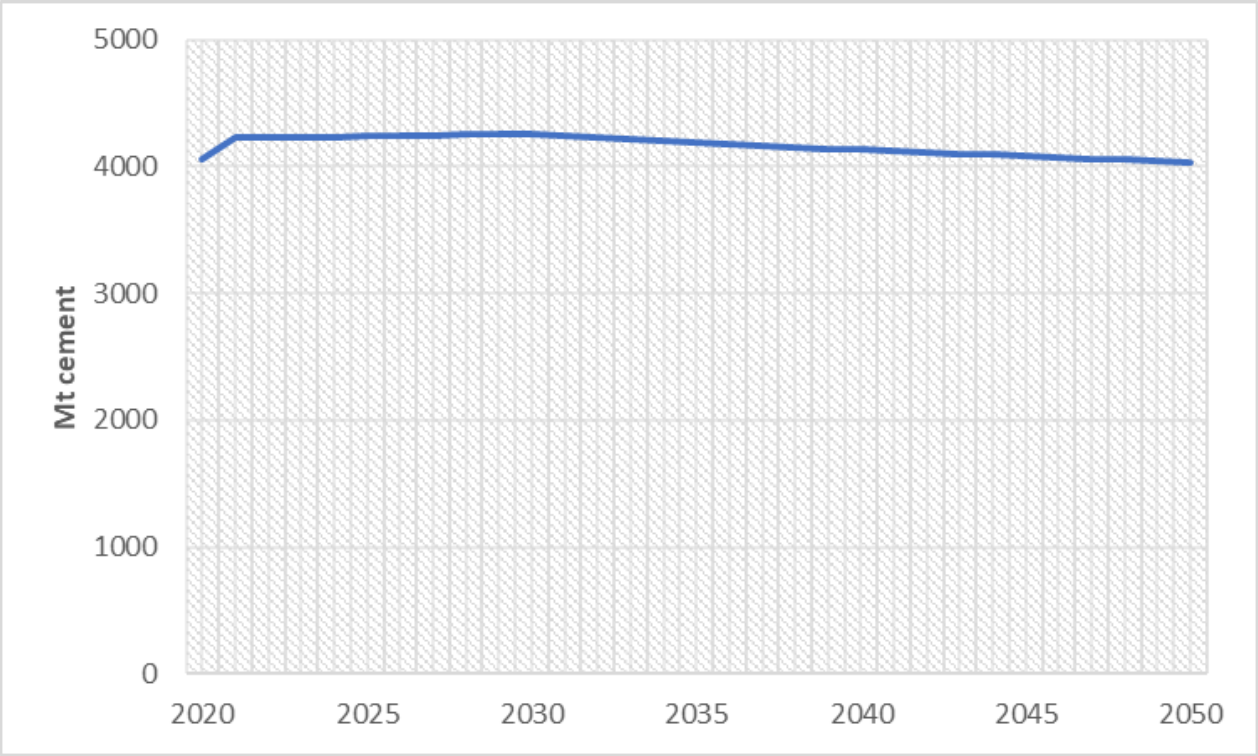

Figure 3: Projected global cement production under the 1.5ºC pathway

In addition to more traditional decarbonisation levers already being implemented today, such as energy efficiency, fuel switching, and clinker substitution, the IEA Net Zero report describes carbon capture and storage (CCS) as "central" to mitigating process (geogenic) emissions in clinker production. The report provides a "low-CCS" case as a comparison, but points out that some other breakthrough technology, such as kiln electrification, would be needed in the absence of CCS.

All 1.5ºC scenarios for cement include the need for unknown or breakthrough technologies to deal with process emissions from cement. This is a shortcoming of all scenarios, in that the risk of not meeting the 1.5ºC aim is increased. Therefore, measures to mitigate this risk in addition to SBT-setting are included in this guidance document.

Addressing non-CO_2 effects of cement

Non-CO_2 GHG emissions from the cement industry are not material today (WBCSD 2011) and so it was not necessary to adjust the pathway to account for this.

3.3 Definition of the sector covered by the pathway

The cement sector is taken to be a largely homogenous sector and therefore one unique 1.5ºC pathway is sufficient, with no disaggregation into sub-sectors. The vast majority of cement production volumes and emissions today are from "traditional" (Portland) cement. Other clinker-based cements such as white cement or calcium sulpho-aluminate cement also fit the definition of cement and are covered by the sector pathway. Future developments in low-emissions novel binders, while remaining small in volumes compared to more traditional cements according to industry roadmaps (GCCA 2021), may contribute to sector average emissions reductions and so are also included in this guidance.

See further sections in this document guidance on where the cement SDA would or would not be applicable.

Why is there no pathway for concrete?

A pathway for concrete production, rather than cement, could have some advantages, in that optimisation/reduction of cement use in concrete would be fully captured as a key decarbonisation lever for companies setting SBTs. However, a pathway on cement is more appropriate and useful, for the following reasons:

- SBTs aim to cover large emitting companies and sectors first, and the largest share of cement/concrete sector emissions come from cement production. Independent concrete producers tend to be small, and only a small part of large cement companies' cement production goes into their own concrete, so focusing on cement captures a much larger share of emissions.
- The use of the SDA is appropriate for cement since process (geogenic) emissions from limestone calcination in clinker production justify a sector-specific method. Emissions from concrete production come from fuels and electricity, which can be covered by the cross-sector target setting method, i.e., absolute contraction.
- Data availability: available emission scenarios break the carbon budget into large industrial sectors, where cement, rather than concrete, is the relevant sector.
- Optimisation of cement use in concrete and construction is captured by the SDA since a company's growth compared to the overall demand in the sector is a key part of the calculation. This means that companies with cement production forecast to grow faster than the overall market are required to have SBTs with lower emissions intensity.

This document includes guidance on how concrete production (by producers of any size) should be included in SBTs.

3.4 Sector carbon intensity pathways

The above discussion results in the Scope 1 and 2 1.5ºC cement sector intensity pathways as shown in the Figure 5 and Figure 6 below, with comparison to the well-below 2ºC pathways. (Full data can be accessed in the target setting tool. Details of how the Scope 2 pathway was derived can be found in Appendix I.)

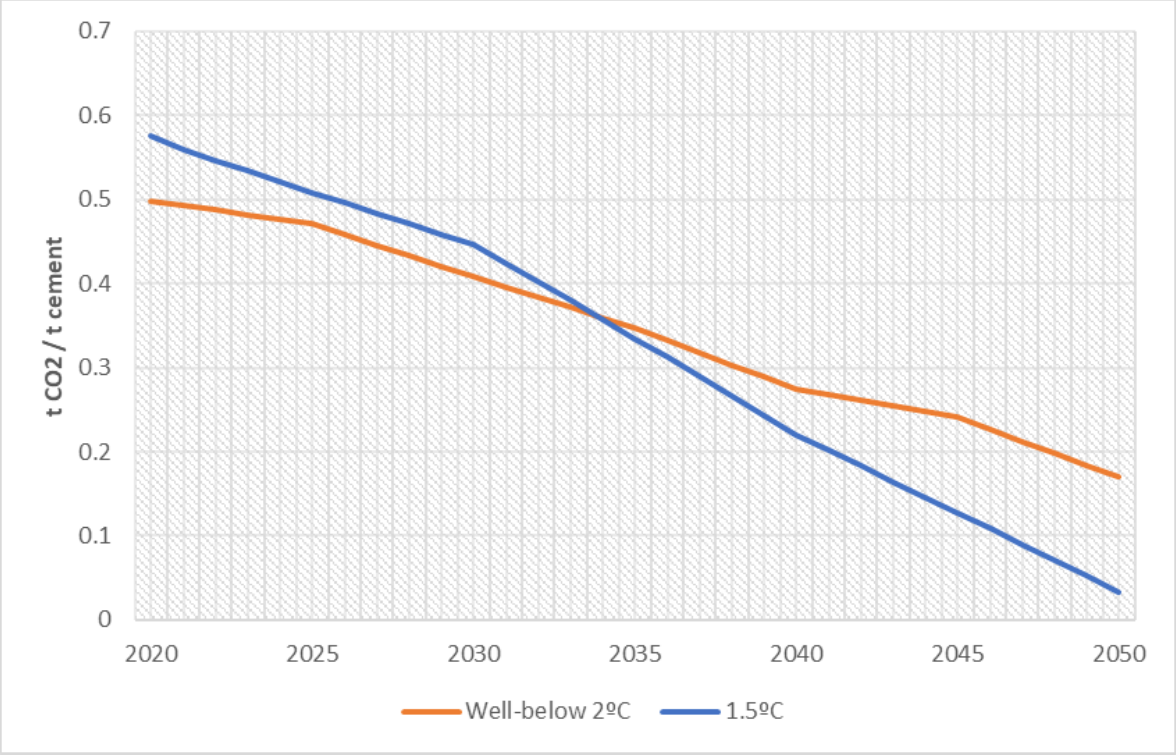

Figure 4: Scope 1 intensity pathways for the global cement industry

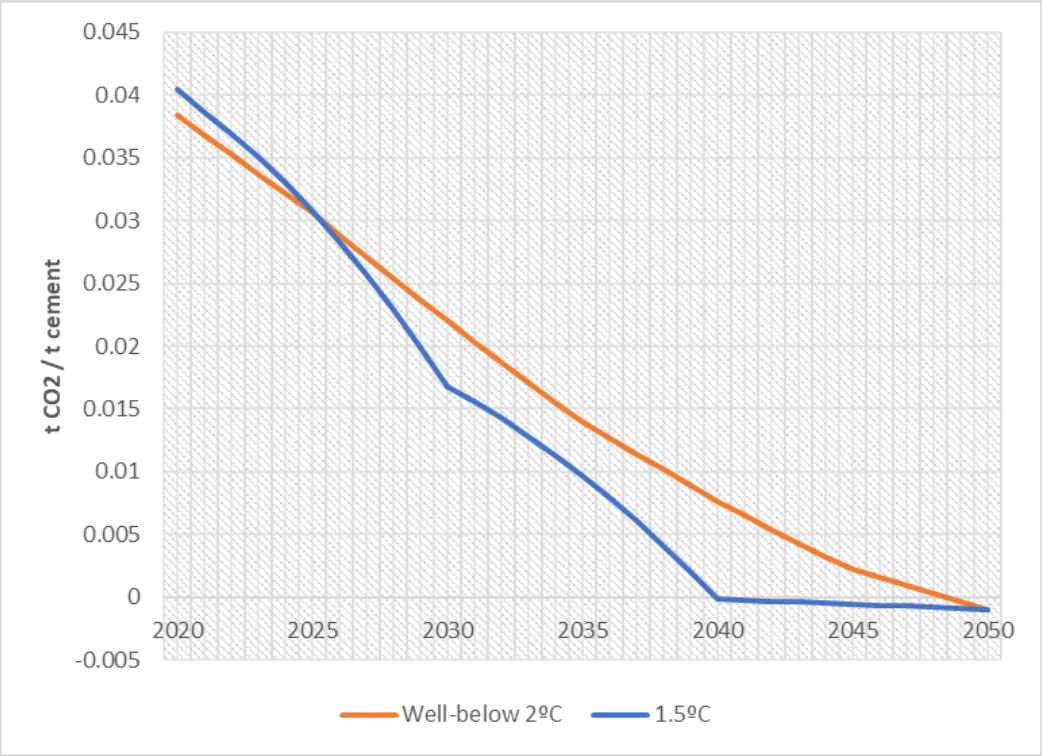

Figure 5: Scope 2 carbon intensity pathways for the global cement industry

4 HOW TO SET SCIENCE BASED TARGETS FOR CEMENT AND CONCRETE COMPANIES

4.1 Overview of target setting steps for companies

1. Decide whether to set a near-term target only, or a long-term/net-zero target (which includes a near-term target).
2. Decide on base and target years for each target. Rules for this can be found in the SBTi general and Net-Zero Criteria.
3. Determine if a Scope 3 target is desired/required (see section 4.8 Criteria on Scope 3 emissions for cement companies).
4. Determine which target-setting method must be used for Scopes 1, 2 and 3 (see section 4.6 TARGET-SETTING METHODS).
5. Collect data for emissions and production volumes for base year and most recent year, applying the criteria below regarding product definitions, emissions included etc.
6. Collect data for production forecasts to the target year.
7. Input the data from the previous steps into the target setting tools to calculate the reductions required for a valid target for Scope 1, 2, and 3.
8. Decide on target wording according to SBTi general and Net-Zero Criteria and Section 9.3.1 Examples of target wording.
9. Submit targets and all necessary documentation to the SBTi for validation.

4.2 Overview of cement-specific criteria and recommendations

The criteria below are sector-specific criteria in addition to the SBTi general and Net-Zero criteria. “C” designates a criterion, i.e. it is mandatory; “R” designates a recommendation.

Topic	Criteria/ Recommendation	Description
Scope 1 and 2 intensity denominator definition	**Cement-C1** Section 4.3.1 SDA intensity denominator	The intensity pathway and therefore target calculations shall be in terms of t CO_2 / t cementitious or t CO_2 / t cement. Cementitious is the preferred denominator The definition for t CO_2 / t cementitious can be found in the Cement CO_2 Protocol.

Topic	Criteria/ Recommendation	Description
Use of cement SDA by cement companies that produce other products	**Cement-C2** Section 4.6.4 Use of cement SDA by cement companies that also produce other products	If clinker production makes up ≥95% of a company's Scope 1 emissions, the cement SDA may be used for target setting for the entirety of that company's Scope 1 and 2 emissions. If clinker production makes up <95% of a company's Scope 1 emissions, the cement SDA may be used for target setting for the Scope 1 and 2 emissions from cement production, and the absolute contraction approach or other relevant SDA shall be used for target setting for Scope 1 and 2 emissions from other production processes.
Mandatory near-term Scope 3 category: fuels	**Cement-C3** Section 4.8.1 Mandatory near-term Scope 3 category	Near-term cement company SBTs shall include a Scope 3 target that covers at least Scope 3 Category 3 "Fuel- and energy-related emissions not included in scope 1 or scope 2". This shall include all fuel types, including waste-derived and biomass fuels. The ambition level for the Scope 3 Category 3 target shall be at least well-below 2ºC. The target-setting method shall be physical intensity or absolute contraction.
Recommended near-term Scope 3 category: clinker and cement	**Cement-R1** Section 4.8.2 Recommended near-term Scope 3 category	Near-term cement company SBTs should include a Scope 3 target for purchased cement and clinker (under Scope 3 Category 1 "Purchased goods and services"). The ambition level shall be 1.5ºC. The target-setting method may be the cement SDA.
Emissions from waste-derived fuels	**Cement-C4** Section 4.3.2 Emissions from waste-derived fuels ("gross" and "net" emissions)	Targets shall be in terms of "gross" emissions, i.e. emissions from combustion of waste-derived fuels in clinker production are included, and this shall be indicated in the target wording.

Topic	Criteria/ Recommendation	Description
Emissions from biomass fuels	**Cement-C5** Section 4.3.3 Biogenic emissions	CO_2 emissions from the combustion, processing and distribution phase of bioenergy and the land use emissions and removals associated with bioenergy feedstocks, shall be reported alongside a company's GHG inventory, regardless of whether or not the combustion is considered carbon neutral. Where the combustion of such fuels is counted as carbon neutral, this shall be justified. Emissions from processing, distribution & land use associated with biomass fuels shall be calculated and included under Scope 3 Category 3 "Fuel- and energy-related activities (not included in scope 1 or scope 2)" targets when relevant, regardless of whether or not the combustion is considered carbon neutral.
Natural recarbonation	**Cement-C6** Section 6.1 Natural recarbonation	Natural recarbonation shall not be counted as an emissions reduction in Scope 1, 2 or 3 targets.
Industrial mineralisation	**Cement-C7** Section 6.2 Industrial mineralisation	Emissions from clinker manufacture that are reduced directly through industrial mineralisation may be counted as an emission reduction towards a cement company's Scope 1 target. Industrial mineralisation that does not happen on a clinker production site shall not be counted as an emission reduction towards a cement company's Scope 1 target.
Carbon capture and geological storage	**Cement-C8** Section 6.3.2 CCS and BECCS in cement plants	Emissions reduced through carbon capture and geological storage may be counted as an emission reduction in cement company near-term and long-term SBTs.

Topic	Criteria/ Recommendation	Description
Carbon capture and use for short-lived products such as e-fuels	**Cement-C9** Section 6.3.1 CCU other than industrial mineralisation	CO_2 captured for use in short-lived products such as e-fuels shall not be counted as an emission reduction in cement company near-term or long-term SBTs.
Forecast growth	**Cement-C10** Section 9.2 Justification of projected growth	The company shall provide, in their target submission, justification of the growth projection used to calculate the target using the SDA, including public or internal documents where growth projections are mentioned if relevant.
Investment in breakthrough technologies	**Cement-R2** Section 9.1 Ensuring near-term targets contribute to long-term progress	Cement companies should provide evidence, in their target submission, that they are taking action to ensure any breakthrough technology required to meet their target ambition will become available in the timeframe expected.
Information on absolute emissions reductions	**Cement-R3**	In order to demonstrate that intensity targets also lead to absolute emissions reductions, and to provide the transparency required by Cement-C10 and Cement-R2, companies whose targets are expressed in intensity terms are recommended to publish also the absolute emissions reductions that will be achieved by their targets.

4.3 GHG accounting rules

All greenhouse gas accounting for target setting shall follow the GHG Protocol Corporate Accounting and Reporting Standard and Corporate Value Chain (Scope 3) Standard.

Further accounting definitions for cement can be found in the Cement CO_2 Protocol.

4.3.1 SDA intensity denominator

The intensity pathway for the SDA and therefore Scope 1 and 2 target calculations shall be in terms of t CO_2 / t cementitious or t CO_2 / t cement (equivalent). The definition shall be according to the Cement CO_2 Protocol v3.0 (2011).

Cementitious is the preferred denominator. “Cement” is also an acceptable denominator where no non-cement materials are being processed and so cement and cementitious are effectively the same. In this case, care should be taken to exclude purchased clinker from the Scope 1 denominator to avoid double-counting with Scope 3.

4.3.2 Emissions from waste-derived fuels (“gross” and “net” emissions)

There exist cement-industry definitions for “gross” and “net” emissions that distinguish whether or not emissions from combustion of waste-derived fuels are included. These definitions can be found in the Cement CO_2 Protocol v3.0 (2011).

Near- and long-term targets shall be in terms of “gross” emissions, i.e., emissions from combustion of waste-derived fuels shall be included in the emissions covered by Scope 1 for all years. This shall be indicated in the target wording (see Section 9.3.1 Examples of target wording).

“Net” emissions, i.e., excluding emissions from the combustion of waste-derived fuels in clinker production, are not acceptable as the basis for target setting, as “avoided emissions” cannot count as emissions reductions in SBTs.

4.3.3 Biogenic emissions

According to SBTi Criteria, CO_2 emissions from the combustion, processing and distribution phase of bioenergy and the land use emissions and removals associated with bioenergy feedstocks, shall be reported alongside a company’s GHG inventory. Furthermore, CO_2 emissions from the combustion, processing and distribution phase of bioenergy and the land use emissions and removals associated with bioenergy feedstocks shall be included in the target boundary when setting a science-based target (in Scopes 1, 2, and/or 3, as relevant) and when reporting progress against that target.

Bioenergy used in the cement industry is typically the biomass part of waste-derived fuels, e.g. the rubber in used tyres, but it can also include “virgin” biomass.

In practice, cement companies often include emissions from bioenergy in their target submissions but declare (the combustion part of) these emissions as carbon neutral.
Companies submitting targets shall robustly justify when they treat biomass fuel as carbon neutral.

The following guidance/standards may be referred to:

- Cement CO_2 Protocol v3.0 (2011)
- ISO 21644 – Measuring the Biomass Content of Solid Recovered Fuels (SRF) (ISO 2021)

If conditions to justify biomass combustion as carbon neutral cannot be met, combustion of biomass fuels shall be included in emissions inventories for base and target years. It is noted that the sustainability and carbon neutrality status or otherwise of biomass fuels is subject to continuing scrutiny and increasingly strict accounting requirements, and so targets shall be calculated taking into account the most up-to-date standards and guidance. If in doubt, a conservative approach of not assuming carbon neutrality of biomass shall be taken.

Emissions from processing, distribution & land use associated with biomass fuels shall be calculated and included under Scope 3 Category 3 “Fuel- and energy-related activities (not included in scope 1 or scope 2)” targets when relevant, regardless of whether or not the combustion is considered carbon neutral.

Where bioenergy is used in combination with carbon capture and storage (BECCS), this may be accounted for in SBTs according to the preceding paragraphs, but shall in no case be counted as “net negative” emissions (i.e., bioenergy emissions must always be greater than or equal to zero).

4.3.4 Non-CO_2 GHGs

The GHG Protocol as well as the SBTi Criteria require that all relevant GHGs be included in the emissions inventory. However, non-CO_2 GHGs tend not to be material in clinker production when compared to CO_2 (WBCSD 2011)[3].

To ease the validation process, cement companies may refer to the Cement CO_2 Protocol to justify exclusion of non-CO_2 GHGs from their inventory with regard to clinker production. For non-clinker-kiln emissions, the Cement CO_2 Protocol suggests that CH_4 and NO_2 may be relevant, and so companies should include these or justify their exclusion.
As the sources quoted date from 2011, should non-CO_2 GHG become more relevant in the cement industry in the future, this recommendation may be revised.

[3] CH_4 emissions of 0.01% of kiln CO_2 emissions on a CO_2-equivalent basis, “small” emissions of nitrous oxide (N_2O) from cement kilns and “not relevant emissions” of PFC, HFC, SF6 (WBCSD 2011).

4.4 Near-term and long-term targets

A near-term target has a timeframe of 5-10 years.

A long-term target is a target to reach the residual emissions level by 2050 at the latest, and commit to neutralizing these residual emissions to reach net-zero.

A long-term target must include a near-term component, whereas a near-term target can be set without a long-term component.

Full criteria and explanations can be found in the SBTi Net-Zero Standard and Criteria.

4.5 Scopes required

General criteria on the scopes required is set out in the SBTi Criteria and Net-Zero Standard Criteria. In summary:

- For near-term targets:
  - Scope 1 and 2 must be included.
  - If a company's relevant scope 3 emissions are 40% or more of total scope 1, 2, and 3 emissions, a scope 3 target is required.
  - All companies involved in the sale or distribution of natural gas and/or other fossil fuels shall set scope 3 targets for the use of sold products, irrespective of the share of these emissions compared to the total scope 1, 2, and 3 emissions of the company.
  - Near-term cement company SBTs shall include a Scope 3 target that covers at least Scope 3 Category 3 "Fuel- and energy-related emissions not included in scope 1 or scope 2".
  - Near-term cement company SBTs should include a Scope 3 target for purchased cement and clinker (under Scope 3 Category 1 "Purchased goods and services")
- For long term (net-zero) targets: Scope 1, 2 and 3 must be included.

The additional criteria on Scope 3 for near-term targets in the cement sector are described in Section 4.8 Criteria on Scope 3 emissions for cement companies.

4.6 Target-setting methods

4.6.1 Target-setting methods for Scope 1

Companies may use either the cement Sectoral Decarbonisation Approach (SDA) or the cross-sector Absolute Contraction Approach to set Scope 1 targets for cement production.

For the use of the cement SDA to be permitted, the Scope 1 emissions to be covered must arise from clinker production.

The SBTi recommends using the most ambitious decarbonization scenarios that lead to the earliest reductions and the least cumulative emissions.

4.6.2 Target-setting methods for Scope 2

Companies in the cement sector may use either the cement Sectoral Decarbonisation Approach (SDA) or the cross-sector Absolute Contraction Approach to set Scope 2 targets.

For the use of the cement SDA to be permitted, the Scope 1 emissions to be covered must arise from clinker production.

Targets to actively source renewable electricity at a rate that is consistent with 1.5°C scenarios are an acceptable alternative to Scope 2 emission reduction targets (see SBTi Criteria).

4.6.3 Target-setting methods for Scope 3

Scope 3 near-term targets may be set using one of five approaches: Absolute Contraction, Economic Intensity, Physical Intensity Convergence (SDA), Physical Intensity Contraction or supplier engagement.

Scope 3 long-term targets may be set using one of four approaches: Absolute Contraction, Economic Intensity, or Physical Intensity Convergence or Physical Intensity Contraction.
General rules are found in the SBTi Criteria and Net-Zero Standard Criteria.

If physical intensity contraction is chosen, an appropriate denominator that is relevant to the target should be chosen. Denominators that are likely to vary significantly with no link to the real decarbonisation of the Scope 3 category should be avoided, as this risks giving the impression of progress towards targets where no real effort to decarbonise has been made.

Some examples for the cement could sector include:

Scope 3 target coverage	Physical intensity denominator examples
Purchased cement and clinker	If cement SDA used: ● Purchased cement or cementitious (t) If other target-setting methods used: ● Purchased cement and clinker (t) ● Produced cement (t)
Upstream emissions from fuels	● Purchased fuels (MJ) ● Produced cement (t)
Downstream transport (distribution)	● Produced cement (t)

4.6.4 Use of cement SDA by cement companies that also produce other products

For a company that produces cement, but also other products, the cement SDA may be used for target setting for the entirety of that company's Scope 1 and 2 emissions if clinker production makes up ≥95% of the company's Scope 1 emissions.

If clinker production makes up <95% of a company's Scope 1 emissions, the cement SDA may be used for target setting for the Scope 1 and 2 emissions from cement production, and the absolute contraction approach or other relevant SDA shall be used for target setting for Scope 1 and 2 emissions from other production processes.

4.7 Combined-scope targets

Targets that combine scopes (e.g., 1+2, 1+2+3) are permitted if the SBTi can review the ambition of the individual components of the target and confirm that each individual component meets the relevant ambition criteria. See SBTi Criteria and Net-Zero Standard Criteria.

Scope 1 and 2 near-term targets using the cement SDA may be set separately, or a combined target may be set. The SBT tool allows for the calculation of such combined targets. Combined Scope 1 and 2 intensity targets are calculated against a combined sector convergence pathway; therefore these targets will be slightly different from the sum of Scope 1 and Scope 2 intensity targets calculated separately.

4.8 Criteria on Scope 3 emissions for cement companies

4.8.1 Mandatory near-term Scope 3 category

Near-term cement company SBTs shall include a Scope 3 target that covers at least Scope 3 Category 3 “Fuel- and energy-related emissions not included in scope 1 or scope 2”. This shall include all fuel types, including waste-derived and biomass fuels.

The introduction of this mandatory criterion aims to harmonize with SBT methods for other sectors such as transport, which use a “Well-to-Wheel” approach whereby upstream emissions associated with extraction, refining and distribution of fuels are included.

The ambition level for the Scope 3 Category 3 target shall be at least well-below 2ºC. The target-setting method shall be physical intensity or absolute contraction. These methods can be found in the SBT tool. The ambition levels are as follows (see SBTi Criteria v5.0 and Target Validation Protocol for Near-term Targets v3.0):

	Well-below 2ºC	**1.5ºC**
Physical intensity	7% per year	7% per year
Absolute contraction	2.5% per year	4.2% per year

For example, a physical intensity well-below 2ºC category 3 target could be formulated as: “Company X commits to reduce scope 3 GHG emissions from fuel and energy related activities 70% per tonne of purchased fuels by 2030 from a 2020 base year.”

4.8.2 Recommended near-term Scope 3 category

Near-term cement company SBTs should include a Scope 3 target for purchased cement and clinker (under Scope 3 Category 1 “Purchased goods and services”).

The ambition level shall be 1.5ºC. The target-setting method may be the cement SDA (the SDA may be used also for purchased clinker).

The introduction of this recommendation aims to ensure the same ambition level for bought clinker and cement as for that manufactured by the company. It reduces the risk of “scope leakage”, whereby a company that shifts to buying more clinker or cement rather than producing it would see its Scope 1 emissions fall but no corresponding rise in Scope 3 emissions covered by a target. It also encourages more similar target boundaries between companies that mostly buy their clinker or cement and those that mostly manufacture it.

5 GUIDANCE FOR CALCULATING SCOPE 3 EMISSIONS

Where a Scope 3 target is required, GHG Protocol rules must be followed in calculating Scope 3 emissions. Key guidance for calculating Scope 3 emissions are therefore:

- GHG Protocol
- Greenhouse gas protocol corporate value chain (scope 3) accounting and reporting standard

The WBCSD Cement Sector Scope 3 GHG Accounting and Reporting Guidance gives more detailed guidance specifically on the cement sector.

Since emissions for Scope 3 Category 1 “Purchased goods and services” must include all upstream emissions for goods purchased (i.e., cradle to gate), this means that care should be taken that all upstream lifecycle emissions of purchased goods such as clinker and cement must be included. In other words, not only direct emissions from these goods are included, but also their upstream emissions.

Calculating upstream emissions of purchased goods is a challenge in all sectors, and fortunately value chains in the cement and concrete industry are relatively short, making this calculation comparatively easier than in other sectors.

Widely accepted LCA standards for construction products such as EN 15804 “Sustainability of construction works. Environmental product declarations. Core rules for the product category of construction products” (CEN 2019) should be followed in the calculation of cradle-to-gate emissions.

Tools for calculation of Scope 3 emissions include:

- GCCA EPD tool for cement and concrete
- GHG Protocol Scope 3 evaluator tool

6 GUIDANCE ON SOME CEMENT/CONCRETE-SPECIFIC PROCESSES

6.1 Natural recarbonation

Natural cement recarbonation (also known as carbonation) is the phenomenon whereby concrete and other cement-based products naturally absorb CO_2 from the air. For most concrete, the CO_2 absorbed is usually very low relative to the CO_2 emitted during cement production, but on aggregate, can reach not insignificant amounts. CO_2 uptake through recarbonation can be calculated in a life-cycle assessment context but is not currently included in corporate GHG accounting methods, emissions trading, nor in IEA figures. Natural recarbonation is outside of the control of the cement or concrete producer as it depends on how the product is used beyond the factory gate.

Natural recarbonation shall not be counted as an emission reduction in SBTs of cement or concrete companies.

See Appendix II for a more detailed discussion of recarbonation in the context of SBTs.

6.2 Industrial mineralisation

Several industrial processes exist or are in development to take advantage of the CO_2 uptake potential of cement-based products, such as:

- CO_2 injected/absorbed during the manufacture of ready-mix or precast concrete
- Treatment of concrete demolition waste, spent lime etc. to absorb CO_2 to create aggregates products

These processes are known by different names, such as “accelerated” or “enhanced” carbonation, or mineralisation. The term “industrial mineralisation” is used here to distinguish it from natural recarbonation.

Such CO_2 absorption is considered permanent, as to reverse the chemical reaction would require large amounts of heat.

Where the CO_2 used is industrially captured, or comes from direct air capture, such processes can potentially be an emissions reduction lever and should be encouraged.

However, to date, insufficient standards and guidance exist to guarantee that these activities represent real emission reduction in all cases, and how to incentivise correctly such activities is still the subject of scientific and political debate (ETIP ZEP 2021). This is an area for further work. Given

this, this guidance document introduces just one case where industrial mineralisation may be counted as an emission reduction in SBTs, with the other cases remaining out of scope until further work is conducted. Some of these may be the subject of work in the SBTi's upcoming 'Beyond Value Chain Mitigation' project.

Type of industrial mineralisation activity	**Challenges for GHG accounting**	**Can be included as an emission reduction in SBTs**	**Can be included as Beyond Value Chain Mitigation**
Cement company capturing CO_2 and mineralising it on site	No	Yes	Not necessary if it is included directly in the company's SBT
Cement company capturing CO_2 and transporting it for mineralisation on another site within the same company	Capture efficiency, guarantees of transport, no leakage etc.	Not currently - but this principle should be developed further	Not necessary if it is included directly in the company's SBT
Cement company capturing CO_2 and selling it for mineralisation by another company	How to share the benefit of CO_2 reduction between two companies; guarantees of transport, no leakage etc.	No	Guidance will need to be developed to determine in what cases such use has a climate benefit, depending on the source of the CO_2
Concrete or other company buying CO_2 and using it for mineralisation	How to share the benefit of CO_2 reduction between two companies; Guarantees of transport, no leakage etc.	No	Guidance will need to be developed on whether such use has a climate benefit depending on the source of the CO_2

6.3 CCU, CCS and BECCS

Further guidance on the following topics is due to be developed in SBTi's upcoming work on Beyond Value Chain Mitigation, and so general principles only are given here.

6.3.1 CCU other than industrial mineralisation

Specific criteria for one category of carbon capture and use (CCU) - industrial mineralisation - are provided above. For other types of use of captured CO_2, such as in chemicals, e-fuels or other short-lived products, this cannot be counted as an emissions reduction in near-term or long-term SBTs.

6.3.2 CCS and BECCS in cement plants

Carbon capture and permanent geological storage (CCS) may, in principle, be counted as an emission reduction in cement company's near-term and long-term SBTs. Further guidance on this should be the subject of further work, to determine the capture efficiency, potential for leakage in transport, and the permanence of storage.

Where bioenergy is used in combination with carbon capture and permanent geological storage (BECCS), this may be accounted for in SBTs according to the preceding paragraph and Section 4.3.3 Biogenic emissions, but shall in no case be counted as "net negative" emissions (i.e. bioenergy emissions must always be greater than or equal to zero).

6.3.3 Direct air capture and BECCS outside value chain

Once a company has met its long-term SBTs, which ensures that it has reached a residual emissions level, the net-zero target can be achieved through further emissions reductions in scopes 1, 2 and 3, or permanent removals inside or outside the value chain. This may include removals from direct air capture or bioenergy, carbon capture and storage (BECCS). In other words, such removals do not count towards emissions reductions needed to reach the residual level of a long-term SBT but may be used to neutralize residual emissions to reach net-zero.

6.4 Optimizing cement use in concrete and buildings

A key lever to reduce global GHG emissions from cement is demand reduction, through the optimisation of cement use in concrete, and concrete use in buildings and structures (GCCA 2021, IEA 2021). However, even if cement companies can have a role in bringing about this optimisation (through their own vertical integration into concrete production or construction, or through working

with clients to offer products and services that optimize cement use), these efforts will not necessarily be visible in SBTs as these are expressed in terms of t CO_2 / t cement or cementitious.

Therefore, cement companies wishing to demonstrate progress through this decarbonisation lever should consider also publishing the production volumes associated with their target. Cement companies may also consider publishing absolute reduction SBTs, where demand optimization would become a clear lever in reducing emissions to meet the target.

7 GUIDANCE ON TARGET SETTING FOR DIFFERENT TYPES OF COMPANIES

7.1 Guidance for including concrete produced by cement companies in SBTs

For a company that produces cement, but also other products, the cement SDA may be used for target setting for the entirety of that company's Scope 1 and 2 emissions if cement production makes up ≥95% of the company's Scope 1 and 2 emissions.

If cement production makes up <95% of a company's Scope 1 and 2 emissions, the cement SDA may be used for target setting for the Scope 1 and 2 emissions from cement production, and the absolute contraction approach or other relevant SDA shall be used for target-setting for Scope 1 and 2 emissions from other production processes.

This means that for a cement company that produces concrete where the emissions from this activity are significant (>5%), the absolute contraction method, at the ambition level of 1.5ºC, shall be used to calculate the part of the Scope 1 and 2 targets covering the emissions from fuels and electricity used in concrete production, while the SDA shall be used for the part of the target covering cement production. See Section 8.1 on how targets calculated using two different target setting approaches may be aggregated into one target.

Criteria and recommendations about when a Scope 3 target must be set in Section 4.8 Criteria on Scope 3 emissions for cement companies shall be followed.

7.2 Guidance for non-clinker-producing cement companies to set SBTs

This case would apply, for example, to a company that does not produce its own clinker but buys clinker and/or cement and/or other constituents and blends them to sell as cement, cement substitutes (such as GGBS, ground granulated blast-furnace slag), or cement-like products (e.g., geopolymers).

In this case, a Scope 3 near-term target would often be required, as emissions from purchased cement or clinker alone would often be above the threshold of 40% of total Scope 1, 2 and 3 emissions.

The SBTi general criteria apply, with the additional requirement that the ambition level for purchased cement or clinker shall be 1.5ºC.

The emissions and target-setting methods for such a company would be as follows:

Scope	**Emissions covered (examples)**	**Target-setting method for near-term SBTs**
Scope 1	Direct emissions e.g. from burning of fuels	Absolute contraction
Scope 2	Electricity	Absolute contraction
Scope 3	Purchased clinker or cement	SDA or absolute contraction, ambition level 1.5ºC
	Purchased fuels	Absolute contraction or physical intensity, ambition level well-below 2ºC
	Other Scope 3 emissions	All Scope 3 methods allowed, ambition level well-below 2ºC

Note: for purchased clinker, the cement SDA may be used to calculate targets.

7.3 Guidance for non-clinker/cement-producing concrete companies to set SBTs

This case would apply, for example, to a company that does not produce its own cement or clinker but purchases cement, aggregates and other constituents to produce concrete.

In this case, a Scope 3 near-term target would generally be required, as emissions from purchased cement or clinker alone would be above the threshold of 40% of total Scope 1, 2 and 3 emissions.

The SBTi general criteria apply, with the additional requirement that the ambition level for purchased

cement or clinker shall be 1.5ºC.

The emissions and target-setting methods for such a company would be as follows:

Scope	Emissions covered (examples)	Target-setting method for near-term SBTs
Scope 1	Direct emissions e.g., from burning of fuels	Absolute contraction
Scope 2	Electricity	Absolute contraction
Scope 3	Purchased clinker or cement	SDA or absolute contraction, ambition level 1.5ºC
	Purchased fuels	Absolute contraction or physical intensity; ambition level well-below 2ºC
	Other Scope 3 emissions	All Scope 3 methods allowed; ambition level well-below 2ºC

Note: for purchased clinker, the cement SDA may be used to calculate targets.

7.4 Guidance for other potential users of cement SDA: e.g., construction companies

Emissions from the manufacture of cement may be relevant Scope 3 emissions for companies in the buildings and construction value chain. For example:

- Construction companies: emissions from purchased cement fall under Scope 3 Category 1 “Purchased goods and services”
- Architects and building design firms: emissions embodied in construction materials for buildings designed fall under Scope 3 Category 11 “Use of sold products”

Further guidance on scope allocation for the building sector will be provided in the upcoming SBTi building sector guidance.

In principle, the cement SDA, rather than the generic Scope 3 methods, can be used for Scope 3 target setting where the emissions concerned are from cement manufacture.

However, as optimization (reduction) of the use of cement and concrete can be a key lever for reducing Scope 3 emissions for these types of companies, target-setters should ensure the target-setting method reflects this. Therefore, an absolute target may be more appropriate than an intensity (t CO_2 / t cement) target.

8 USING THE TARGET SETTING TOOLS

Near-term target-setting tool

The draft target-setting tool is launched alongside this public consultation draft guidance, which integrates the 1.5ºC pathways but is otherwise unchanged in functionality from previous versions.

Long-term target-setting tool

The long-term target tool is found here and contains instructions for calculating long-term targets.

8.1 Combined and separate targets

In general, combined-scope targets, and targets that are an aggregation of different target-setting methods, are permitted only where the following conditions are met:

- Data is submitted for validation that allows the ambition level of each scope or element to be checked separately
- Aggregation is technically feasible e.g. two different SDA-based targets such as t CO_2 / t cement and t CO_2 / t steel cannot be aggregated as the denominators are different, whereas two absolute targets could be aggregated into one.

Note for consultation draft: This section is to be expanded with further examples from EAG.

The following examples are provided for near-term targets, but the same principles apply for long-term targets.

Example of company producing cement and other products where non-clinker emissions make up ≤5%

Company X produces 10mt of cement and 2m m^3 (4.8mt) of concrete annually:

- Scope 1 emissions from clinker production: 6.5mt CO_2 or 99.7% of total Scope 1
- Scope 1 emissions from concrete: 0.02 mt CO_2 or 0.3% of total Scope 1
- Base year is 2020 and target year is 2030

Therefore, this company may use the cement SDA for the entirety of its Scope 1 & 2 emissions. In the row "Base year Activity output", the company should enter its activity data for cement/cementitious only (t cement).

In the rows "Base year Scope 1 emissions" and "Base year Scope 2 emissions", the company should enter its total Scope 1 and 2 emissions respectively, including cement and concrete production.

Section 1. Input data

Target setting method	Sectoral Decarbonization Approach
SDA scenario	SBTi 1.5C
SDA sector	Cement
Base year	2020
Base year | Activity output	10,000,000
Base year | Scope 1 emissions	6,520,000
Base year | Scope 2 emissions	500,000
Target year	2030
Target year | Type of activity projection	Fixed market share
No input required	
Most recent year (MRY)	2020

Results:

	Base year (2020)	Target year (2030)	% SBT reduction
Company | Scope 1 emissions (tCO2)	6,520,000.00	5,293,860.65	18.8%
Company | Scope 2 emissions (tCO2)	500,000.00	219,345.09	56.1%
Company | Scope 1+2 emissions (tCO2)	7,020,000.00	5,525,400.80	21.3%
Company | Scope 1 emissions intensity (tCO2/t)	0.652	0.504	22.7%
Company | Scope 2 emissions intensity (tCO2/t)	0.050	0.021	58.2%
Company | Scope 1+2 emissions intensity (tCO2/t)	0.702	0.526	25.1%

Example on company producing cement and other products where non-clinker emissions make up >5%

Company Y produces 10mt of cement and 0.5mt of other products annually:

- Scope 1 emissions from clinker production: 6.5mt CO_2 or 96% of total Scope 1
- Scope 1 emissions from other products: 0.5 mt CO_2 or 7.7% of total Scope 1
- Base year is 2020 and target year is 2030

Therefore, this company may use the cement SDA only for its cement Scope 1 & 2 emissions and must use absolute contraction for its other product emissions.

The company calculates two separate targets.

Cement emissions:

Section 1. Input data

Target setting method	Sectoral Decarbonization Approach
SDA scenario	SBTi 1.5C
SDA sector	Cement
Base year	2020
Base year | Activity output	10,000,000
Base year | Scope 1 emissions	6,500,000
Base year | Scope 2 emissions	500,000
Target year	2030
Target year | Type of activity projection	Fixed market share
No input required	
Most recent year (MRY)	2020

Results:

	Base year (2020)	Target year (2030)	% SBT reduction
Company | Scope 1 emissions (tCO2)	6,500,000.00	5,277,875.87	18.8%
Company | Scope 2 emissions (tCO2)	500,000.00	219,345.09	56.1%
Company | Scope 1+2 emissions (tCO2)	7,000,000.00	5,509,910.17	21.3%
Company | Scope 1 emissions intensity (tCO2/t)	0.650	0.503	22.7%
Company | Scope 2 emissions intensity (tCO2/t)	0.050	0.021	58.2%
Company | Scope 1+2 emissions intensity (tCO2/t)	0.700	0.525	25.1%

Other product emissions:

Section 1. Input data

Target setting method	Absolute Contraction Approach
SDA scenario	
SDA sector	
Base year	2020
Base year | Activity output	
Base year | Scope 1 emissions	500,000
Base year | Scope 2 emissions	25,000
Target year	2030
Target year | Type of activity projection	
No input required	
Most recent year (MRY)	2020

	Base year (2020)	Same as base year	Target year (2030)	% Reduction to date	% FLA Adjustment	% SBT reduction
Scope 1 emissions (tCO2e)	500,000	-----	290,000	-----	Not required	42.0%
Scope 2 emissions (tCO2e)	25,000	-----	14,500	-----	Not required	42.0%
Scope 1+2 emissions (tCO2e)	525,000	-----	304,500	-----	-----	42.0%

The company can then choose to publish these as aggregate targets or as separate targets.

To aggregate targets calculated using the SDA and absolute contraction, intensity-based targets must be converted to absolute emissions. Therefore, two options[4] for publishing targets in this example would be:

		Base year emissions (t CO_2)	Target year emissions (t CO_2)	% reduction intensity	% reduction absolute	Example target wording
Option 1	Cement S1+2 target	7,000,000	5,509,910	21.3%	-	Company Y commits to reduce Scope 1 & 2 GHG gross emissions 21.3% per tonne cementitious materials by 2030 from a 2020 base year
	Other products S1+2 target	525,000	304,500	-	42%	Company Y commits to reduce absolute Scope 1 & 2 GHG emissions from non-cement production 21.3% by 2030 from a 2020 base year
Option 2	Aggregated S1 + S2 target	7,525,000	5,814,410	-	22.7%	Company Y commits to reduce absolute Scope 1 & 2 GHG emissions 22.7% by 2030 from a 2020 base year

Example of company producing cement substitutes, geopolymers and cement

Company Z produces 0.5mt of GGBS, 0.1mt of geopolymers and 0.5mt of cement annually. The company does not produce its own clinker.

- Scope 1 emissions (50,000 t CO_2) come from fuels used in blending, drying etc.
- Scope 2 emissions (50,000 t CO_2) are from electricity.
- Scope 3 emissions (350,000 t CO_2) are greater than 40% of Scope 1, 2 and 3 and come mostly from cradle-to-gate emissions of purchased clinker for blending into cement (325,000 t CO_2), as well as cradle-to-gate emissions of other raw materials and fuels for all products (25,000 t CO_2).
- Base year is 2020 and target year is 2030

Absolute contraction shall be used for Scope 1 and 2 emissions.

[4] The option of separate Scope 1 and 2 targets also exists but is not shown here.

The cement SDA or absolute contraction may be used for Scope 3 purchased clinker. All Scope 3 target-setting methods may be used for other Scope 3 emissions. Care should be taken to include all upstream emissions (cradle-to-gate) for Scope 3 raw materials and fuels,

In this example, the company decides to use absolute contraction for Scope 1 and 2, the cement SDA for Scope 3 purchased clinker, and physical intensity for all other Scope 3 emissions. In this case, for transparency about the different denominators used, the two elements of the Scope 3 target cannot be aggregated and must be kept separate.

9 SUBMITTING A TARGET FOR VALIDATION

Companies should follow the general SBTi guidelines for submitting a target for validation. The following sections include some additional criteria and recommendations for cement companies.

9.1 Ensuring near-term targets contribute to long-term progress

Cement industry decarbonisation roadmaps, as well as the IEA Net Zero Report, rely on breakthrough technologies such as CCS that do not yet exist at scale to mitigate a large part of emissions from 2030 onwards (GCCA 2021, IEA 2021).

This is of concern for science-based target setting if a company only sets near-term (5-10 year) targets, as it means that a company's near-term target could be validated if it is low enough to meet the 1.5ºC requirements for the target year according to the cement SDA, even if the company has no viable plan to implement CCS or other breakthrough technology in the years thereafter. This risks creating a credibility issue in claiming such targets are science-based, i.e. that they contribute to society meeting the 1.5ºC goal.

It is beyond the scope of SBTi's current validation process[5] to set additional qualitative requirements for targets to be validated, but companies are expected to provide an explanation on how they intend to meet their targets.

To deal with the risks described above, cement companies submitting near-term or long-term targets are encouraged to provide evidence that the company is investing now to prepare for implementing new technology as part of a plan to reach net-zero. Such evidence could include:

- Published plans to be operating at least one industrial-scale CCS plant by the near-term target year or before, including details on how the captured CO_2 will be transported and stored.
- Published R&D spend in breakthrough technologies.

[5] SBTi's upcoming progress-tracking project may develop solutions to some of the risks discussed here.

- Assessment of “readiness for net-zero” by other third party initiatives, such as ACT.

9.2 Justification of projected growth

Stakeholders have pointed out cases of cement companies having very different growth projections to those used in their target calculation. Correct growth projection is important to ensure that absolute emissions do not exceed the carbon budget. The SDA calculation includes a correction to the emissions intensity pathway if a company’s growth forecast is greater than that required by the industry as a whole, so faster-growing companies must reduce their emissions intensity faster.

Therefore, companies submitting targets shall provide (confidentially) justification for the growth forecast used in their target submission, including public or internal documents where growth projections are mentioned if relevant.

As an alternative, voluntary, safeguard, companies may wish to make public the absolute emissions that their intensity target would lead to, so that stakeholders can see that it leads to absolute reductions.

9.3 Communicating a target

9.3.1 Examples of target wording

This section is to be expanded with further examples from companies

Target wording shall follow the templates in the Target Validation Protocol for Near-term Targets v3.0 and the SBTi Net-Zero Standard, with the additional requirement that for targets that include cement Scope 1 emissions, the word “gross” shall be included to make clear that emissions from waste-derived fuels are included.

Example wordings: near-term targets

Scope 1 & 2:

- [Company X] commits to reduce Scope 1 & 2 GHG **gross** emissions 40% per tonne cementitious materials by 2030 from a 2020 base year.
- For combined targets, it is recommended (but not required) to also provide the disaggregated targets, as follows: Within this target, [Company X] commits to reduce scope 1 GHG **gross** emissions 30% per ton of cementitious material and scope 2 GHG emissions 70% per ton of cementitious materials within the same timeframe

Scope 3:

- [Company Y] commits to reduce scope 3 GHG emissions from purchased goods and services 20% per tonne of purchased clinker and cement by 2030 from a 2020 base year
- [Company Y] also commits to reduce scope 3 GHG emissions from fuel and energy related activities 20% per ton of purchased fuels by 2030 from a 2020 base year.

Example wordings: long-term targets

- [Company X] commits to reach net-zero greenhouse gas emissions across the value chain by 2050
- [Company Y] commits to reduce absolute scope 1, 2, and 3 GHG emissions 90% by 2040 from a 2019 base year
- [Company Z] commits to reduce scope 1+2 emissions per tonne of cementitious materials 95% by 2050 from a 2020 base year. [Company Z] also commits to reduce absolute scope 3 GHG emissions 90% by 2050 from a 2020 base year

Note on bioenergy

If a company is using bioenergy, the following footnote is required to be included in target language: “*The target boundary includes land-related emissions and removals from bioenergy feedstocks."

9.3.3 Guidance to avoid confusion over “net” and “gross” when communicating

Companies often communicate their SBTi-validated targets in press releases or other longer communications formats, which include additional information. Where other figures outside of the SBTi-validated target are communicated together with the target, companies should take care to avoid creating confusion around what comprises the validated target and what is additional information. In particular, cement companies should avoid creating confusion around “gross” emissions (including emissions from waste-derived fuels), which are the basis for SBTs, and “net” emissions (excluding emissions from waste derived fuels), which cannot be the basis of SBTs. Therefore, in addition to including the word “gross” in target wording to be validated by the SBTi, as mentioned above, companies should avoid referring to “net” emissions in such a way that they might be construed as forming part of the SBT, such as in the same paragraph. Companies should carefully distinguish between “gross” and “net” emissions in communications.

10 CONCLUDING REMARKS AND OPPORTUNITIES

The SBTi endeavors to keep our resources and sector-specific methodologies up to date to align with the latest climate science, data availability and research. Consequently, as knowledge and data develop within this arena, potential future updates to this guidance could include: further guidance on natural recarbonation, industrial mineralisation, other CCU, and CCS.

11 GLOSSARY

BECCS - Bioenergy, carbon capture and storage

CCU - Carbon capture and use

CCS - Carbon capture and storage

GGBS - Ground granulated blast-furnace slag

GHG - Greenhouse gas

IEA - International Energy Agency

IPCC - United Nations Intergovernmental Panel on Climate Change

LCA - Life-cycle Assessment

SDA - Sectoral Decarbonisation Approach

SBT - Science-based target

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13 APPENDIX I: SCOPE 2 PATHWAY

The IEA Net Zero report does not publish sector-specific electricity consumption (unlike the IEA ETP 2017, on which the SBTi's well-below 2ºC pathways were based). Therefore, a Scope 2 pathway was developed, in consultation with IEA, by assuming that cement industry total electricity consumption grows in line with electricity consumption for all heavy industries (this data is provided by IEA), but corrected for slower growth of cement volumes compared to other industries (steel and chemicals). The formula is as follows:

- Cement global electricity consumption in year y = (2019 cement electricity consumption[6]) * (electricity demand for heavy industry in year y compared to 2019[7]) * (cement volume growth compared to other heavy industry for year y[8])

Electricity carbon intensity is taken from IEA Net Zero to create the Scope 2 pathway.

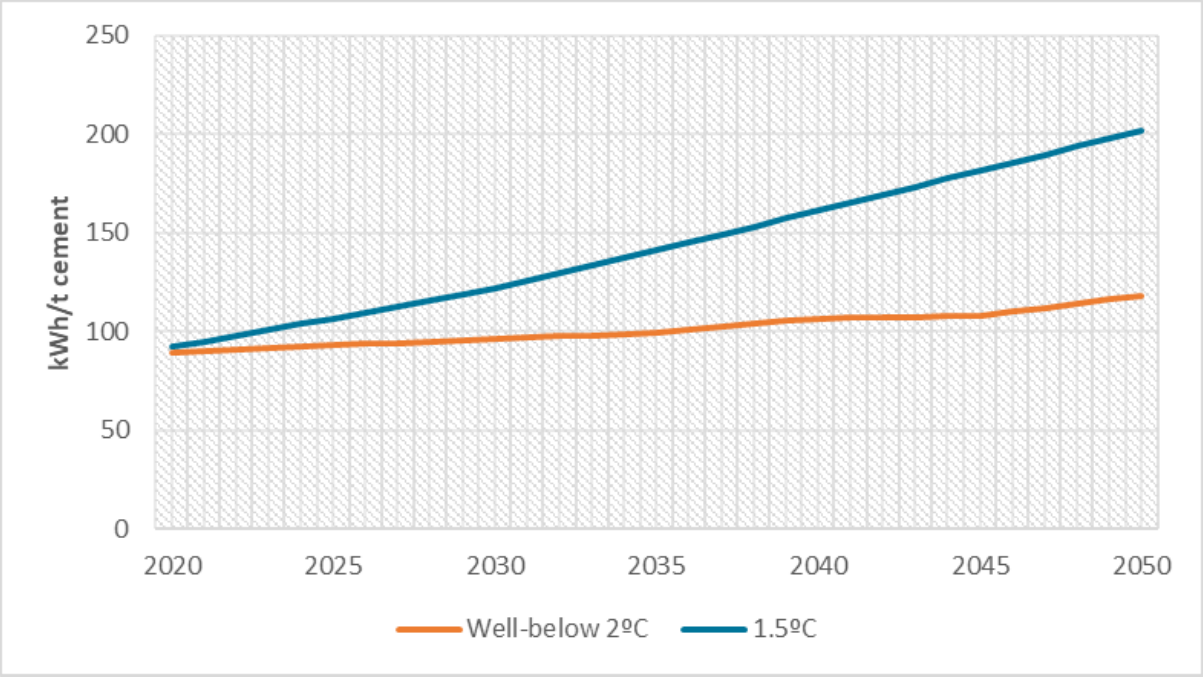

Figure 6: Electricity consumption for the global cement industry

[6] Source is IEA ETP 2017 specific electricity consumption and IEA Net Zero cement production

[7] Source is IEA Net Zero report Figure 2.16

[8] Source is IEA Net Zero report Figure 2.16

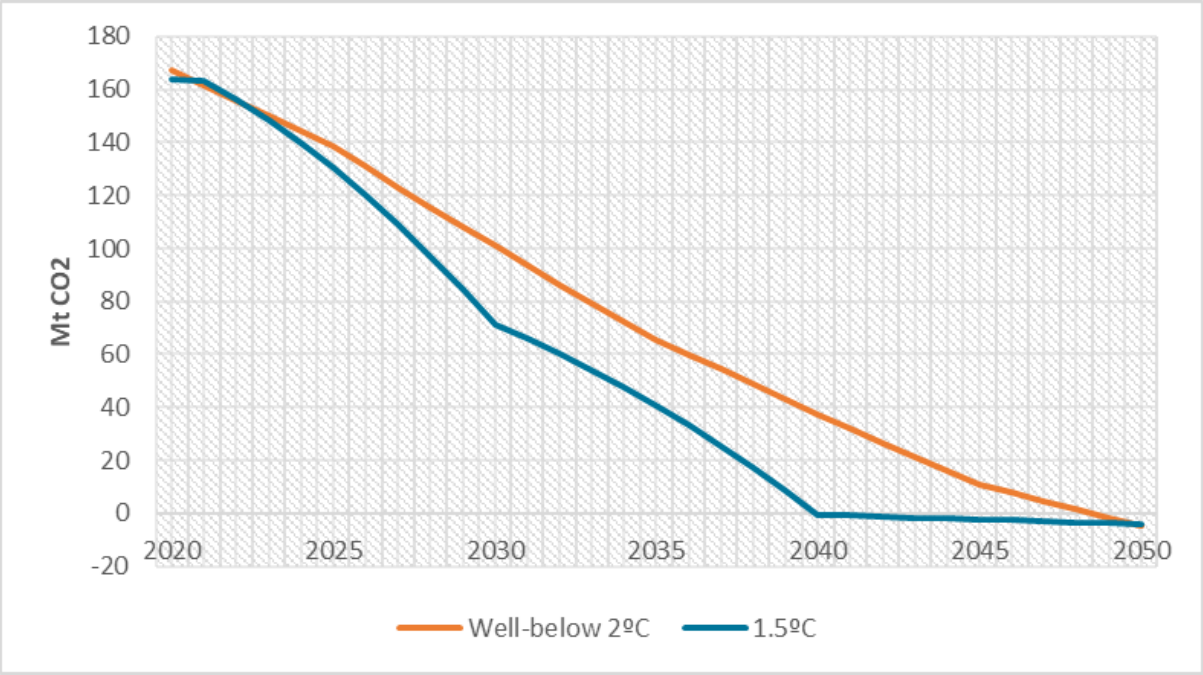

Figure 7: Scope 2 pathways for global cement industry

14 APPENDIX II: NATURAL RECARBONATION AND TARGET SETTING

Natural cement recarbonation (or carbonation) is the process whereby CO_2 is absorbed from the air by cement-based products such as concrete and mortar.

Since recarbonation can cause corrosion in reinforcement and therefore reduce the lifetime of reinforced concrete structures, limiting the recarbonation rate and depth is a key part of concrete structural design.

Natural cement recarbonation is recognised as a not-insignificant carbon sink (IPCC 2006, IPCC 2021, Friedlingstein 2021)[9] although it is not currently accounted for in corporate or industry inventories (such as the GHG Protocol or IEA)[10], nor in SBTs.

Including natural recarbonation in the SBT framework carries with it clear risks and barriers:

- According to SBTi principles, near-term SBTs cannot include removals (except for FLAG sector)[11].
- The GHG Protocol states[12] that removals and emissions targets must be kept separate.
- SBTs are intended to incentivise additional decarbonisation action. Including natural recarbonation would change accounting rules (by e.g., lowering both the baseline and target), but change little in terms of cement companies' challenge or opportunity to decarbonise.
- There is no way currently to link natural recarbonation in existing structures or waste to a specific producer, and therefore there is a risk of several companies wanting to "claim" the same CO_2 uptake as part of their target.

Existing accounting methods

In recent years, two broad approaches for accounting for CO_2 uptake due to natural recarbonation in cement-based products have been developed.

[9] IPCC 6th AR notes 0.2 PgC per year globally (IPCC 2021).

[10] IPCC notes that recarbonation should not be considered in national GHG accounting for good practice, but notes it is an area for future work (IPCC 2006).

[11] From SBTi Pathways to Net Zero: "SBTs are emissions targets that do not include carbon dioxide (CO_2) removal, except for SBTs calculated with dedicated guidance for companies in the forestry, land, and agriculture (FLAG) sectors and in specific cases of bioenergy use".

[12] As per forthcoming GHG Protocol guidance on removals, emissions targets do not include removals. Removals targets or "net" targets must be separate.

The first is intended for product life-cycle assessment (LCA) or carbon footprinting, where all impacts over the life-cycle of a product are quantified (CEN 2017). Here, a reasonably accurate estimate can be made for a specific product, as conditions affecting carbonation may be known, such as the type and strength of the concrete, the exposure conditions, and the exposure time. The magnitude of CO_2 uptake will vary significantly depending on these conditions.

The second method could be called the "global sink" method, where the annual CO_2 uptake in all existing concrete structures is estimated (Andersson et al. 2019). This requires estimates about concrete produced historically for existing buildings and infrastructure. Often, this annual CO_2 uptake is expressed as a percentage of the CO_2 emissions from the global cement industry in a given year, although of course these two figures are not directly related (if cement production in one year goes down, while the global sink remains roughly the same, the calculated percentage uptake would remain misleadingly high).

Neither of the two methods above naturally lends itself to target setting, which is based on corporate Scope 1, 2 and 3 GHG accounting.

If mapped to the Scope 1, 2 and 3 approach, the LCA method could be applied to Scope 3 emissions from the point of view of a cement producer, or Scope 1 emissions from the point of view of a concrete producer. The global sink method could in principle be used in calculation of a cement company's Scope 1 emissions, although this is problematic as explained above, as the sink and the source have no direct relation for a given year.

One solution, discussed during the development of this guidance, would be to assume a conservative average figure for the annual global cement natural recarbonation sink per tonne of cement, and to reduce the cement carbon budget and 1.5ºC pathway by this amount. Companies should then subtract the same amount from their own baseline and future emissions. This approach has not been taken, however, as it was preferred to use the IEA Net Zero pathway without modification (for transparency and consistency), which does not account for recarbonation. In addition, if the result of this approach were only to reduce baseline and target year emissions, it would not incentivise additional actions.

Natural recarbonation as a way to mitigate residual emissions

The SBTi Net-Zero Standard states that when a long-term target year is reached, companies must commit to neutralizing residual emissions that remain. It may be that natural recarbonation could be appropriate to cover this requirement for cement companies.

Given that today the SBTi does not provide detailed guidance on what activities can count towards neutralization of residual emissions, nor on how a company can claim these activities are exclusive and additional (i.e., mitigating their emissions rather than those of another company), no decision

has been taken yet on whether natural recarbonation is appropriate in this context. This is a potential area to be explored in SBTi's upcoming 'Beyond Value Chain Mitigation' work.

Note on industrial mineralisation

The above discussion applies to recarbonation happening naturally. Industrial carbonation (also called mineralisation), where the uptake of CO_2 is part of the production process (e.g. through injection of CO_2 into fresh concrete), does have the potential to incentivise additional decarbonisation, as well as providing clearer "ownership" of the emissions savings. For this reason, industrial mineralisation is included as an emission reduction mechanism in SBTs, subject to certain conditions (see Section 6.2).

There is a chemical limit to how much CO_2 can be taken up by recarbonation by cement-based products like concrete. If industrial mineralisation is counted as part of a company's emission reductions to reach net-zero, then some of the natural recarbonation potential can be considered as having been consumed, and so would not be available to neutralize residual emissions.