SCIENCE BASED TARGETS

DRIVING AMBITIOUS CORPORATE CLIMATE ACTION

CONSULTATION DRAFT

# CHEMICALS SECTOR TARGET-SETTING CRITERIA

## 2nd PUBLIC CONSULTATION DRAFT

November 2024

# NOTE ON CONSULTATION DRAFT

This document has been prepared for the purpose of publication for public consultation. The content, format and/or design of the document may be subject to significant changes due to the outcomes of the public consultation, new data, and potential changes in the SBTi's format for sector-specific resources.

# ABOUT SBTi

The Science Based Targets initiative (SBTi) is a corporate climate action organization that enables companies and financial institutions worldwide to play their part in combating the climate crisis.

We develop standards, tools and guidance which allow companies to set greenhouse gas (GHG) emissions reductions targets in line with what is needed to keep global heating below catastrophic levels and reach net-zero by 2050 at latest.

The SBTi is incorporated as a UK charity, with a subsidiary SBTi Services Limited, which hosts our target validation services (together with SBTi, the “SBTi Group”). Partner organizations who facilitated SBTi’s growth and development are CDP, the United Nations Global Compact, the We Mean Business Coalition, the World Resources Institute (WRI), and the World Wide Fund for Nature (WWF).

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These criteria are issued by the SBTi. Any feedback on the SBTi resources can be submitted to info@sciencebasedtargets.org for consideration of the SBTi.

# VERSION HISTORY

| Version | Update description | Release date | Effective dates |
|---|---|---|---|
| Version 1.0 | • Publication of the initial version of the target-setting criteria | TBD | TBD |

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# EXECUTIVE SUMMARY

## Summary of Criteria (C) and Recommendations (R)

### CHEM-C1 Ammonia production SDA method

Companies may set a near-term target only, or a near-term and long-term target (as part of a net-zero target) on GHG emissions from ammonia production on the basis of tonnes (t) of GHG per t of ammonia produced using the SDA method pathway for ammonia production.

#### CHEM-C1.1 Target boundary

Companies shall include in their target boundary for both near-term and long-term targets, at a minimum, emissions from the production of hydrogen, the production of nitrogen, and the synthesis of ammonia from these two components. Companies shall include emissions from all sources within this boundary of the ammonia SDA pathway and include them within the SDA target, regardless of whether these emissions occur within scope 1, 2 or 3.

#### CHEM-C1.2 Target boundary exclusions

Companies shall not use the ammonia production SDA to set targets on emissions from production of ammonia that is produced for use as an energy carrier. Emissions from such production shall be covered using the SBTi Corporate Net-Zero Standard and Corporate Near-Term Criteria.

Companies shall not include upstream emissions associated with feedstocks or fuels (e.g. $CH_4$ emissions from purchased natural gas production and transport) within the SDA target boundary.

#### CHEM-C1.3 Baseline and target year data

Companies shall determine the following for the purposes of setting a target using the ammonia production SDA:

- GHG emissions in their chosen baseline year from all processes that fall within the minimum target boundary as described in this criterion, regardless of whether these processes fall within the company's scope 1, 2 or 3 GHG inventory.
- Activity output (t of ammonia produced) in the chosen baseline year.
- The target year.
- Projected activity output in the chosen target year.

### CHEM-C2 Methanol production SDA method

Companies may set a near-term target only, or a near-term and long-term target (as part of a net-zero target) on GHG emissions from methanol production on the basis of tonnes (t) of GHG per t of methanol produced using the SDA method pathway for methanol production.

#### CHEM-C2.1 Target boundary

Companies shall include in their target boundary for both near-term and long-term targets, at a minimum, emissions from the production of hydrogen and/or syngas, and the synthesis of methanol. If a supplemental source of $CO_2$ is used to synthesize methanol, companies shall include emissions associated with the production or capture of the $CO_2$. Companies shall calculate emissions from all sources within this boundary of the methanol SDA and include them within the SDA target, regardless of whether these emissions occur within scope 1, 2 or 3.

#### CHEM-C2.2 Target boundary exclusions

Companies shall not use the methanol production SDA to set targets on emissions

from production of methanol that is produced for direct energy supply purposes, for example as a fuel. Emissions from such production shall be covered using the SBTi's cross-sectoral criteria in the SBTi Corporate Net-Zero Standard and Corporate Near-Term Criteria.

Companies shall not include upstream emissions associated with feedstocks or fuels (e.g. $CH_4$ emissions from natural gas production and transport) within the SDA target boundary.

**CHEM-C2.3 Baseline and target year data**

Companies shall determine the following for the purposes of setting a target using the methanol production SDA:

- Emissions in their chosen baseline year from all processes that fall within the minimum target boundary as described in this criterion, regardless of whether these processes fall within the company's scope 1, 2 or 3 GHG inventory.
- Activity output (t methanol produced) in the chosen baseline year.
- The target year.
- Projected activity output in the chosen target year.

**CHEM-C3 HVC production SDA method**

Companies may set a near-term target only, or a near-term and long-term target (as part of a net-zero target) on GHG emissions from HVC production on the basis of tonnes (t) of GHG per t of HVC produced using the SDA method pathway for HVC production.

**CHEM-C3.1 Target boundary**

Companies shall include in their target boundary for both near-term and long-term targets, at a minimum, emissions from the direct production of HVC. Companies shall include emissions from all sources within this boundary of the HVC SDA pathway and include them within the SDA target, regardless of whether these emissions occur within scope 1, 2 or 3.

**CHEM-C3.2 Target boundary exclusions**

Companies shall not include:

- Upstream emissions associated with feedstocks or fuels (e.g. emissions from refining of crude oil into naphtha) within the SDA target boundary.
- Emissions from production of HVC that occur within refineries. Emissions from such production shall be covered using other available target-setting methods.

**CHEM-C3.3 Baseline and target year data**

Companies shall determine the following for the purposes of setting a target using the HVC production SDA:

- Emissions in their chosen baseline year from all processes that fall within the minimum target boundary as described in this criterion, regardless of whether these processes fall within the company's scope 1, 2 or 3 GHG inventory.
- Activity output (HVC produced) in the chosen baseline year.
- The target year.
- Projected activity output in the chosen target year.

**CHEM-C4 Scope 1 $N_2O$ emissions target setting for nitric acid production**

Chemical companies that have $N_2O$ emissions from nitric acid production within their base year scope 1 emissions inventory which represent at least 5% of the sum of their total scope 1, 2 and 3 GHG emissions shall set targets on these scope 1 $N_2O$ emissions using the method described in this criterion.

**CHEM-C4.1 Baseline and target year data**

Companies may choose a different base year from their other targets for the purpose of setting a target based on criterion CHEM-C4.

Companies shall determine the following for the purpose of setting a target as described in this criterion:

- The total $N_2O$ emissions and average $N_2O$ emissions intensity in units of kg $N_2O$ / t nitric acid across all their operations from the production of nitric acid in the base year.
- Estimated nitric acid production in the year 5 years from the chosen base year, if their base year emissions intensity is greater than 0.5 kg $N_2O$ / t nitric acid.

**CHEM-C4.2 Target boundary**

Companies shall include all scope 1 emissions of $N_2O$ from the production of nitric acid within the boundary of the target calculated based on criterion CHEM-C4.

**CHEM-C4.3 Target boundary exclusions**

Companies shall not include scope 2, scope 3 emissions, nor scope 1 emissions of $CO_2$ associated with the production of nitric acid within the boundary of the target calculated based on criterion CHEM-C4.

**CHEM-C5 Combined targets: SDA targets and other scope 1 and 2 targets**

Companies may combine near-term and/or long-term targets set using the primary chemical SDA target-setting methods outlined in criteria CHEM-C1 through CHEM-C3 with targets set on other scope 1 and 2 emissions using the absolute reduction approach if the following conditions are met:

- Both targets are set using a 1.5°C-aligned level of ambition;
- The same base year and target year are used for both targets;
- Sufficient data is included with the target submission so that the SBTi can determine that each target was determined separately using an adequate minimum level of ambition for the relevant target-setting method;
- The methods used to set each target are disclosed as part of the target language;
- The target(s) set using the SDA method are converted to an absolute emissions reduction basis so they may be combined with the absolute reduction target; and
- The SDA method target(s) remain as sub-target(s), on an emissions intensity basis, that must be achieved separately.

**CHEM-C6 Scope 3 category 1 emissions from purchased primary chemicals**

Chemical companies that directly purchase primary chemicals shall set a target on all scope 3 category 1 emissions from purchased primary chemicals using any applicable method in the SBTi's Corporate Net-Zero Standard, if scope 3 category 1 emissions from purchased primary chemicals represent more than 5% of their total scope 3 GHG inventory. This criterion shall apply regardless of whether a company's scope 3 emissions contribute 40% or more towards their total scope 1, 2 and 3 inventory.

Targets set on these emissions shall count towards the minimum scope 3 inventory coverage required by the SBTi Corporate Net-Zero Standard.

**CHEM-C7 Scope 3 category 11 emissions from urea-based fertilizers**

Chemical companies that produce and sell urea that is used in N-fertilizers or companies that produce and sell urea-based fertilizers shall set a target on all scope 3 category 11

$CO_2$ emissions from sold urea using any applicable method in the SBTi's Corporate Net-Zero Standard, if scope 3 category 11 emissions from sold urea represent more than 5% of their total scope 3 GHG inventory. This criterion shall apply regardless of whether a company's scope 3 emissions contribute 40% or more towards their total scope 1, 2 and 3 inventory.

Targets set on these emissions shall count towards the minimum scope 3 inventory coverage required by the SBTi Corporate Net-Zero Standard.

### CHEM-C8 Scope 3 category 11 near-term target setting for fertilizer use phase $N_2O$ emissions

Companies may set near-term targets on $N_2O$ emissions from the use of sold nitrogen fertilizers in scope 3 category 11 using the following level of ambition:

- For base years ≥ 2020, the minimum value for absolute reduction target = 1.3% x (Target year - 2020).
- For base years ＜2020, the minimum value for absolute reduction target = 1.3% x (Target year - Base year).

Targets set using this criterion are considered to align with a 1.5°C level of ambition; however, the SBTi does not currently classify scope 3 targets based on temperature alignment.

#### CHEM-C8.1 Baseline and target year data

Companies shall calculate and report emissions of N2O in scope 3 category 11 associated with the use of sold synthetic nitrogen fertilizers in their base year.

### CHEM-C9 Scope 3 category 11 long-term target setting for fertilizer use phase $N_2O$ emissions

Companies may set long-term targets on $N_2O$ emissions from the use of sold nitrogen fertilizers in scope 3 category 11 using the following level of ambition:

- For base years ≥ 2020, the minimum value for absolute reduction target = 17%
- For base years ＜2020, the minimum value for absolute reduction target = 17% + 0.57% x (2020 - Base year)[1].

#### CHEM-C9.1 Baseline and target year data

Companies shall calculate and report emissions of $N_2O$ in scope 3 category 11 associated with the use of sold synthetic nitrogen fertilizers in their base year.

### CHEM-C10 Combined targets: SDA targets and other scope 3 targets

Companies that directly purchase primary chemicals may combine targets set on scope 3 category 1 using the primary chemical SDA target-setting methods outlined in criteria CHEM-C1 through CHEM-C3 with other scope 3 targets set using the absolute reduction approach if the following conditions are met:

- The SDA target is set on emissions that are solely within the company's scope 3 inventory;
- The same base year and target year are used for both targets;
- Sufficient data is included with the target submission so that the SBTi can determine that each target was separately set using an adequate minimum level of ambition for the relevant target-setting method;
- The methods used to set each target are disclosed as part of the target language;

[1] Formula adjusts overall ambition for base years prior to 2020 by applying additional reduction requirements at the same rate of total linear annual reduction for each year before 2020.

- The target(s) set using the SDA method are converted to an absolute emissions reduction basis so they may be aggregated with the scope 3 absolute reduction target; and
- The SDA method target(s) remain as sub-target(s), on an emissions intensity basis and using the target boundary described in criteria CHEM-C1 through CHEM-C3, that must be achieved separately.

**CHEM-C11 Near-term alternative feedstock targets**

Companies shall set a near-term alternative feedstock target based on feedstock purchased for use within their operational boundary, expressed in percentage by weight (wt. %) carbon content. Companies shall set the target on the total company-wide share of alternative carbon-based feedstocks they utilize to make products.

The near-term target shall be calculated using the Chemicals Sector Target-Setting Tool.

**CHEM-C11.1 Baseline and target year data**

Companies shall calculate and report the share, as a wt. %, of alternative feedstocks from all sources within the boundary of this target in their chosen base year relative to the sum of total virgin fossil and alternative feedstocks. This share shall be calculated based on the total carbon utilized as feedstock in the company's operational boundary.

Companies shall provide in their target submission a description for their strategy to achieve the target percentage of alternative feedstock.

**CHEM-C11.2 Companies may exclude the feedstocks used for production of ammonia for other purposes than conversion to urea from the scope of this target**

Companies may exclude the feedstocks used for production of ammonia for other purposes than conversion to urea from the scope of this target.

**CHEM-C12 Mass balance accounting**

Companies that utilize the mass balance accounting method to allocate or identify the attributes of purchased or sold products that consist of materials of different origins shall adhere to the following requirements:

- Describe in their target submission, in detail, how the attributes of a particular product (sold or purchased) were estimated, including the mechanism used to ensure traceability of the material between process inputs and outputs.
  - For example, a company estimating that a sold product contains 40% by weight of biobased carbon should describe how the 40% value was derived based on known inputs to the production process or based on information provided by the supplier of the company's raw materials.
- Demonstrate how the attributes of the materials have been utilized in GHG emissions inventory calculations (e.g. using appropriate emission factors for relevant scope 3 categories each material type).
- Follow all applicable GHG accounting requirements for scopes 1, 2 and 3 from the SBTi and GHG Protocol as appropriate for the materials (e.g. accounting for full upstream impacts of bio-based materials, including land sector emissions).
- Companies shall not use credits or certificates that have been generated using a book and claim approach, traded on a marketplace/exchange, and/or transferred from a different company or transferred from a different site within the same company.

# GLOSSARY

For terms and definitions used in this document and in the SBTi framework, please refer to the SBTi Glossary.

### New glossary terms

A list of the new terms being introduced to the SBTi Glossary as a result of the Chemicals Sector Target-Setting Criteria development is provided here:

| TERM | DEFINITION |
|---|---|
| Alternative feedstock | Carbon-based feedstocks to chemical processes that are of the following origin:<br>• Bio-based (e.g. bio-oils, bioethanol, dry biomass, wet biomass).<br>• Feedstocks from chemical recycling (e.g. pyrolysis oil).<br>• $CO_2$ from Carbon Capture and Utilization (CCU) sources (point-source captured $CO_2$), regardless of whether the $CO_2$ has a fossil or a bio-origin, provided the $CO_2$ originates from a process that is itself producing a product or supplying energy (e.g. captured $CO_2$ from a boiler or electricity production plant, or $CO_2$ from a cement plant)[2].<br>• Direct air capture (DAC) $CO_2$. |
| Ammonia as an energy carrier | Ammonia that is produced for the purpose of being used as a low-emissions fuel, fuel additive, or for energy storage as a hydrogen carrier. For example, ammonia used as maritime fuel or as a long-distance energy carrier for hydrogen. |
| Chemical recycling | Technologies that utilize heat, chemical agents, or both, to alter the basic chemical structure of a material. Chemical recycling of polymer based materials (e.g. plastics) involves breaking down the polymer into smaller molecules. |
| Consumer chemicals | Chemicals for use in personal care and household purposes such as cleaning products, cosmetics and hygiene products[3]. |
| Global warming potential 100 (GWP-100) | A factor describing the radiative forcing impact (degree of harm to the atmosphere) of one unit of a given GHG relative to one unit of $CO_2$. The GWP values in this document are on a 100-year time horizon basis[4]. |
| High value chemicals (HVCs) | The following chemicals are considered HVCs for the purpose of this document: ethylene and propylene (together classified as olefins), benzene, toluene, and mixed xylenes (together classified as aromatics). |

[2] This implies that cases such as ammonia produced from fossil feedstocks delivering the $CO_2$ and ammonia for conversion to urea within the same plant, do not qualify as “alternative feedstock”.
[3] Definitions adapted from CDP’s Activity Classification System (CDP-ACS).
[4] Definition from the GHG Protocol (GHG Protocol, 2004).

| | |
|---|---|
| Intermediate chemicals | Chemicals that typically utilize primary and other base chemicals as inputs and are often used as inputs for additional products or are sold directly to consumers. Intermediate chemicals include propylene oxide, polymers, styrene, acetone and formaldehyde. |
| Low-emission hydrogen | Hydrogen produced through water electrolysis with electricity generated from a low-emissions source such as renewables or nuclear, or biomass or from fossil fuels equipped with CCS technology. Production from fossil fuels with CCS is included only if upstream emissions are sufficiently low, if capture, at high rates, is applied to all $CO_2$ streams associated with the production route, and if all $CO_2$ is permanently stored to prevent its release to the atmosphere[5,6]. |
| Mechanical recycling | Technologies that do not alter the basic chemical structure of a material. |
| Merchant hydrogen | Hydrogen produced by one company to sell to others[7]. |
| Methanol as an energy carrier | Methanol that is produced for the purpose of being used as a fuel or – as methanol – as fuel additive. Methanol converted to fuel additives, such as MTBE, is not considered an energy carrier in this definition. |
| Other base chemicals | Base chemicals not included in the definition of primary chemicals, such as acids, bases, alkalis, and industrial gases. |
| Pharmaceuticals | Operations involved in the discovery, development, and manufacture of drugs and medications. |
| Primary chemicals | Ammonia, methanol, ethylene, propylene, benzene, toluene, or mixed xylenes (the latter five chemicals collectively known as HVCs). |
| Process emissions | Emissions of GHGs that originate from the raw materials used to produce chemicals, rather than from the combustion of fuels to produce energy. Process emissions often occur as a byproduct to an industrial process, for example when there is an excess of carbon in the raw materials as compared to the final product, in which case the excess carbon can be emitted as $CO_2$. Examples of process emissions are $CO_2$ emissions from steam methane reforming of natural gas to produce hydrogen, or $N_2O$ emissions from nitric acid production. |

[5] Definitions adapted from IEA (IEA, 2023c).
[6] This document does not contain criteria that rely on a quantitative definition of low-emissions hydrogen. However, certain jurisdictions have developed maximum regulatory thresholds for the amount of GHG emissions allowed in the production process for hydrogen to be considered 'low carbon hydrogen', for example the United Kingdom's (UK) Low Carbon Hydrogen Standard.
[7] Definition adapted from IEA (IEA, 2021b).

| | |
|---|---|
| Specialty chemicals | Chemicals for bespoke purposes not included in other categories, such as chemicals used to produce additives, adhesives, solvents, catalysts, dyes, flavourings, ink, lubricants, paints and advanced materials[8]. |

[8] Definitions adapted from CDP's Activity Classification System (CDP-ACS).

# 0. INTRODUCTION

## 0.1 Introduction to the chemicals sector

The chemicals industry has one of the most complex and diverse value chains of all industrial sectors. Products from the chemicals sector are critical to nearly every aspect of modern life. These products vary from bulk industrial chemicals to highly specialized pharmaceuticals and laboratory reagents. The health care, agriculture, construction, packaging, manufacturing, and transport industries all rely heavily on chemical products. What's more, demand for chemicals is expected to continue to grow in the decades to come (IEA, 2023c).

Much of the chemicals value chain is based on the building blocks of carbon and hydrogen. Today, the sector relies heavily on direct fossil-based hydrocarbon feedstocks (e.g. coal, natural gas, natural gas liquids) or feedstocks that are products of crude oil refineries (e.g. naphtha) for the source of these building blocks. For this reason, the chemicals industry is the largest industrial consumer of energy in the world when both feedstocks and fuel consumption are considered (IEA, 2021b).

Value chain (scope 3) emissions of the chemicals industry are substantial. The fate of the carbon embedded in chemical products must be considered down the value chain, where GHG emissions can occur either during the use phase or at the end-of-life via incineration or decomposition. Additionally, $N_2O$ emissions generated from N-fertilizer application in the field presents a particular challenge for companies producing such fertilizer products. The upstream emissions associated with the extraction and production of the fossil-based feedstocks and fuels, and their alternatives, including land-related and production emissions to obtain biomaterials, emissions from waste recycling processes, and to obtain carbon dioxide ($CO_2$) via Carbon Capture & Utilization processes, are just as critical.

In this document, the SBTi outlines criteria for chemical companies to set credible, ambitious, science-aligned climate targets. By following these criteria, chemical companies will demonstrate their commitment to the forward-thinking goal of achieving net-zero emissions by no later than 2050 on a 1.5°C-aligned trajectory by setting both ambitious near-term and long-term targets.

## 0.2 Rationale for development of the SBTi Chemicals Sector Target-Setting Criteria

The chemicals sector is responsible for the third highest emissions of GHGs in the global industrial sector, behind steel and cement production, contributing 1,330 megatons (Mt) of direct $CO_2$ emissions in 2022 (IEA, 2023c). Emissions from any unabated combustion of hydrocarbons at the end of their life adds to these emissions.

Much of the chemicals value chain starts with the production of ammonia, methanol, ethylene, propylene, benzene, toluene and mixed xylenes (the latter five known as high value chemicals, or HVC). These seven building blocks will be referred to as "primary chemicals" for the purposes of these target-setting criteria, consistent with the International Energy Agency's (IEA) modeling of individual chemicals (IEA, 2021b).

Primary chemical production accounted for approximately two-thirds of all direct (scope 1) $CO_2$ emissions from the industry in 2020 (IEA, 2021b):

- Production of primary chemicals involve energy-intensive processes, requiring large amounts of heat currently produced primarily through the combustion of fossil fuels.
- In addition to the emissions from the combustion of these fuels, process emissions are generated from carbon contained in the feedstock.

While there are opportunities to reduce emissions from existing production routes, deep emissions reductions from primary chemical production are reliant on innovative technologies (IEA, 2023a). Therefore, the rate at which the sector can reduce its emissions from these chemicals in the short term may differ from the overall rate of decarbonization possible by the broader economy, as reflected by multiple pathways available in the literature [(IEA, 2021b), (Kremer, et. al 2022)]. For these reasons, dedicated pathways are justified to allow companies to set targets on emissions related to primary chemical production.

Further challenges exist in the impacts throughout the chemicals value chain. The chemicals value chain is not linear in nature, with many overlapping and intersecting material paths. Further, the downstream emissions impacts of many chemical products are difficult to accurately quantify, due to uncertainty in the circumstances of their use, as with emissions from the application of fertilizers, or due to a lack of data about the fate of chemical products at their end-of-life. The SBTi has assessed the complexity and has included sector-specific target-setting pathways and informative guidance for several issues related to scope 3 emissions from the chemicals sector.

The IPCC's Sixth Assessment Report (2021) confirmed that climate change is already affecting every region on Earth, its impacts increasingly visible in the form of extreme weather, worsened droughts and heightened risk of forest fires. The Paris agreement's overarching goal in 2015 was to hold the increase in the global average temperature to well below 2°C above pre-industrial levels and pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels. Scientists and world leaders have more recently stressed that we must limit global temperature rise to 1.5°C above pre-industrial levels and reach net-zero $CO_2$ emissions by 2050 for the best chance of avoiding catastrophic climate breakdown. Even though global temperature rise has (almost) reached 1.5°C, our goal is to limit warming as much as possible, reverse the trend of increasing global GHG emissions, and in time make a 1.5°C world possible again - as any temperature above this threshold is not safe for humanity and for all the other species with whom we cohabit on this planet.

The Chemicals Sector Target-Setting Criteria aims to support GHG emissions reduction by providing a sector-specific set of criteria for companies with activities related to the chemicals sector to use when setting science-aligned climate targets.

### 0.3 System of SBTi Standards

SBTi Standards are organized in a modular framework that includes a foundational Standard (the Corporate Net-Zero Standard) and several sector-specific standards with criteria

specific to each sector, including this Chemicals Sector Target-Setting Criteria. Sector-specific criteria contained in sector standards may be additional to or supersede the Corporate Net-Zero Standard criteria, as specified in each relevant sector criterion within the sector standards.

### 0.3.1 How to use the Chemicals Sector Target-Setting Criteria

These target-setting criteria are a supplement to the SBTi Corporate Net-Zero Standard and Corporate Near-Term Criteria. Companies shall adhere to the criteria in the SBTi Corporate Net-Zero Standard and Corporate Near-Term Criteria, except where explicitly superseded in this document. Applicability of specific criteria in this document to products, product groups, or certain sources of emissions is specified in each criterion; therefore, not all criteria are applicable to all chemical companies.

Criteria are mandatory for all chemical companies fitting the applicability conditions specified in each criterion. Recommendations are optional for chemical companies fitting the applicability conditions specified in each recommendation. Companies should carefully read the applicability statements in each criterion or recommendation, as some criteria include options for companies to choose.

Companies should follow these steps when using these target-setting criteria:

1. Determine whether there are operations or activities within your organizational boundary that are within the scope of the chemicals sector as defined below.
2. Determine which of the criteria or recommendations in this document are not applicable to your operations, or are optional. The applicability of certain criteria depends on whether a company chooses to adhere to it. In these cases, a company may choose to set targets on the relevant emission sources using other methods, such as the SBTi Corporate Net-Zero Standard and/or Corporate Near-Term Criteria[9].
3. Follow all applicable criteria and their guidelines to set a target on the relevant operations or emissions when developing a company-wide target. If a company chooses to adhere to a recommendation or optional criterion, it must adhere fully to the applicable requirements therein.
4. Set a target using the SBTi Corporate Net-Zero Standard and/or Corporate Near-Term Criteria on any remaining emissions necessary to meet the minimum cumulative target coverage requirements in the SBTi Corporate Net-Zero Standard and Corporate Near-Term Criteria.

For terms and definitions used in these target-setting criteria and in the SBTi framework, please refer to the SBTi Glossary. Additional definitions of terms specific to this document are included in the Glossary section above.

[9] For example, a company that purchases ammonia may choose to adhere to the criterion for setting an emissions intensity target on scope 3 emissions from the production of purchased ammonia, or, they may choose to use other scope 3 target-setting methods from the SBTi Corporate Net-Zero Standard and Corporate Near-Term Criteria.

### 0.4 Document structure

The Chemicals Sector Target-Setting Criteria contains criteria and recommendations, organized into thematic sections, that entities must or should follow to be validated by the SBTi.

Each section includes:

- The intended outcomes and a background providing a rationale for the outcome.
- The intent outlining the objective of the section.
- The criteria which are the rules entities must adhere to.
- The recommendations which are the best practices entities are encouraged to pursue.

Criteria and recommendations are structured in a table format that includes:

- At the top left, ‘criterion name’ and ‘criterion text’.
- At the top right, the metadata related to ‘application’ of the criterion/recommendation (based on e.g. entity type, sector, industry, activity).
- In the bottom half, the interpretation guidance used to better understand the criterion text, and the recommendation (if relevant) that outlines the best practice that entities should strive to pursue related to the criterion the table refers to.

Key definitions, examples and additional background information on the derivation of selected components of this document are provided in the Annexes:

- Annex A - Coverage and treatment of activities within the chemicals sector.
- Annex B - Instructions and examples for setting targets.
- Annex C - Additional information on scope 3 accounting.
- Annex D - Setting targets on shares of alternative feedstocks.

The Annexes and Chemicals Sector Target-Setting Criteria Supplemental Data Memorandum should be consulted to have an in-depth understanding of the SBTi framework and access more extensive guidance related to some of the elements in this document.

### 0.5 Terminology

Within these target-setting criteria, the terms “shall”, “should” and “may” are used as follows:

- “Shall” and “must” indicate criteria that are required for the applicable activities.
- “Should” indicates a recommendation. Recommendations are important for transparency and best practices but are not required.
- “May” indicates an optional criterion that is permissible, but not required. However, an optional criterion, if chosen, must be adhered to fully. A company may not selectively follow parts of the optional element.

Criteria are identified with a “C” followed by numbers. Recommendations are instead identified with an “R” followed by numbers.

### 0.6 Effective date

The Chemicals Sector Target-Setting Criteria becomes effective after 6 months from its publication. Entities that wish to submit their targets for validation before the 6 months grace period may do so from the day following publication.

### 0.7 The development process

The SBTi developed these target-setting criteria with support from Guidehouse. The development of these criteria began prior to the adoption of the Standard Operating Procedures (SOP) for the Development of SBTi Standards. Despite beginning prior to the current SOP's adoption, the project has been developed following the principles of a transparent multi-stakeholder development process that is central to all SBTi's technical development[10]. The project was partially funded via generous donations from the organizations noted in the acknowledgements section of this document. Funding does not confer any special status in drafting the content of this document.

Overall, the standard development process involves the following phases: project initiation, research, drafting, consultation and pilot testing, approval, implementation, and monitoring & evaluation. Stakeholders are able to submit feedback not only during the public consultation phase but also throughout the course of the project through the Project Feedback Form. The 1st public consultation was held from May 15 - August 1, 2024. The SBTi has made revisions to the 1st consultation draft based on stakeholder feedback. Responses to feedback thus far have been published in the 1st Public Consultation Feedback Report, the Project Feedback log and the Main Changes Document. The current 2nd public consultation will be open for a minimum of 45 days. Feedback will be reviewed and additional revisions made to the draft as necessary. A period of pilot testing will be held, after which the target-setting criteria will be finalized and submitted to the SBTi Technical Council for approval and the SBTi Board of Trustees for adoption.

The project team was advised by an Expert Advisory Group (EAG) composed of 25 individuals from industry, industry associations, civil society and academia to provide detailed input during the development of these target-setting criteria. EAG members were selected and invited to join the group based on their expertise, position within the sectoral value chain, and geographic location. Member organizations of the EAG are listed in the acknowledgements section of this document. The EAG's role was advisory, and decision on the content included within this document is exclusively within the remit of SBTi. Therefore, criteria and recommendations in this document do not represent the views of individual EAG members.

The SBTi is grateful for the engagement and input from EAG members as well as those that have provided input via the public consultation process thus far.

These target-setting criteria include sector-specific criteria and recommendations that are complementary to the SBTi's Corporate Net-Zero Standard and Corporate Near-Term Criteria. The Corporate Net-Zero Standard and Corporate Near-Term Criteria shall be followed except where superseded in these target-setting criteria.

[10] See footnote 2 to Paragraph 10 in the Standard Operating Procedure (SOP) for Development of SBTi Standards.

# 1. SCOPE

## 1.1 Applicability

Companies shall adhere to the applicable criteria in this document, and should adhere to the applicable recommendations, when setting targets on emissions from their value chains as part of an entity-wide science-based target if they manufacture any products that fall within the boundary of the chemicals sector, as defined below.

For the purposes of these target-setting criteria, the "sectoral boundary of the chemicals sector" includes the following activities. Each activity is defined in the Glossary of this document.

- The production of primary chemicals.
- The production of other base chemicals.
- The production of intermediate chemicals.
- The production of specialty chemicals.
- The production of pharmaceuticals.
- The production of consumer chemicals.
- Chemical recycling activities.

For the purposes of these target-setting criteria, companies are considered to manufacture chemical products if these manufacturing activities fall within the company's operational boundary that is used to calculate its scope 1 and scope 2 corporate GHG inventory, as outlined in the GHG Protocol's Corporate Accounting and Reporting Standard (GHG Protocol, 2004).

These target-setting criteria address emissions from the value chain of these chemicals only; however, companies may also have activities within their value chain that fall outside the chemicals sector. For such activities, companies shall follow any other applicable sector-specific guidance or standards from the SBTi. Sources of emissions that are not addressed via sector-specific criteria shall be set using the SBTi's Corporate Net-Zero Standard and/or the Corporate Near-Term Criteria.

Due to the extremely diverse and heterogeneous nature of the chemicals sector, certain criteria and recommendations have been established in this document that apply only to activities involving specific products, or product groups, in order to most effectively address the climate target setting needs of the emissions associated with these products. Other criteria apply to the production of all products within scope. The organization of the sector at the activity level, including why certain products have (or have not) been singled out for criteria or recommendations, is discussed in greater detail in Annex A.

This standard contains chemicals sector-specific criteria for setting scope 1, 2 and/or 3 targets. As described in greater detail below, when developing their targets, companies with activities in the chemicals sector should carefully identify which criteria or recommendations apply to them. Not all criteria or recommendations will apply to all companies. Further, any products or sources of emissions that are not explicitly addressed in these target-setting

criteria shall be covered via the target-setting methods and criteria in the SBTi's Corporate Net-Zero Standard and the Corporate Near-Term Criteria.

The target-setting criteria shall be applied modularly, at the product level. This means that criteria or recommendations within this document may apply even if a company as a whole is not classified as a chemical company under widely used industry classification frameworks[11]. Additionally, it is possible that a company may have activities that fall within the sectoral boundary of the chemicals sector, but they may not be subject to any sector-specific criteria depending on their specific operational profile. In other cases, chemical companies may choose not to follow certain target-setting criteria even if they are eligible to do so, and thus their entity-wide target may not include targets set under these criteria.

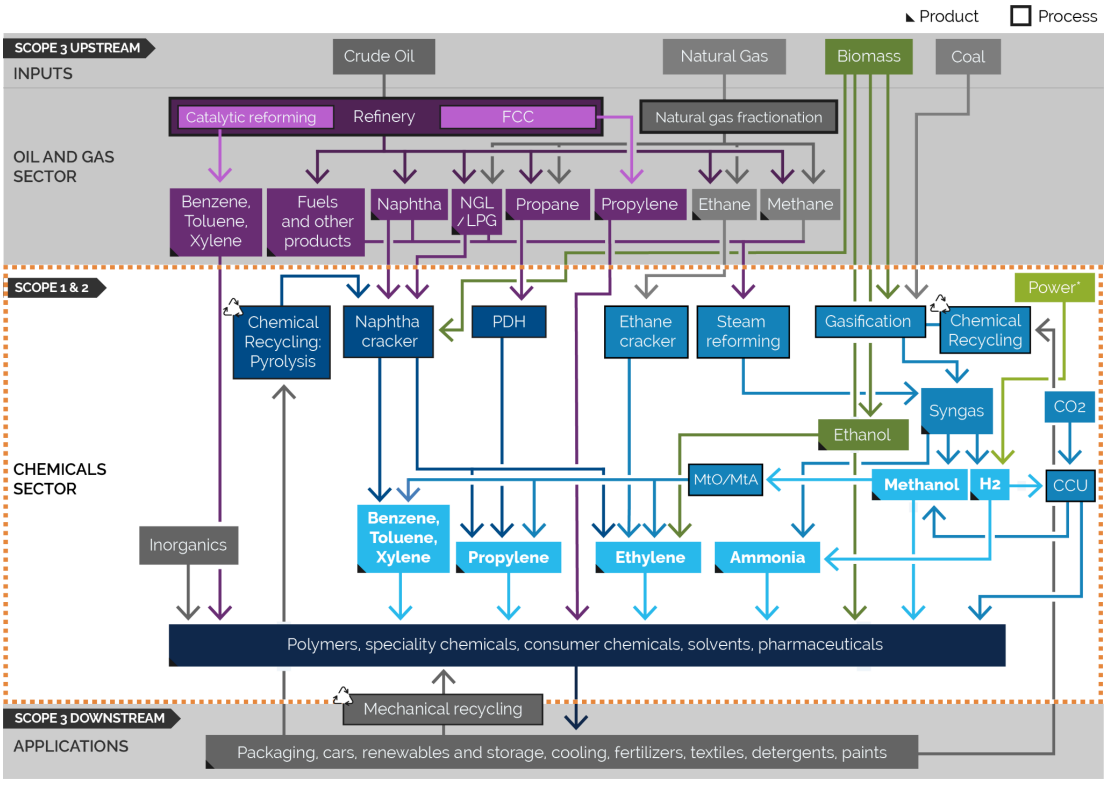
### 1.2 Exclusions from the scope

The scope of these target-setting criteria does not include:

- The production of final products that may be manufactured using the chemicals listed above, such as plastic packaging, cosmetics, textiles, detergents, paints, or inks.
- Mechanical recycling activities.
- Production of biofuels.
- Production of chemicals in refineries.

A visualization of the sectoral boundary is shown in Figure 1 below.

*Figure 1. Chemicals sector boundary (SBTi, 2020)[12]*




[11] E.g. Global Industry Classification System (GICS), Industrial Classification Benchmark (ICB), North American Industry Classification System (NAICS), etc.
[12] This figure is not intended to visualize the boundary of SDA pathways defined below.

### 1.3 Other users for which these target-setting criteria may be relevant

Companies that do not have operations within the sectoral boundary shall follow the criteria in the SBTi Corporate Net-Zero Standard and Corporate Near-Term Criteria[13], and may use elements of the Chemicals Sector Target-Setting Criteria where relevant and applicable. For example, a company that purchases primary chemicals may choose to adhere to the criteria for setting targets on primary chemical production emissions in their scope 3 inventory, even if the company itself does not have operations within the chemicals sectoral boundary.

# 2. TARGET SETTING FOR PRIMARY CHEMICALS

**Outcome:** Companies are given the option to set targets using the SBTi's sectoral decarbonization approach (SDA) on emissions related to production of primary chemicals, which are responsible for the majority of direct emissions from the chemicals sector.

**Background:** This chapter includes sector-specific criteria for chemical companies to set emissions reduction targets on emissions from primary chemical production. The applicability of each requirement is defined in the criteria themselves.

Criteria CHEM-C1 through CHEM-C3 are applicable only if companies choose to utilize the respective SDA target-setting methods for ammonia, methanol or HVC. Companies choosing not to utilize these methods shall follow the target-setting requirements of the SBTi Corporate Net-Zero Standard and Corporate Near-Term Criteria for emissions related to the production of primary chemicals.

### SDA target setting for ammonia production

**Intent:** This section intends to define the requirements for setting a target using the optional SDA method for ammonia production, and how companies may use this method to set targets on the relevant emissions.

| CHEM-C1 AMMONIA PRODUCTION SDA METHOD | **Application:** |
|---|---|
| Companies may set a near-term target only, or a near-term and long-term target (as part of a net-zero target) on GHG emissions from ammonia production on the basis of tonnes (t) of GHG per t of ammonia produced using the SDA method pathway for ammonia production. | Companies that:<br>1. Have ammonia production activities within their value chain which represent at least 5% of the sum of their total scope 1, 2 and 3 GHG emissions; and<br>2. Choose to use the ammonia production SDA method. |
| **Interpretation guidance:** | |

[13] The SBTi Corporate Net-Zero Standard and Corporate Near-Term Criteria contain the necessary guidance and criteria for companies to set net-zero and near-term targets.

- Companies may choose to use other applicable target-setting methods from the SBTi Corporate Net-Zero Standard and Corporate Near-Term Criteria to set targets on emissions from ammonia production instead of the ammonia production SDA method.
- Companies shall use the Chemicals Sector Target-Setting Tool to establish the minimum level of ambition for their target(s).
- Companies that choose to utilize the ammonia production SDA method shall follow the requirements of CHEM-C1.1, CHEM-C1.2 and CHEM-C1.3.
- Sample language for a near-term target set using this criterion is as follows:

  *Company A commits to reduce scope 1, 2 and 3 GHG emissions from the production of ammonia for non-energy purposes 32.8% per tonne of ammonia produced by 2030 from a 2020 base year.*

| CHEM-C1.1 TARGET BOUNDARY | **Application:** |
|---|---|
| Companies shall include in their target boundary for both near-term and long-term targets, at a minimum, emissions from the production of hydrogen, the production of nitrogen, and the synthesis of ammonia from these two components. Companies shall include emissions from all sources within this boundary of the ammonia SDA pathway and include them within the SDA target, regardless of whether these emissions occur within scope 1, 2 or 3. | Companies that:<br>1. Have ammonia production activities within their value chain which represent at least 5% of the sum of their total scope 1, 2 and 3 GHG emissions; and<br>2. Choose to use the ammonia production SDA method. |

**Interpretation guidance:**

The minimum target boundary has been set to ensure consistency with the underlying emissions scenario upon which the ammonia production SDA pathway has been based and to ensure comparability of targets between companies.

Companies should use primary data when calculating emissions within the ammonia SDA boundary; however, secondary sources or average data may be used in the absence of primary data for calculating scope 3 emissions within the boundary[14].

The following processes are examples of sources within the boundary of the ammonia production SDA:

- Production of hydrogen used to produce ammonia. Example production types include, but are not limited to:
  - Steam methane reforming (SMR) of natural gas.
  - Electrified SMR of natural gas.
  - Oil partial oxidation.
  - Coal gasification.
  - Biomass gasification.
  - Methane pyrolysis.
  - Water electrolysis.
- Production of nitrogen used to produce ammonia (e.g. air separation).
- Production of ammonia (e.g. via the Haber Bosch process).

The following type of emissions related to ammonia production processes are within the boundary of the ammonia production SDA:

[14] Primary data is data from specific activities within a company's value chain (e.g. data provided by suppliers related to their specific activities). Secondary data is data that is not from specific activities within a company's value chain (e.g. industry averages, proxy data, etc.) (GHG Protocol, 2011).

- $CO_2$ process emissions.
- GHG emissions from combustion to supply heat to the process, regardless of whether this heat is produced by the company itself or is imported. This shall include all emissions that are associated with the heat consumption of the ammonia production process.
- GHG emissions from the production of electricity used in the process, regardless of whether this electricity is produced by the company itself (scope 1) or is imported (scope 2).

In alignment with the IEA data on which this target-setting method is based, $CO_2$ generated during ammonia production that is then utilized to produce urea is not considered as a scope 1 emission. Nor are $CO_2$ emissions that are captured and sold as a product to other industries. Therefore, these emissions are not considered within the SDA target boundary. Emissions of $CO_2$ from the use of urea-containing products (e.g. fertilizers) shall be considered within a company's scope 3 emissions inventory per the GHG Protocol.

Companies may include emissions within the SDA target boundary from additional related sources which are expected to be minor relative to total production emissions, such as emissions from fuel pre-heaters, supplemental heaters, etc., but these are not mandatory.

| CHEM-C1.2 TARGET BOUNDARY EXCLUSIONS | **Application:** |
|---|---|
| Companies shall not use the ammonia production SDA to set targets on emissions from production of ammonia that is produced for use as an energy carrier. Emissions from such production shall be covered using the SBTi Corporate Net-Zero Standard and Corporate Near-Term Criteria.<br><br>Companies shall not include upstream emissions associated with feedstocks or fuels (e.g. $CH_4$ emissions from purchased natural gas production and transport) within the SDA target boundary. | Companies that:<br>1. Have ammonia production activities within their value chain which represent at least 5% of the sum of their total scope 1, 2 and 3 GHG emissions; and<br>2. Choose to use the ammonia production SDA method. |

**Interpretation guidance:**

- For more information on why the SBTi has excluded the production of ammonia for use as an energy carrier from the SDA target boundary, please see Annex A.
- Companies producing ammonia for both non-energy and energy applications shall exclude the emissions and volume of production activity from ammonia that is bound for energy carrier applications from the SDA target boundary. If there are emissions associated with this production, they shall be included within a company's GHG inventory and considered as part of targets set on emissions outside of the SDA target boundary.
    - Companies should use primary data when estimating the amount of ammonia sold for non-energy and energy purposes. In the absence of primary data, companies may make estimates for the amount of ammonia sold for non-energy and energy purposes based on best available data.

| CHEM-C1.3 BASELINE AND TARGET YEAR DATA | **Application:** |
|---|---|
| Companies shall determine the following for the purposes of setting a target using the ammonia production SDA:<br>● GHG emissions in their chosen baseline year from all processes that fall within the minimum target boundary as described in this criterion, regardless of whether these processes fall within the company's scope 1, 2 or 3 GHG inventory.<br>● Activity output (t of ammonia produced) in the chosen baseline year.<br>● The target year.<br>● Projected activity output in the chosen target year. | Companies that:<br>1. Have ammonia production activities within their value chain which represent at least 5% of the sum of their total scope 1, 2 and 3 GHG emissions; and<br>2. Choose to use the ammonia production SDA method per criterion CHEM-C1. |

**Interpretation guidance:**

Companies shall use the SBTi's Chemicals Sector Target-Setting Tool to calculate targets using the ammonia production SDA method. Detailed instructions for using the Chemicals Sector Target-Setting Tool are provided within the tool. Companies shall calculate the required inputs to the tool using the following steps:

1. **Calculate base year emissions within the SDA target boundary:** Companies shall calculate the GHG emissions from each of the processes within the SDA boundary that fall within their value chain in their chosen base year and include these emissions within their ammonia production SDA target boundary, regardless of where they occur within the value chain. For example, a company operating only the Haber Bosch process that chooses to set a target using the ammonia production SDA must include the emissions from the production of the hydrogen and nitrogen they purchase. This measure is necessary to ensure alignment of targets with the underlying emissions scenario and to provide a level playing field between companies with operations covering the entire SDA boundary and companies that operate in only part of the process. An example is outlined in Table 1 below.

   The Chemicals Sector Target-Setting Tool requires heat and process-related and electricity-related emissions within the SDA target boundary in the base year to be reported separately. Companies shall follow the following guidelines when calculating and reporting heat and process-related and electricity-related emissions:

   - Emissions from purchased and self-generated electricity shall be reported as electricity-related emissions in the SDA Chemicals Sector Target-Setting Tool, regardless of whether these emissions occur in scopes 1, 2, or 3.
   - Emissions from purchased and self-generated heat and process emissions shall be reported as heat and process-related emissions in the SDA Chemicals Sector Target-Setting Tool, regardless of whether these emissions occur in scopes 1, 2, or 3.

2. **Calculate base year production:** Companies shall calculate the total production of ammonia for non-energy purposes in their value chain in their chosen base year.

3. **Calculate target year production:** Companies shall project the production of ammonia in their chosen target year. This projection shall be based on the company's best estimates of future production. If a company concludes after its target has been set, but before the mandatory 5-year review that the projection is inaccurate, it shall revise its target using the updated projection estimate.

The company's minimum target emissions intensity for ammonia production will be calculated as an output from the Chemicals Sector Target-Setting Tool.

*Table 1. Emissions scope summary for an example company operating Haber Bosch process only (thus purchasing hydrogen and nitrogen)*

| PROCESS | SCOPE AND CATEGORY | NOTES |
|---|---|---|
| Hydrogen production | Scope 3 category 1 | Within ammonia production SDA boundary |
| Nitrogen production | Scope 3 category 1 | Within ammonia production SDA boundary |
| Haber Bosch process | Scopes 1 and 2 | Within ammonia production SDA boundary |

## SDA target setting for methanol production

**Intent:** This section intends to define the requirements for setting a target using the optional SDA method for methanol production, and how companies may use this method to set targets on the relevant emissions.

| CHEM-C2 METHANOL PRODUCTION SDA METHOD | **Application:** |
|---|---|
| Companies may set a near-term target only, or a near-term and long-term target (as part of a net-zero target) on GHG emissions from methanol production on the basis of tonnes (t) of GHG per t of methanol produced using the SDA method pathway for methanol production. | Companies that:<br>1. Have methanol production activities within their value chain which represent at least 5% of the sum of their total scope 1, 2 and 3 GHG emissions; and<br>2. Choose to use the methanol production SDA method. |

**Interpretation guidance:**

- Companies may choose to use other applicable target-setting methods from the SBTi Corporate Net-Zero Standard and Corporate Near-Term Criteria to set targets on emissions from methanol production instead of the methanol production SDA method.
- Companies shall use the Chemicals Sector Target-Setting Tool to establish the minimum level of ambition for their target(s).
- Companies that choose to utilize the methanol production SDA method shall follow the requirements of CHEM-C2.1, CHEM-C2.2 and CHEM-C2.3.
- Sample language for a target set using this criterion is as follows:

  *Company A commits to reduce scope 1, 2 and 3 GHG emissions from the production of methanol for non-energy purposes 26.4% per tonne of methanol produced by 2030 from a 2020 base year.*

| CHEM-C2.1 TARGET BOUNDARY | **Application:** |
|---|---|
| Companies shall include in their target boundary for both near-term and long-term targets, at a minimum, emissions from the production of hydrogen and/or syngas, and the synthesis of methanol. If a supplemental source of $CO_2$ is used to synthesize methanol, companies shall include emissions associated with the production or capture of the $CO_2$. Companies shall calculate emissions from all sources within this boundary of the methanol SDA and include them within the SDA target, regardless of whether these emissions occur within scope 1, 2 or 3. | Companies that:<br>1. Have methanol production activities within their value chain which represent at least 5% of the sum of their total scope 1, 2 and 3 GHG emissions; and<br>2. Choose to use the methanol production SDA method per criterion CHEM-C2. |

**Interpretation guidance:**

The minimum target boundary has been set to ensure consistency with the underlying emissions scenario upon which the methanol production SDA pathway has been based and to ensure comparability of targets between companies.

Companies should use primary data when calculating emissions within the methanol SDA boundary; however, secondary sources or average data may be used in the absence of primary data for calculating scope 3 emissions within the boundary.

The following processes are examples of sources within the boundary of the methanol production SDA:

- Production of hydrogen/syngas used to produce methanol. Example production types include, but are not limited to:
    - Steam methane reforming (SMR) of natural gas.
    - Oil partial oxidation.
    - Coke oven gas (COG) reforming.
    - Electrified SMR of natural gas.
    - Gas heated reforming (GHR).
    - Coal gasification.
    - Biomass gasification.
    - Water electrolysis (requires separate source of $CO_2$).
- Capture of $CO_2$ to be used as feedstock.
- Methanol synthesis.

The following emissions sources related to methanol production processes are within the boundary of the methanol production SDA:

- $CO_2$ process emissions.
- GHG emissions from combustion to supply heat to the process, regardless of whether this heat is produced by the company itself or is imported. This shall include all emissions that are associated with the heat consumption of the methanol production process.
- GHG emissions from the production of electricity used in the process, regardless of whether this electricity is produced by the company itself (scope 1) or is imported (scope 2).

Companies may include emissions within the SDA target boundary from additional related sources which are expected to be minor relative to total production emissions, such as emissions from fuel pre-heaters, supplemental heaters, etc., but these are not mandatory.

| CHEM-C2.2 TARGET BOUNDARY EXCLUSIONS | **Application:** |
|---|---|
| Companies shall not use the methanol production SDA to set targets on emissions from production of methanol that is produced for direct energy supply purposes, for example as a fuel[15]. Emissions from such production shall be covered using the SBTi's cross-sectoral criteria in the SBTi Corporate Net-Zero Standard and Corporate Near-Term Criteria.<br><br>Companies shall not include upstream emissions associated with feedstocks or fuels (e.g. $CH_4$ emissions from natural gas production and transport) within the SDA target boundary. | Companies that:<br>1. Have methanol production activities within their value chain which represent at least 5% of the sum of their total scope 1, 2 and 3 GHG emissions; and<br>2. Choose to use the methanol production SDA method per criterion CHEM-C2. |

**Interpretation guidance:**

- For more information on why the SBTi has excluded the production of methanol for use as an energy carrier from the SDA target boundary, please see Annex A.
- Companies producing methanol for both non-energy and energy applications shall exclude the emissions and volume of production activity from ammonia that is bound for energy carrier applications from the SDA target boundary. If there are emissions associated with this production, they shall be included within a company's GHG inventory and considered as part targets set on emissions outside of the SDA target boundary.
    - Companies should use primary data when estimating the amount of methanol sold for non-energy and energy purposes. In the absence of primary data, companies may make estimates for the amount of methanol sold for non-energy and energy purposes based on best available data.

| CHEM-C2.3 BASELINE AND TARGET YEAR DATA | **Application:** |
|---|---|
| Companies shall determine the following for the purposes of setting a target using the methanol production SDA:<br>• Emissions in their chosen baseline year from all processes that fall within the minimum target boundary as described in this criterion, regardless of whether these processes fall within the company's scope 1, 2 or 3 GHG inventory.<br>• Activity output (t methanol produced) in the chosen baseline year.<br>• The target year.<br>• Projected activity output in the chosen target year. | Companies that:<br>1. Have methanol production activities within their value chain which represent at least 5% of the sum of their total scope 1, 2 and 3 GHG emissions; and<br>2. Choose to use the methanol production SDA method per criterion CHEM-C2. |

[15] Methanol converted to fuel additives, such as MTBE, does fall within the scope of this criterion, in line with the SBTi's understanding of IEA's modeling boundaries.

**Interpretation guidance:**

Companies shall use the SBTi's Chemicals Sector Target-Setting Tool to calculate targets using the methanol production SDA method. Detailed instructions are provided within the tool. Companies shall calculate the required inputs to the tool using the following steps:

1. **Calculate base year emissions within the SDA target boundary:** Companies shall calculate the GHG emissions from each of the processes within the SDA boundary that fall within their value chain in their chosen base year and include these emissions within their methanol production SDA target boundary, regardless of where they occur within the value chain. For example, a company operating only the hydrogen production process that chooses to set a target using the methanol production SDA must include the emissions from the production of the methanol produced from the hydrogen they sell. This measure is necessary to ensure alignment of targets with the underlying emissions scenario and to provide a level playing field between companies with operations covering the entire SDA boundary with companies that operate in only part of the process. An example is outlined in Table 2 below.

   The Chemicals Sector Target-Setting Tool requires heat and process related and electricity-related emissions within the SDA target boundary in the base year to be reported separately. Companies shall follow the following guidelines when calculating and reporting heat and process related and electricity-related emissions:

   - Emissions from purchased and self-generated electricity shall be reported as electricity-related emissions in the SDA Chemicals Sector Target-Setting Tool, regardless of whether these emissions occur in scopes 1, 2, or 3.
   - Emissions from self-generated heat and process emissions shall be reported as heat and process-related emissions in the SDA Chemicals Sector Target-Setting Tool, regardless of whether these emissions occur in scopes 1, 2, or 3.
2. **Calculate base year production:** Companies shall calculate the total production of methanol in their value chain in their chosen base year.

3. **Calculate target year production:** Companies shall project production of methanol in their chosen target year. This projection shall be based on the company's best estimates of future production. If a company concludes after its target has been set, but before the mandatory 5-year review that the projection is inaccurate, it shall revise its target using the updated projection estimate.

*Table 2. Emissions scope summary for company operating the hydrogen production process only*

| PROCESS | SCOPE AND CATEGORY | NOTES |
|---|---|---|
| Hydrogen production | Scope 1 and 2 | Within methanol production SDA boundary |
| Methanol synthesis | Scope 3 category 10 | Within methanol production SDA boundary |

## SDA target setting for high value chemicals (HVC) production

**Intent:** This section intends to define the requirements for setting a target using the optional SDA method for HVC production, and how companies may use this method to set targets on the relevant emissions.

| CHEM-C3 HVC PRODUCTION SDA METHOD | **Application:** |
|---|---|
| Companies may set a near-term target only, or a near-term and long-term target (as part of a net-zero target) on GHG emissions from HVC production on the basis of tonnes (t) of GHG per t of HVC produced using the SDA method pathway for HVC production. | Companies that:<br>1. Have HVC production activities within their value chain which represent at least 5% of the sum of their total scope 1, 2 and 3 GHG emissions; and<br>2. Choose to use the HVC production SDA method. |

**Interpretation guidance:**

- Companies may choose to use other applicable target-setting methods from the SBTi Corporate Net-Zero Standard and Corporate Near-Term Criteria to set targets on emissions from HVC production instead of the HVC production SDA method.
- Companies shall use the Chemicals Sector Target-Setting Tool to establish the minimum level of ambition for their target(s).
- Companies that choose to utilize the HVC production SDA method shall follow the requirements of CHEM-C3.1, CHEM-C3.2 and CHEM-C3.3.
- Sample language for a target set using this criterion is as follows:

  *Company A commits to reduce scope 1, 2 and 3 GHG emissions from the production of high value chemicals (HVC) 22.6% per tonne of HVC produced by 2030 from a 2020 base year.*

| CHEM-C3.1 TARGET BOUNDARY | **Application:** |
|---|---|
| Companies shall include in their target boundary for both near-term and long-term targets, at a minimum, emissions from the direct production of HVC. Companies shall include emissions from all sources within this boundary of the HVC SDA pathway and include them within the SDA target, regardless of whether these emissions occur within scope 1, 2 or 3. | Companies that:<br>1. Have HVC production activities within their value chain which represent at least 5% of the sum of their total scope 1, 2 and 3 GHG emissions; and<br>2. Choose to use the HVC production SDA method. |

**Interpretation guidance:**

The minimum target boundary has been set to ensure consistency with the underlying emissions scenario upon which the HVC production SDA pathway has been based and to ensure comparability of targets between companies. In the case of HVC produced via the methanol-to-olefins or methanol-to-aromatics production routes, only the final HVC production step is within the HVC production SDA boundary.

Companies should use primary data when calculating emissions within the HVC SDA boundary; however, secondary sources or average data may be used in the absence of primary data for calculating scope 3 emissions within the boundary.

The following processes are examples of sources within the boundary of the HVC production SDA:

- Steam cracking of naphtha (traditional and electric cracking).

- Steam cracking of ethane (traditional and electric cracking).
- Pyrolysis oil steam cracking (traditional and electric cracking).
- LPG steam cracking.
- Catalytic cracking of naphtha.
- Ethanol dehydration.
- Bioethanol dehydration.
- Propane dehydrogenation.
- Methanol-to-Olefins (MTO).
- Methanol-to-Aromatics (MTA).

The following emissions sources related to HVC production processes are within the boundary of the HVC production SDA:

- $CO_2$ process emissions.
- GHG emissions from combustion to supply heat to the process, regardless of whether this heat is produced by the company itself or is imported. This shall include all emissions that in all reason are associated with the heat consumption of the HVC production process.
- GHG emissions from the production of electricity used in the process, regardless of whether this electricity is produced by the company itself or is imported.

Companies may include emissions within the SDA target boundary from additional related sources, such as emissions from fuel pre-heaters, supplemental heaters, etc., but these are not mandatory.

Companies that choose to use the HVC production SDA method shall include total production of all HVCs within their target boundary. This shall be done regardless of whether the individual chemicals are co-produced within the same processes or produced separately.

Some processes for producing HVC, such as steam crackers, also produce co-products such as butadiene that are not considered HVC for the purpose of this guidance. The boundary of the HVC production SDA includes all emissions from the HVC production process, even if that process produces non-HVC co-products. All emissions from the process shall be allocated to HVC products when calculating a target. When calculating the production of HVC, only the volume of HVC should be included.

| CHEM-C3.2 TARGET BOUNDARY EXCLUSIONS | **Application:** |
|---|---|
| Companies shall not include:<br>• Upstream emissions associated with feedstocks or fuels (e.g. emissions from refining of crude oil into naphtha) within the SDA target boundary.<br>• Emissions from production of HVC that occur within refineries. Emissions from such production shall be covered using other available target-setting methods. | Companies that:<br>1. Have HVC production activities within their value chain which represent at least 5% of the sum of their total scope 1, 2 and 3 GHG emissions; and<br>2. Choose to use the HVC production SDA method. |

| CHEM-C3.3 BASELINE AND TARGET YEAR DATA | **Application:** |
|---|---|
| Companies shall determine the following for the purposes of setting a target using the HVC production SDA:<br>● Emissions in their chosen baseline year from all processes that fall within the minimum target boundary as described in this criterion, regardless of whether these processes fall within the company's scope 1, 2 or 3 GHG inventory.<br>● Activity output (HVC produced) in the chosen baseline year.<br>● The target year.<br>● Projected activity output in the chosen target year. | Companies that:<br>1. Have HVC production activities within their value chain which represent at least 5% of the sum of their total scope 1, 2 and 3 GHG emissions; and<br>2. Choose to use the HVC production SDA method. |

**Interpretation guidance:**

Companies shall use the SBTi's Chemicals Sector Target-Setting Tool to calculate targets using the HVC production SDA method. Detailed instructions are provided within the tool. Companies shall calculate the required inputs to the tool using the following steps:

1. **Calculate base year emissions within the SDA target boundary:** Companies shall calculate the GHG emissions from each of the processes used to produce any HVC within the SDA boundary that fall within their value chain in their chosen base year and include these emissions within their HVC production SDA target boundary, regardless of where they occur within the value chain. This measure is necessary to ensure alignment of targets with the underlying emissions scenario and to provide a level playing field between companies with operations covering the entire SDA boundary with companies that operate in only part of the process.

   The Chemicals Sector Target-Setting Tool requires heat and process related and electricity-related emissions within the SDA target boundary in the base year to be reported separately. Companies shall follow the following guidelines when calculating and reporting heat and process related and electricity-related emissions:

   - Emissions from purchased and self-generated electricity shall be reported as electricity-related emissions in the SDA Chemicals Sector Target-Setting Tool, regardless of whether these emissions occur in scopes 1, 2, or 3.
   - Emissions from self-generated heat and process emissions shall be reported as heat and process-related emissions in the SDA Chemicals Sector Target-Setting Tool, regardless of whether these emissions occur in scopes 1, 2, or 3.

2. **Calculate base year production:** Companies shall calculate the total production of any HVC in their value chain in their chosen base year. The production of individual HVC shall be combined to determine a single value for total HVC production.

3. **Calculate target year production:** Companies shall calculate the projected production of any HVC in their chosen target year. The production of individual HVC shall be combined to determine a single value for total HVC production. This projection shall be based on the company's best estimates of future production. If a company concludes after its target has been set, but before the mandatory 5-year review that the projection is inaccurate, it shall revise its target using the updated projection estimate.

## Scope 1 $N_2O$ emissions target setting for nitric acid production

**Intent:** This section intends to define mandatory target-setting criteria on $N_2O$ emissions from nitric acid production, in order to directly address this source of emissions within the chemicals sector.

| CHEM-C4 SCOPE 1 $N_2O$ EMISSIONS TARGET SETTING FOR NITRIC ACID PRODUCTION | **Application:** |
|---|---|
| Chemical companies that have $N_2O$ emissions from nitric acid production within their base year scope 1 emissions inventory which represent at least 5% of the sum of their total scope 1, 2 and 3 GHG emissions shall set targets on these scope 1 $N_2O$ emissions using the method described in this criterion. | Companies that have nitric acid production activities within their value chain which represent at least 5% of the sum of their total scope 1, 2 and 3 GHG emissions. |

**Interpretation guidance:**

- Companies shall use the Chemicals Sector Target-Setting Tool to establish the target on $N_2O$ emissions from nitric acid production.
- Companies that have $N_2O$ emissions from nitric acid production within their base year scope 1 emissions inventory shall follow the requirements of CHEM-C4.1, CHEM-C4.2 and CHEM-C4.3.
- Once a company's average emissions intensity for $N_2O$ emissions from nitric acid production has reached the target emissions intensity, a separate emissions intensity target on these emissions is no longer required. This may occur before or at the target year. Once the target emissions intensity has been reached, companies shall revise their corporate targets to remove this specific $N_2O$ emissions intensity target and shall ensure their remaining corporate target(s) are aligned with all other applicable criteria.

| CHEM-C4.1 BASELINE AND TARGET YEAR DATA | **Application:** |
|---|---|
| Companies may choose a different base year from their other targets for the purpose of setting a target based on criterion CHEM-C4.<br><br>Companies shall determine the following for the purpose of setting a target as described in this criterion:<br>• The total $N_2O$ emissions and average $N_2O$ emissions intensity in units of kg $N_2O$ / t nitric acid across all their operations from the production of nitric acid in the base year.<br>• Estimated nitric acid production in the year 5 years from the chosen base year, if their base year emissions intensity is greater than 0.5 kg $N_2O$ / t nitric acid. | Companies that have nitric acid production activities within their value chain which represent at least 5% of the sum of their total scope 1, 2 and 3 GHG emissions. |

**Interpretation guidance:**

- See Annex B for step-by-step guidance on setting targets using this criterion.

| CHEM-C4.2 TARGET BOUNDARY | **Application:** |
|---|---|
| Companies shall include all scope 1 emissions of $N_2O$ from the production of nitric acid within the boundary of the target calculated based on criterion CHEM-C4. | Companies that have nitric acid production activities within their value chain which represent at least 5% of the sum of their total scope 1, 2 and 3 GHG emissions |

| CHEM-C4.3 TARGET BOUNDARY EXCLUSIONS | **Application:** |
|---|---|
| Companies shall not include scope 2, scope 3 emissions, nor scope 1 emissions of $CO_2$ associated with the production of nitric acid within the boundary of the target calculated based on criterion CHEM-C4. | Companies that have nitric acid production activities within their value chain which represent at least 5% of the sum of their total scope 1, 2 and 3 GHG emissions. |

# 3. SCOPE 1 AND 2 TARGET SETTING FOR NON-PRIMARY CHEMICALS AND OTHER EMISSION SOURCES

**Outcome**: Companies are provided clarity on the options to set targets on emissions related to production of chemicals not covered by other criteria in this document.

**Background**: Please see Annex A for more background on target-setting for emissions from the production of chemicals not covered by other criteria in this document.

**Intent**: This section intends to clarify target-setting options when companies use different methods to set targets on different sources of emissions.

| CHEM-C5 COMBINED TARGETS: SDA TARGETS AND OTHER SCOPE 1 AND 2 TARGETS | **Application:** All companies. |
|---|---|
| Companies may combine near-term and/or long-term targets set using the primary chemical SDA target-setting methods outlined in criteria CHEM-C1 through CHEM-C3 with targets set on other scope 1 and 2 emissions using the absolute reduction approach if the following conditions are met:<br>• Both targets are set using a 1.5°C-aligned level of ambition;<br>• The same base year and target year are used for both targets;<br>• Sufficient data is included with the target submission so that the SBTi can determine that each target was determined separately using an adequate minimum level of ambition for the relevant target-setting method;<br>• The methods used to set each target are disclosed as part of the target language; | |

| | |
|---|---|
| • The target(s) set using the SDA method are converted to an absolute emissions reduction basis so they may be combined with the absolute reduction target; and<br>• The SDA method target(s) remain as sub-target(s), on an emissions intensity basis, that must be achieved separately. | |
| **Interpretation guidance:**<br>• Please see Annex B for example calculations on combining targets set using an SDA pathway and absolute reduction pathway.<br>• Companies shall first develop each target separately, following all applicable criteria, before combining the targets. The SBTi will validate that each target was separately set in adherence to the relevant criteria. | |

# 4. TARGET SETTING FOR SCOPE 3 EMISSIONS

**Outcome**: Companies are provided clarity on the options and requirements to set targets on sources of scope 3 emissions that are of particular importance to the chemicals sector value chain.

**Background**: Scope 3 emissions often represent the majority of emissions in chemical companies' GHG emissions inventories. This is due to several factors. On the upstream side, the sector has traditionally relied on fossil-based feedstocks and fuels, which contribute significant GHG emissions during extraction, processing, and transport. Downstream, numerous chemical products contribute to GHG emissions during further processing steps or in the use phase, such as $N_2O$ emissions from the use of nitrogen fertilizers in agriculture. Further, emissions are often generated at the end-of-life of carbon-based chemical products when they are incinerated or left to decompose as waste. Thus, chemicals sector-specific requirements and tailored target-setting methods around scope 3 target-setting are defined here.

### Minimum target boundary requirements for scope 3 emissions in the chemicals sector

**Intent**: This section intends to define mandatory target coverage for certain sources of significant scope 3 emissions within the chemicals sector.

| | |
|---|---|
| CHEM-C6 SCOPE 3 CATEGORY 1 EMISSIONS FROM PURCHASED PRIMARY CHEMICALS | **Application:**<br><br>Companies that directly purchase primary chemicals, if scope 3 category 1 emissions from purchased primary chemicals represent more than 5% of their total scope 3 GHG inventory[16]. |

[16] Directly purchasing primary chemicals means either purchasing a primary chemical directly from the producer, or purchasing primary chemicals from a third-party supplier.

| | |
|---|---|
| Chemical companies that directly purchase primary chemicals shall set a target on all scope 3 category 1 emissions from purchased primary chemicals using any applicable method in the SBTi's Corporate Net-Zero Standard, if scope 3 category 1 emissions from purchased primary chemicals represent more than 5% of their total scope 3 GHG inventory. This criterion shall apply regardless of whether a company's scope 3 emissions contribute 40% or more towards their total scope 1, 2 and 3 inventory[17].<br><br>Targets set on these emissions shall count towards the minimum scope 3 inventory coverage required by the SBTi Corporate Net-Zero Standard. | |

**Interpretation guidance:**

- This criterion only requires coverage of the relevant emissions sources within a company's target boundary. It does not prescribe any particular target-setting method. Companies may use any applicable method to set a target on these emissions including, but not limited to, the SDA target-setting method for primary chemicals, an absolute reduction target, or supplier engagement targets.
- Targets set on scope 3 category 1 emissions from purchased primary chemicals may be aggregated as part of the company's broader scope 3 target. Achievement of the target on scope 3 category 1 emissions from purchased primary chemicals does not need to be achieved separately from the broader scope 3 target.
- This criterion applies only to chemical companies that directly purchase primary chemicals. This does not apply to companies that purchase intermediate or other products that are manufactured from primary chemicals.
- This criterion is intended to discourage the possibility of "scope leakage", in which the production of primary chemicals may be outsourced from scope 1 into scope 3 category 1 emissions from purchased goods and services.
- Companies shall report, separately, the emissions in scope 3 category 1 from purchased primary chemicals in their base year GHG inventory.
- Companies should use primary supplier data when calculating emissions in scope 3 category 1 from purchased primary chemicals. Companies may use secondary data sources when primary data is not available.

[17] The SBTi requires companies to set scope 3 targets only if scope 3 emissions are 40% or more of total scope 1, 2 and 3 emissions. Setting a target on the emissions noted in this criterion is required regardless of whether this 40% threshold is met by a company.

| CHEM-C7 SCOPE 3 CATEGORY 11 EMISSIONS FROM UREA-BASED FERTILIZERS | **Application:**<br><br>Companies that produce and sell urea that is used in N-fertilizers or produce and sell urea-based fertilizers, if scope 3 category 11 emissions from sold urea represent more than 5% of their total scope 3 GHG inventory. |
|---|---|
| Chemical companies that produce and sell urea that is used in N-fertilizers or companies that produce and sell urea-based fertilizers shall set a target on all scope 3 category 11 $CO_2$ emissions from sold urea using any applicable method in the SBTi's Corporate Net-Zero Standard, if scope 3 category 11 emissions from sold urea represent more than 5% of their total scope 3 GHG inventory. This criterion shall apply regardless of whether a company's scope 3 emissions contribute 40% or more towards their total scope 1, 2 and 3 inventory[18].<br><br>Targets set on these emissions shall count towards the minimum scope 3 inventory coverage required by the SBTi Corporate Net-Zero Standard. | |

**Interpretation guidance:**

- This criterion only requires coverage of the relevant emissions sources within a company's target boundary. It does not prescribe any particular target-setting method. Companies may use any applicable method to set a target on these emissions including, but not limited to, an absolute reduction target or customer engagement targets.
- Targets set on scope 3 category 11 emissions from sold urea-based fertilizers may be aggregated as part of the company's broader scope 3 target. Achievement of the target on scope 3 category 11 emissions from sold urea-based fertilizers does not need to be achieved separately from the broader scope 3 target.
- Companies shall include in their GHG inventory and report the $CO_2$ emissions in scope 3 category 11 from the use of sold urea or urea-based fertilizers in their base year.

## Nitrogen fertilizer use-phase $N_2O$ emissions

**Intent**: This section intends to define a sector-specific target-setting method for emissions of $N_2O$ that occur in the use-phase of nitrogen fertilizers, which are a major product of the chemicals sector. These emissions pose unique mitigation challenges due to limited mechanisms for reducing emissions once the products are applied in the field and the continued demand for nitrogen as a critical nutrient for crops to meet food demand.

| CHEM-C8 SCOPE 3 CATEGORY 11 NEAR-TERM TARGET SETTING FOR FERTILIZER USE PHASE $N_2O$ EMISSIONS | **Application:**<br><br>Companies that have $N_2O$ emissions from the use-phase of sold nitrogen fertilizers in their scope 3 category 11 inventory which represent at least 5% of the sum of their total scope 1, 2 and 3 GHG emissions. |
|---|---|

[18] The SBTi requires companies to set scope 3 targets only if scope 3 emissions are 40% or more of total scope 1, 2 and 3 emissions. Setting a target on the emissions noted in this criterion is required regardless of whether this 40% threshold is met by a company.

| | |
|---|---|
| Companies may set near-term targets on $N_2O$ emissions from the use of sold nitrogen fertilizers in scope 3 category 11 using the following level of ambition:<br>● For base years ≥ 2020, the minimum value for absolute reduction target = 1.3% x (Target year - 2020).<br>● For base years ＜2020, the minimum value for absolute reduction target = 1.3% x (Target year - Base year).<br><br>Targets set using this criterion are considered to align with a 1.5°C level of ambition; however, the SBTi does not currently classify scope 3 targets based on temperature alignment. | |

**Interpretation guidance:**

- Companies that choose to utilize this criterion shall follow the requirements of CHEM-C8.1.
- This criterion presents a sector-specific absolute reduction scope 3 target-setting method that is available for companies to use in setting near-term targets on scope 3 category 11 emissions of $N_2O$ from the use of sold synthetic nitrogen fertilizers that is consistent with the level of decarbonization required to keep global temperature increase to 1.5°C compared to pre-industrial temperatures.
- This criterion only applies to the $N_2O$ emissions resulting from the use phase of synthetic fertilizers on land. These emissions fall under the GHG Protocol's scope 3 category 11: use of sold products (GHG Protocol, 2011). Targets set using this criterion would count towards the 67% minimum near-term target coverage of scope 3 emissions required by the SBTi Corporate Net-Zero Standard.
- Companies may instead choose to set near-term targets on scope 3 category 11 emissions of $N_2O$ from the use of sold synthetic nitrogen fertilizers using other methods. These emissions need only be covered by a single target. Alternative methods are as follows:
    - Companies may choose to set targets on these emissions using other available scope 3 target-setting methods, such as customer engagement targets or emissions intensity-based targets, in line with the SBTi Corporate Net-Zero Standard and SBTi Corporate Near-Term Criteria.
    - As described in Annex A, companies may choose to set targets on these emissions as FLAG related emissions using the Forest, Land and Agriculture (FLAG) Science-Based Target-Setting Guidance, if the company meets the applicability criteria for the FLAG Guidance. In this case, companies must follow the FLAG Guidance in full to set targets on their FLAG related emissions.
- If companies choose to utilize this criterion instead of the SBTi FLAG Guidance, then emissions of $N_2O$ in scope 3 category 11 from the use of sold nitrogen fertilizers shall not count towards the calculation of the 20% applicability threshold for the SBTi FLAG Guidance. If companies have other FLAG related emissions, these shall be considered towards the 20% applicability threshold. Also, companies shall follow the FLAG Guidance if they trigger any other direct applicability criteria in the FLAG Guidance.
- Applicable products: This criterion applies to companies that produce any synthetic fertilizer that supplies nitrogen, and thus contributes to $N_2O$ emissions upon application in the use phase. Examples of these products include, but are not limited to:
    - Ammonia (sold for use as a fertilizer).
    - Ammonium nitrate.
    - Ammonium phosphate.
    - Ammonium sulfate.
    - Calcium ammonium nitrate.
    - Nitrogen potassium.
    - Nitrogen phosphorus potassium.
    - Nitrogen phosphorus.
    - Urea.

- See Annex B for step-by-step guidance on setting targets using this criterion.
- Companies shall not set a target that has already been achieved as of the company's most recent annual GHG inventory.

| CHEM-C8.1 BASELINE YEAR DATA | **Application:** |
|---|---|
| Companies shall calculate and report emissions of $N_2O$ in scope 3 category 11 associated with the use of sold synthetic nitrogen fertilizers in their base year. | Companies that have $N_2O$ emissions from the use-phase of nitrogen fertilizers in their scope 3 category 11 inventory which represent at least 5% of the sum of their total scope 1, 2 and 3 GHG emissions. |

**Interpretation guidance:**

- The metric for this criterion is absolute $N_2O$ emissions from fertilizer use. In order to accurately estimate base year emissions and emissions reductions, the use-phase $N_2O$ emissions should be calculated using a methodology based on the IPCC Tier system to calculate $N_2O$ emissions from managed soils (IPCC, 2006):
  - A Tier 1 approach provides a generic methodology that is solely based on the volume of fertilizers sold regardless of location. It therefore is widely applicable but low in level of detail.
  - A Tier 2 approach is location-specific and allows for a disaggregation of the emission factor used, based on factors such as climate type, crop type, soil type and fertilizer type, in combination with the amount of synthetic fertilizer sold.
- A methodology based on the IPCC's Tier 3 approach may also be used. Such a method provides the most detail as it involves the integration of dynamic models and/or on-site experimental measurements.

**Recommendation:**

- Companies should use a quantification methodology based on the Intergovernmental Panel on Climate Change (IPCC) tier 2 or tier 3 approach to calculate base year and annual emissions. A tier 1 approach may also be used in the absence of more detailed data (IPCC, 2006). If a tier 1 approach is used, companies should seek improvements in data availability over time.

| CHEM-C9 SCOPE 3 CATEGORY 11 LONG-TERM TARGET SETTING FOR FERTILIZER USE PHASE $N_2O$ EMISSIONS | **Application:** |
|---|---|
| Companies may set long-term targets on $N_2O$ emissions, as part of a net-zero target, from the use of sold nitrogen fertilizers in scope 3 category 11 using the following level of ambition:<br>• For base years ≥ 2020, the minimum value for absolute reduction target = 17%<br>• For base years <2020, the minimum value for absolute reduction target = 17% + 0.57%[19] x (2020 - Base year). | Companies that have $N_2O$ emissions from the use-phase of sold nitrogen fertilizers in their scope 3 category 11 inventory which represent at least 5% of the sum of their total scope 1, 2 and 3 GHG emissions. |

[19] Formula adjusts overall ambition for base years prior to 2020 by applying additional reduction requirements at the same rate of total annual linear reduction for each year before 2020.

**Interpretation guidance:**

- Companies that choose to utilize this criterion shall follow the requirements of CHEM-C9.1.
- This criterion presents a sector-specific absolute reduction scope 3 target-setting method that is available for companies to use in setting long-term targets, as part of a net-zero target, on scope 3 category 11 emissions of $N_2O$ from the use of sold synthetic nitrogen fertilizers.
- This criterion only applies to the $N_2O$ emissions resulting from the use phase of synthetic fertilizers on land. These emissions fall under the GHG Protocol's scope 3 category 11: use of sold products (GHG Protocol, 2011). Targets set using this criterion would count towards the 90% minimum long-term target coverage of scope 3 emissions required by the SBTi Corporate Net-Zero Standard.
- Companies shall follow all other applicable requirements related to setting net-zero targets from the SBTi Corporate Net-Zero Standard.
- Companies may instead choose to set long-term targets on scope 3 category 11 emissions of $N_2O$ from the use of sold synthetic nitrogen fertilizers using other methods. These emissions need only be covered by a single target. Alternative methods are as follows:
    - Companies may choose to set targets on these emissions using other available scope 3 target-setting methods, in line with the SBTi Corporate Net-Zero Standard and SBTi Corporate Near-Term Criteria.
    - As described in Annex A, companies may choose to set targets on these emissions as FLAG related emissions using the SBTi's FLAG Guidance, if the company meets the applicability criteria for the FLAG Guidance. In this case, companies must follow the FLAG Guidance in full to set targets on their FLAG related emissions.
- If companies choose to utilize this criterion instead of the SBTi FLAG Guidance, then emissions of $N_2O$ in scope 3 category 11 from the use of sold nitrogen fertilizers shall not count towards the calculation of the 20% applicability threshold for the SBTi FLAG Guidance. If companies have other FLAG related emissions, these shall be considered towards the 20% applicability threshold. Also, companies shall follow the FLAG Guidance if they trigger any other direct applicability criteria in the FLAG Guidance.
- Applicable products: This criterion applies to companies that produce any synthetic fertilizer that supplies nitrogen, and thus contributes to $N_2O$ emissions upon application in the use phase. Examples of these products include, but are not limited to:
    - Ammonia (sold for use as a fertilizer).
    - Ammonium nitrate.
    - Ammonium phosphate.
    - Ammonium sulfate.
    - Calcium ammonium nitrate.
    - Nitrogen potassium.
    - Nitrogen phosphorus potassium.
    - Nitrogen phosphorus.
    - Urea.
- See Annex B for step-by-step guidance on setting targets using this criterion.
- Companies shall not set a target that has already been achieved as of the company's most recent annual GHG inventory.

| CHEM-C9.1 BASELINE YEAR DATA | **Application:** |
|---|---|
| Companies shall calculate and report emissions of $N_2O$ in scope 3 category 11 associated with the use of sold synthetic nitrogen fertilizers in their base year. | Companies that have $N_2O$ emissions from the use-phase of nitrogen fertilizers in their scope 3 category 11 inventory which represent at least 5% of the sum of their total scope 1, 2 and 3 GHG emissions. |

**Interpretation guidance:**

- The metric for this criterion is absolute $N_2O$ emissions from fertilizer use. In order to accurately estimate base year emissions and emissions reductions, the use-phase $N_2O$ emissions should be calculated using a methodology based on the IPCC Tier system to calculate $N_2O$ emissions from managed soils (IPCC, 2006):
    - A Tier 1 approach provides a generic methodology that is solely based on the volume of fertilizers sold regardless of location. It therefore is widely applicable but low in level of detail.
    - A Tier 2 approach is location-specific and allows for a disaggregation of the emission factor used, based on factors such as climate type, crop type, soil type and fertilizer type, in combination with the amount of synthetic fertilizer sold.

- A methodology based on the IPCC's Tier 3 approach may also be used. Such a method provides the most detail as it involves the integration of dynamic models and/or on-site experimental measurements.

**Recommendation:**

- Companies should use a quantification methodology based on the Intergovernmental Panel on Climate Change (IPCC) Tier 2 or Tier 3 approach to calculate base year and annual emissions. A Tier 1 approach may also be used in the absence of more detailed data (IPCC, 2006).

## Other scope 3 emissions sources

**Intent:** This section intends to define how chemical companies will develop targets on any sources of scope 3 emissions that are not otherwise addressed in criteria in this document.

| CHEM-C10 COMBINED TARGETS: SDA TARGETS AND OTHER SCOPE 3 TARGETS | **Application:** All companies. |
|---|---|
| Companies that directly purchase primary chemicals may combine targets set on scope 3 category 1 using the primary chemical SDA target-setting methods outlined in criteria CHEM-C1 through CHEM-C3 with other scope 3 targets set using the absolute reduction approach if the following conditions are met:<br>• The SDA target is set on emissions that are solely within the company's scope 3 inventory;<br>• The same base year and target year are used for both targets;<br>• Sufficient data is included with the target submission so that the SBTi can determine that each target was separately set using an adequate minimum level of ambition for the relevant target-setting method;<br>• The methods used to set each target are disclosed as part of the target language;<br>• The target(s) set using the SDA method are converted to an absolute emissions reduction basis so they may be aggregated with the scope 3 absolute reduction target; and<br>• The SDA method target(s) remain as sub-target(s), on an emissions intensity basis and using the target boundary described in criteria CHEM-C1 through CHEM-C3, that must be achieved separately. | |

**Interpretation guidance:**

- This criterion applies to scope 3 category 1 emissions associated with purchased primary chemicals, for which companies have chosen to set targets using the SDA method.
- Please see Annex B for example calculations on combining scope 3 targets set using an SDA pathway and absolute reduction pathway.
- Companies shall first develop each target separately, following all applicable criteria, before combining the targets. The SBTi will validate that each target was separately set in adherence to the relevant criteria.
- Target language for the combined target shall indicate the level of ambition that was used to set each individual target prior to combination.

# 5. TARGET SETTING FOR ALTERNATIVE SOURCES OF FEEDSTOCK

**Outcome**: Companies are provided clarity on the requirements to set targets on increasing shares of purchased feedstocks that are produced from carbon sources alternative to virgin fossil carbon.

**Background**: Please see the Chemicals Sector Target-Setting Criteria Supplemental Data Memorandum for more information on the background on target setting for increasing shares of purchased feedstocks that are produced from alternative sources of carbon.

**Intent**: This section intends to define how companies that purchase carbon-containing materials to manufacture chemical products will set targets to increase the share of purchased feedstocks produced from sources of alternative carbon.

| CHEM-C11 NEAR-TERM ALTERNATIVE FEEDSTOCK TARGETS | **Application:** |
|---|---|
| Companies shall set a near-term alternative feedstock target based on feedstock purchased for use within their operational boundary, expressed in percentage by weight (wt. %) carbon content. Companies shall set the target on the total company-wide share of alternative carbon-based feedstocks they utilize to make products.<br><br>The near-term target shall be calculated using the Chemicals Sector Target-Setting Tool. | Companies that purchase and use carbon-containing materials as feedstocks for the manufacture of products to which these target-setting criteria are applicable, if combined scope 1, 2, and 3 emissions from production of such products represent at least 5% of the sum of their total scope 1, 2 and 3 GHG emissions. |

**Interpretation guidance:**

- Companies shall follow the requirements of CHEM-C11.1 and CHEM-C11.2.
- The alternative feedstock targets shall accompany, not replace, emissions reductions targets. This target is not intended to be specifically aligned with emission reduction goals, because companies are provided flexibility in determining what sources of alternative feedstock to purchase, and therefore each company's application of this target may be unique. This target lays a foundation for a feedstock transition through a minimum requirement (by setting a floor). Alternative feedstock targets shall be set on a company-wide basis and do not count towards the minimum target coverage for scopes 1, 2 or 3.
- Chemical companies shall set an alternative feedstock target through the steps described in Annex D.

- This criterion applies only to feedstocks that are purchased and used to manufacture additional products. Feedstocks that are purchased and sold as-is, without further processing, shall not be included in either the alternative feedstock nor virgin fossil-based feedstock portion when calculating the company's share of alternative feedstock.
- This criterion applies only to feedstocks that are purchased and used to manufacture additional products in the reporting year. Feedstocks that are purchased and stockpiled for use in future years shall not be included in either the alternative feedstock nor virgin fossil-based feedstock portion when calculating the company's share of alternative feedstock.
- Companies shall adhere to the GHG accounting requirements in the GHG Protocol when calculating scope 3 emissions associated with purchased alternative feedstocks and products containing alternative sources of carbon. Some processes to produce alternative feedstocks, such as chemical recycling, may produce significant GHG emissions. Companies should ensure that the scope 3 impacts of these materials are properly accounted for.
- This criterion applies to the production of chemicals that originate from feedstocks containing carbon molecules. Examples of these include, but are not limited to:
    - Methanol.
    - HVC.
    - Intermediate chemicals (e.g. polyethylene, styrene, propylene oxide).
    - Specialty chemicals and pharmaceuticals.
    - Ammonia (when based on SMR).
    - Urea.
- The types of alternative feedstocks that apply towards the target are the following:
    - Bio-based (e.g. bio-oils, bioethanol, lignin, dry biomass, wet biomass).
    - Feedstocks from chemical recycling (e.g. pyrolysis oil).
    - $CO_2$ from Carbon Capture and Utilization (CCU) sources (point-source captured $CO_2$), regardless of whether the $CO_2$ has a fossil or a bio-origin, provided the $CO_2$ originates from a process that is itself producing a separate product or supplying energy (e.g. captured $CO_2$ from a boiler or electricity production plant, or $CO_2$ from a cement plant)[20].
    - Direct air capture (DAC) $CO_2$.
- Companies may also include mechanically recycled feedstocks as alternative feedstocks; however, in order to do so they shall set a target using the higher target threshold values determined for “alternative feedstock percentages including mechanical recycling” in the Chemicals Target-Setting Tool. Companies shall disclose whether the target includes or excludes mechanically recycled feedstocks in their target language.[21]
- Companies sourcing bio-based feedstocks should ensure that production of the feedstock is not linked to deforestation practices.
- This criterion does not apply to feedstocks that do not contain carbon, such as hydrogen, nitrogen, and others.
- Re-use or recovery (for example solvent recovery[22]) does not qualify as alternative feedstock because this does not lead to the production of new chemical products – existing products are just used longer.

**Recommendation:**

- Companies should use primary data when calculating share of feedstocks within the target boundary; however, secondary sources or average data may be used in the absence of primary data.

[20] This implies that cases such as ammonia produced from fossil feedstocks delivering the $CO_2$ and ammonia for conversion to urea within the same plant, do not qualify as “alternative feedstock”. Similarly, $CO_2$ that is produced explicitly for use as a feedstock, and not captured as emissions, is not considered an alternative feedstock source.

[21] Mechanical recycling as an activity is still excluded from the scope of the chemicals sector for the purposes of this document.

[22] For example, purifying solvents by distilling them periodically to remove heavy impurities that would build up over time.

| CHEM-C11.1 BASELINE AND TARGET YEAR DATA | **Application:** |
|---|---|
| Companies shall calculate and report the share, as a wt. %, of alternative feedstocks from all sources within the boundary of this target in their chosen base year relative to the sum of total virgin fossil and alternative feedstocks. This share shall be calculated based on the total carbon utilized as feedstock in the company's operational boundary.<br><br>Companies shall provide in their target submission a description for their strategy to achieve the target percentage of alternative feedstock. | Companies that purchase and use carbon-containing materials as feedstocks for the manufacture of products to which these target-setting criteria are applicable, if combined scope 1, 2, and 3 emissions from production of such products represent at least 5% of the sum of their total scope 1, 2 and 3 GHG emissions. |

| CHEM-C11.2 TARGET BOUNDARY EXCLUSIONS | **Application:** |
|---|---|
| Companies may exclude the feedstocks used for production of ammonia for other purposes than conversion to urea from the scope of this target. | Companies that purchase and use carbon-containing materials as feedstocks for the manufacture of products to which these target-setting criteria are applicable, if combined scope 1, 2, and 3 emissions from production of such products represent at least 5% of the sum of their total scope 1, 2 and 3 GHG emissions. |
| **Interpretation guidance:**<br><br>• Ammonia production may be optionally excluded because there are low-emissions routes for ammonia production that do not involve any carbon feedstock, such as electrolysis using renewable electricity, also known as green ammonia. Companies pursuing green ammonia technologies will not be required, under this criterion, to also set a target on increasing the share of alternative feedstocks used in non-electrolysis based production routes. | |

# 6. GHG ACCOUNTING REQUIREMENTS

**Outcome**: Companies are provided clarity on sector-specific requirements related to GHG accounting practices.

**Background**: Please see Annex B for more information on the background of GHG accounting in the chemicals sector.

**Intent**: This section intends to define how companies shall utilize relevant GHG accounting methods when establishing and/or demonstrating achievement of targets.

| CHEM-C12 MASS BALANCE ACCOUNTING | **Application**: All companies. |
|---|---|
| Companies that utilize the mass balance accounting method to allocate or identify the attributes of purchased or sold products that consist of materials of different origins shall adhere to the following requirements:<br>● Describe in their target submission, in detail, how the attributes of a particular product (sold or purchased) were estimated, including the mechanism used to ensure traceability of the material between process inputs and outputs.<br>○ For example, a company estimating that a sold product contains 40% by weight of biobased carbon should describe how the 40% value was derived based on known inputs to the production process or based on information provided by the supplier of the company's raw materials.<br>● Demonstrate how the attributes of the materials have been utilized in GHG emissions inventory calculations (e.g. using appropriate emission factors for relevant scope 3 categories each material type).<br>● Follow all applicable GHG accounting requirements for scopes 1, 2 and 3 from the SBTi and GHG Protocol as appropriate for the materials (e.g. accounting for full upstream impacts of bio-based materials, including land sector emissions).<br>● Companies shall not use credits or certificates that have been generated using a book and claim approach, traded on a marketplace/exchange, and/or transferred from a different company or transferred from a different site within the same company. | |
| **Interpretation guidance:**<br>● For additional background on the mass balance accounting approach, please see Annex C.<br>● The SBTi recognizes that some available mass balance certification mechanisms allow for the transfer of credits between companies or between sites within companies. Use of attributes that have been traded or transferred in this way cannot currently be used to calculate emissions for the purposes of setting or meeting a target with the SBTi. This is subject to change based on updated guidance from the SBTi or GHG Protocol, at which point this criterion may be amended.<br>● Companies shall adhere to any future guidance or criteria produced by the SBTi or GHG Protocol related to the use of mass balance allocation approaches. | |
| **Recommendation:**<br>● Companies should:<br>○ Utilize a mechanism, such as a third-party certification, to substantiate the environmental attributes (e.g. percent by weight of bio-based carbon) of the purchased or sold material in the company's value chain, if that mechanism adheres to the requirements of this criterion.<br>○ Provide justification of the mechanism used and a description of the chain of custody documentation and the allocation methods used in the mechanism. | |

# STANDARD TRANSLATION AND REVIEW

The working language for SBTi Standards is English. As appropriate, the SBTi shall arrange translations of SBTi Standards into languages other than English. Translated versions of a standard are for information only. In case of doubt the official English language version of the SBTi Standard shall be deemed definitive.

These criteria are subject to a periodic review to ensure its continued relevance and accuracy. The review will occur within a minimum of two years and no more than five years from the date of its initial approval. The exact review date will be determined based on the evolving needs of stakeholders and advancements in the relevant field.

# ANNEXES

## Annex A: Coverage and treatment of activities within the chemicals sector

### Treatment of emissions from the use of nitrogen fertilizers

In the 2020 Chemicals Scoping Paper (SBTi, 2020), and the 2023 Chemicals Sector Status Report (SBTi, 2023), the SBTi identified emissions of $N_2O$ from fertilizers used in the land sector as a significant and impactful portion of the scope 3 inventories for chemical companies that manufacture nitrogen fertilizers. These use-phase emissions have been estimated at 50-80% of the total GHG emissions of the fertilizer value chain (Systemiq, 2022). This source of emissions also presents unique challenges in modeling and realizing emissions reductions. Emissions from fertilizer use are inherently related to food demand, given that synthetic nitrogen fertilizers play a crucial role in achieving high crop yields (IEA, 2021a). Further, while the SBTi has published guidance for the FLAG sector (SBTi, 2022), the FLAG Guidance is intended for companies with value chain activities that encompass broad land-related emissions (e.g. agriculture companies or companies purchasing crops or livestock products). This Chemicals Sector Target-Setting Criteria addresses the emissions of $N_2O$, that occur specifically in the land sector as relevant scope 3 emissions from the perspective of the companies that produce the fertilizers and fertilizer precursors.

This Chemicals Sector Target-Setting Criteria includes criteria for manufacturers of fertilizers on setting targets on scope 3 category 11 emissions of $N_2O$ from the land sector. Companies with emissions of $N_2O$ in scope 3 category 11 from the use of sold nitrogen fertilizers have the following options for setting targets on these emissions:

- They may follow the criteria in this standard rather than the SBTi FLAG Guidance, regardless of whether they would be subject to the SBTi FLAG Guidance based on the materiality of their FLAG related emissions, or
- They may follow the SBTI FLAG Guidance if they trigger the applicability requirements. In this case, companies must follow the FLAG Guidance in full to set targets on their FLAG related emissions.

### Primary chemicals

The SBTi's Sectoral Decarbonization Approach (SDA) method is applicable to sectors that produce a relatively homogenous product, since the method relies on a single physical activity metric to establish a representative emissions intensity pathway for the sector (SBTi, 2015). Additionally, the SBTi relies on published emissions scenarios that include data at the sectoral level consistent with an overall carbon budget that aligns with a 1.5°C trajectory, which can be paired with projections of the relatively homogenous physical activity to establish new intensity-based SDA pathways. The chemicals sector as a whole is not a good candidate for a single SDA pathway, because the large number and variation in the products that are manufactured would make the establishment of a single intensity pathway for the sector impractical.

The SBTi instead has focused on the establishment of SDA pathways for each of the primary chemicals because each of these chemicals represents a homogeneous product for which a

physical intensity metric that is comparable across companies may be developed, and there are published 1.5°C-aligned integrated emission scenarios that include emissions and production levels until 2050 for each primary chemical.

### Chemicals produced in refineries

A significant quantity of chemicals are currently produced within oil refineries as co-products to the primary fuel products from the refinery. Specifically, propylene is co-produced within fluid catalytic cracking (FCC) units, and benzene, toluene, and xylenes are outputs from catalytic reforming processes.

The SBTi has not included chemicals produced from refineries within the sectoral scope of these target-setting criteria. As co-products of refinery processes, allocating emissions from production of these chemicals between the oil and gas sector and the chemicals sector would be very difficult for the purposes of setting targets. Additionally, many emissions scenarios that include sectoral-level modeling, such as the International Energy Agency's (IEA's) NZE scenario do not consider emissions from chemicals produced within refineries as part of the chemicals sector (IEA, 2023d). Emissions associated with chemical production in refineries are important and will likely increase as a share of total refinery emissions as the demand for fossil fuels decreases. Emissions from refineries are considered as part of the scoping for the SBTi Oil and Gas Sector Standard.

### Hydrogen

Hydrogen plays a crucial role in the chemicals sector as a vital feedstock for ammonia and methanol production. However, its production is currently very emissions intensive, resulting in large quantities of $CO_2$ as a by-product from traditional hydrogen production routes. Hydrogen is also promising as a carbon-free energy carrier that could directly replace fossil fuels in many applications, thus mitigating the $CO_2$ emissions at the point of combustion. The condition for achieving this environmental benefit in the energy sector hinges on producing hydrogen through zero or low-carbon methods. Many 1.5°C-aligned emissions scenarios include a rapid and substantial increase in the use of hydrogen in new markets, as a direct energy source or as part of products that bypass the need for fossil-based hydrocarbon feedstocks (e.g. synthetic methane).

It is therefore critical that the SBTi address the production of hydrogen in its methods. Current hydrogen demands are primarily for feedstocks to produce primary chemicals (ammonia and methanol), direct reduced iron (DRI) production, and crude oil refining (IEA, 2022)[23].

While smaller volumes are used in industries like electronics and glassmaking (IEA, 2022), nearly all current hydrogen demand stems from the above applications. Presently, hydrogen production is dominated by fossil fuel-based routes in which $CO_2$ is also generated, or as a by-product from fossil-based processes within refineries (IEA, 2022). However, technologies[24] to produce low-emission hydrogen exist, and transitioning to these

[23] See Figure 2.19 and Table 3.3 in the cited source.
[24] Low carbon emission technologies include hydrogen produced from electrolysis of water using renewable electricity and steam methane reforming from natural gas with CCUS.

technologies is one of the primary routes to achieving a net-zero trajectory for the chemicals sector while meeting existing hydrogen demand.

The SBTi addresses the emissions associated with current hydrogen production as follows:

- Hydrogen for ammonia and methanol are included within the boundary of the ammonia and methanol SDA pathways described in these target-setting criteria, with ammonia and methanol production as the activity metric used to determine emissions intensity.
- Hydrogen for DRI is included within the boundary of the existing iron and steel sector SDA pathway, with steel production as the activity metric used to determine emissions intensity.
- Hydrogen in refineries is considered within the boundary of the oil and gas sector.

The SDA pathways for ammonia, methanol, and iron and steel are based on the IEA's NZE scenario, which maps a transition from traditional to low-emission production methods to meet demand for these existing markets.

While negligible in the current hydrogen demand profile, new markets for hydrogen, primarily as an energy carrier, are expected to increase in the coming decades (IEA, 2023c). The IEA's NZE scenario requires hydrogen and hydrogen-based fuels to contribute significantly to the transport and power sectors especially. This new demand for hydrogen will require an increase in the trade of merchant hydrogen. In the NZE scenario, hydrogen and hydrogen-based fuels are modeled as low-emissions fuels. Thus, new markets for hydrogen are met solely by low-emissions hydrogen in the model, as demonstrated by Figure 3.21 in the IEA's *Net Zero Roadmap: A Global Pathway to keep the 1.5°C Goal in Reach* (IEA, 2023c).

The SDA pathways described above provide a method for companies to set targets on emissions from the vast majority of existing hydrogen production using projections of demand for each product (e.g. ammonia, methanol, steel), while taking into account the transition of such production to low-emissions methods. Other existing markets within the chemicals sector and broader industry represent a very small portion of hydrogen production today and do not warrant separate individualized pathways[25]. However, as new markets emerge, it is crucial that merchant hydrogen producers within the chemicals sector adopt low-emission production methods from the outset so that the climate benefits of hydrogen and hydrogen-based fuels can truly be realized. Consequently, the SBTi has not developed a separate SDA pathway for hydrogen production beyond the existing markets of ammonia, methanol and iron and steel at this time. Emissions from such production are subject to the SBTi's Corporate Net-Zero Standard and Corporate Near-Term Criteria.

[25] Not mentioned are existing SDA pathways for cement, and potential future pathways for other industrial sectors. Hydrogen production for use in other applications will be considered as part of the SDA pathway boundary for that sector.

### Nitric acid

During the production of nitric acid, $N_2O$ is formed and – when not abated – emitted. $N_2O$ has a Global Warming Potential (GWP-100) of 265 (GHG Protocol, 2023), thus the relatively small quantities of $N_2O$ still contribute significant $CO_2e$ emissions[26]. $N_2O$ emitted from nitric acid production can be abated to a large extent at very limited costs (NACAG, 2023). Criteria on target setting for nitric acid production are outlined in this document. The SBTi has established specific target-setting requirements on these emissions to:

- Ensure that companies who have not yet taken steps to abate a significant portion of their $N_2O$ emissions from nitric acid production will be incentivized to do so, while simultaneously addressing other sources of emissions within their value chain(s); and
- Acknowledge that companies who have already abated this portion of their $N_2O$ emissions from nitric acid production may consider remaining $N_2O$ emissions from nitric acid production as part of their company-wide target(s) and will thus not be expected to address them separately.

### All other chemicals

The applicability of each criterion in this document is defined in the criterion itself, therefore, companies should carefully review the criteria to determine what is and is not applicable to their operations.

These target-setting criteria contain chemicals sector-specific criteria for setting scope 1, 2 and/or 3 targets on emissions from certain production sources. Targets on emissions from chemicals or processes other than those explicitly included in the criteria are set in accordance with the SBTi's Corporate Net-Zero Standard and Corporate Near-Term Criteria. The SBTi's evaluation of existing emissions scenarios did not result in the development of additional sector-specific target-setting methods beyond those included in this document.

The SBTi reviewed the IEA's NZE scenario, which was used as the basis to develop the SDA pathways for primary chemicals described above. The NZE scenario reports emissions from non-primary chemicals as well; however, non-primary chemicals are not treated using the same technology-rich integrated model that is used for primary chemicals. The model used for most non-primary chemicals accounts for emissions from energy usage, does not include technological considerations in how these non-primary chemicals are produced, and does not project demand for individual chemicals themselves (IEA, 2023b). Additionally, there is a vast diversity in how non-primary chemical products are produced, which introduces a risk in applying a single emissions pathway to these products. In particular, a sector-specific pathway based on the NZE scenario may significantly underestimate the decarbonization rate potential for many chemical products, resulting in an under ambitious target on emissions from production of these chemicals. Therefore, the SBTi has chosen not to utilize this data to establish a sector-specific target-setting method for non-primary chemicals.

[26] An approximate estimate of emissions from for nitric acid production is at least 16 Mt $CO_2e$ / year (derived from data obtained from (Nieto, 2023) and (AmericanChemistryCouncil, 2022)) or >35 Mt $CO_2e$ / year (Joerss, 2023) for industrialized countries.

As part of the review and revision procedures for these target-setting criteria, the SBTi will consider whether additional methods would further the goals of the SBTi to reduce the climate impact of the chemicals sector on a 1.5°C-aligned trajectory.

## Annex B: Instructions and examples for setting targets

### Setting targets on scope 3 emissions of $N_2O$ from nitric acid production

Companies setting targets in adherence with criterion CHEM-C4 will do so following these steps. These steps outline the function of the Chemicals Sector Target-Setting Tool.

1. Calculate the average $N_2O$ emissions intensity in units of kg $N_2O$ / t of nitric acid, across all their operations in their base year. Using the following formula:

*Average $N_2O$ Emissions Intensity (kg $N_2O$ / t Nitric Acid) = Company-wide $N_2O$ emissions from Nitric Acid production (kg $N_2O$) / Company-wide Nitric Acid Production (t)*

2. For companies producing nitric acid with an average annual emissions intensity **below 0.5 kg $N_2O$ / t nitric acid** in the base year, no separate target is required.
3. Companies producing nitric acid with an average annual emissions intensity **above 0.5 kg $N_2O$ / t nitric acid** in the base year shall set a target as follows:
    a. Estimate projected nitric acid production in a target year that is 5 years from the base year and calculate the estimated absolute $N_2O$ emissions in this year based on an average emissions intensity of 0.5 kg $N_2O$ / t nitric acid using the following formula:

    *Absolute $N_2O$ Emissions (kg $N_2O$) = 0.5 kg $N_2O$ / t Nitric Acid x Projected Nitric Acid Production (t Nitric Acid)*

    b. Calculate the absolute $N_2O$ emissions in the target year based on a minimum ambition of 4.2% annual reduction that is consistent with a 1.5°C level of ambition for the same target year as step 3.a[27].
    c. If the absolute $N_2O$ emissions in the target year calculated in steps 2.a are lower than the emissions calculated in step 2.b, the company shall set a target to reduce their average $N_2O$ emissions intensity from nitric acid production to **0.5 kg $N_2O$ / t nitric acid or less** within 5 years of their base year.
    d. If the absolute $N_2O$ emissions in the target year calculated in steps 2.a are higher than the emissions calculated in step 2.b, no separate target is required.

Below are examples for the application of the target-setting method described in criterion CHEM-C4.

[27] The minimum ambition consistent with a 1.5°C goal may vary based on the chosen base year, and shall be calculated based on the SBTi's Criteria Assessment Indicators.

## EXAMPLE B.1: SAMPLE CALCULATIONS FOR A TARGET ON $N_2O$ EMISSIONS FROM NITRIC ACID PRODUCTION

Two example calculations have been provided below. These calculations will be performed by the Chemicals Target-Setting Tool but have been provided here for reference.

| EXAMPLE B.1.a: COMPANY A | |
|---|---|
| **Base Year** | 2021 |
| **Target Year** | 2026 |
| **$N_2O$ emissions from nitric acid production in base year** | 12,000 kg |
| **Nitric acid production in base year** | 15,000 t |
| **Emissions intensity in base year** | 0.8 kg $N_2O$ / t nitric acid |
| **Projected nitric acid production in target year** | 17,000 t |

Calculated $N_2O$ emissions in target year based on emissions intensity of 0.5 kg $N_2O$ / t nitric acid (step 2.a above):

*0.5 kg $N_2O$ / tonne nitric acid x 17,000 t nitric acid =* ***8,500 kg $N_2O$***

Calculated emissions reduction consistent with a 1.5°C level of ambition for a 2026 target year (step 2.b above):

*4.2% * (2026 – 2020) =* ***25.2% emissions reduction***

Calculated $N_2O$ emissions in target year consistent with a 1.5°C level of ambition:

*12,000 kg $N_2O$ x (1 – 25.2%) =* ***9,000 kg $N_2O$***

Since the projected emissions calculated under step 2.a are lower than those calculated under step 2.b, Company A must set a target to reduce their average $N_2O$ emissions intensity from nitric acid production to **0.5 kg $N_2O$ / t nitric acid or less** by 2026.

Sample language for Company A's target set using this criterion is as follows:

*Company A commits to reduce the average scope 1 $N_2O$ emissions intensity from its own nitric acid production to a value of 0.5 kg $N_2O$ / t nitric acid or less by no later than 2026.*

| EXAMPLE B.1.b: COMPANY B | |
|---|---|
| **Base Year** | 2021 |
| **Target Year** | 2026 |
| **$N_2O$ emissions from nitric acid production in base year** | 12,000 kg |

| | |
|---|---|
| **Nitric acid production in base year** | 15,000 t |
| **Emissions intensity in base year** | 0.8 kg $N_2O$ / t nitric acid |
| **Projected nitric acid production in target year** | 20,000 t |

Calculated $N_2O$ emissions in target year based on emissions intensity of 0.5 kg $N_2O$ / t nitric acid (step 2.a above):

*0.5 kg $N_2O$ / tonne nitric acid x 20,000 t nitric acid =* ***10,000 kg $N_2O$***

Calculated emissions reduction consistent with a 1.5°C level of ambition for a 2026 target year (step 2.b above):

*4.2% * (2026 – 2020) =* ***25.2% emissions reduction***

Calculated $N_2O$ emissions in target year consistent with a 1.5°C level of ambition:

*12,000 kg $N_2O$ x (1 – 25.2%) =* ***9,000 kg $N_2O$***

Since the projected emissions calculated under step 2.a are higher than those calculated under step 2.b, **no separate target on $N_2O$ emissions from nitric acid production is required.**

### Setting targets on scope 3 category 11 emissions of $N_2O$ from sold synthetic nitrogen fertilizers using criterion CHEM-C8 or CHEM-C9

If companies choose to utilize criterion CHEM-C8 or CHEM-C9 to set near-term or long-term targets on scope 3 category 11 emissions of $N_2O$ from sold synthetic nitrogen fertilizers, they should do so following these steps. These steps outline the function of the Chemicals Sector Target-Setting Tool.

1. Calculate base year scope 3 $N_2O$ emissions in category 11 from all synthetic N-fertilizer products.
2. Establish the target year(s). The target years for near-term targets and long-term targets shall be the same target year used to set targets on other emissions sources (excluding targets set on scope 1 $N_2O$ emissions from nitric acid production as described in Criterion CHEM-C4).
3. Calculate the required reduction in scope 3 category 11 $N_2O$ emissions based on the minimum level of ambition aligned with the required reduction between 2020 and 2030 (near-term) or 2050 (long-term) in $N_2O$ emissions per year using the below formulas.

   For base years after or equal to 2020:
   *Minimum value for near-term absolute reduction in $N_2O$ emissions = 1.3% x (Target year - 2020)*
   *Minimum value for long-term absolute reduction in $N_2O$ emissions = 17% regardless of base or target year*

For base years before 2020:
*Minimum value for absolute reduction in $N_2O$ emissions = 1.3% x (Target year – Base year)*
*Minimum value for long-term absolute reduction in $N_2O$ emissions = 17% + 0.57% x (2020 - Base year)*

- Sample language for a net-zero target set using this criterion is as follows:

  *Company A will reduce absolute emissions of $N_2O$ from the use of sold synthetic nitrogen fertilizers in the field in scope 3 category 11 10.4% by 2028 and 17% by 2050 from a base year of 2020.*

### Combining scope 3 targets set using the SDA method and absolute reduction method

As described in criterion CHEM-C10, chemical companies may combine scope 3 targets set using different methods on emissions associated with the purchase of primary chemicals. Provided below are example calculations for developing a combined target in adherence with this criterion.

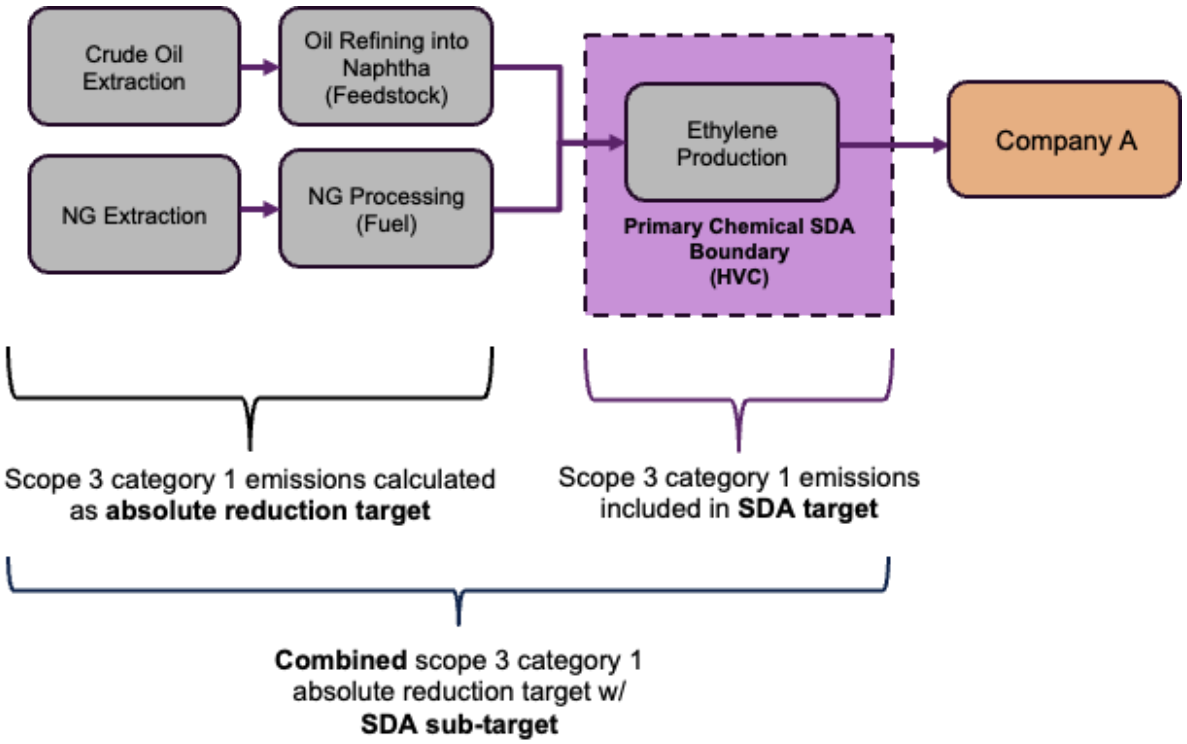
**EXAMPLE B.2: COMBINING NEAR-TERM SCOPE 3 TARGETS SET USING SDA PATHWAYS AND ABSOLUTE REDUCTION PATHWAYS**

| | EMISSIONS SOURCES | |
|---|---|---|
| | SCOPE 3 CATEGORY 1 FROM PURCHASED HVC *(UPSTREAM NAPHTHA AND FUELS USED TO PRODUCE ETHYLENE)* | SCOPE 3 CATEGORY 1 FROM PURCHASED HVC *(ETHYLENE PRODUCTION)* |
| **Target-Setting Method** | Scope 3 Absolute Reduction at well-below 2°C ambition | HVC Production SDA |
| **Base Year** | 2020 | 2020 |
| **Total Base Year Emissions (MT $CO_2e$)** | 40 | 82.5 |
| **Total Base Year Emissions (Combined, MT $CO_2e$)** | 122.5 | |
| **Total Base Year Purchased (MT Product)** | N/A | 75 |
| **Base Year Emissions Intensity (t $CO_2e$/t Product)** | N/A | 1.1 t $CO_2e$/t HVC |
| **Target Year** | 2030 | 2030 |
| **Total Target Year Purchased (MT Product)** | N/A | 80 |

| | | |
|---|---|---|
| **Target Year Emissions Intensity (t $CO_2e$/t Product) (Calculated by SDA Method)** | N/A | 0.86 t $CO_2e$/t HVC *(Rounded)* |
| **Target Year Emissions (Absolute Basis, MT $CO_2e$)** | 30 | 68.5 |
| **Total Target Year Emissions (Combined, MT $CO_2e$)** | 98.5 | |
| **Total Target Ambition (Combined, % Reduction)** | 19.6% | |

Figure B.1 provides a visual representation of the sources of emissions covered by Example B.2 from the perspective of a purchaser of HVC.

*Figure B.1. Emissions target coverage for combining targets on scope 3 category 1 emissions from purchased primary chemicals (HVC)*




Sample target language based on the example calculations above would be:

*Company A commits to reduce absolute scope 3 GHG emissions from scope 3 category 1 from purchased HVC 19.6% by 2030 from a 2020 base year. This combined target was determined from an SDA target set on scope 3 emissions from the production of HVC and a well below 2°C aligned absolute reduction target set on emissions upstream of the HVC production.*

*Within this target, Company A commits to reduce scope 3 GHG emissions in scope 3 category 1 from the production of purchased HVC 22.2% per tonne of HVC purchased by 2030 from a 2020 base year.*

### Combining scope 1 and 2 SDA targets with targets set using absolute reduction approach

As described in criterion CHEM-C5, companies may combine targets set using the SDA method for primary chemical production with targets set on other sources of scope 1 and 2 emissions using the absolute reduction method. Provided below are example calculations for combining targets, as well as the resulting sample target language.

**EXAMPLE B.3: COMBINING NEAR-TERM TARGETS SET USING SDA PATHWAYS AND SCOPE 1 AND 2 ABSOLUTE REDUCTION APPROACH**

| | EMISSIONS SOURCES | | |
|---|---|---|---|
| | METHANOL PRODUCTION | HVC PRODUCTION | ALL OTHER SCOPE 1 AND 2 EMISSIONS SOURCES |
| **Target-Setting Method** | Methanol Production SDA | HVC Production SDA | Scope 1+2 Absolute Reduction Method |
| **Base Year** | 2020 | 2020 | 2020 |
| **Total Base Year Emissions (MT $CO_2e$)** | 50 | 82.5 | 100 |
| **Total Base Year Emissions (Combined, MT $CO_2e$)** | 232.5 | | |
| **Total Base Year Production (MT Product)** | 20 | 75 | N/A |
| **Base Year Emissions Intensity (t $CO_2e$/t Product)** | 2.5<br>t $CO_2e$/t Methanol | 1.1<br>t $CO_2e$/t HVC | N/A |
| **Target Year** | 2030 | 2030 | 2030 |
| **Total Target Year Production (MT Production)** | 25 | 80 | N/A |
| **Emissions Intensity (t $CO_2e$/t Product) (Calculated by SDA Method)** | 1.85<br>t $CO_2e$/t Methanol<br>*(Rounded)* | 0.86<br>t $CO_2e$/t HVC<br>*(Rounded)* | N/A |
| **Target Year Emissions (Absolute Basis, MT $CO_2e$)** | 46.2 | 68.5 | 58 |
| **Total Target Year Emissions (Combined, MT $CO_2e$)** | 172.7 | | |

| | |
|---|---|
| **Total Target Ambition (Combined, % Reduction)** | 25.7% |

Sample target language for these emissions based on the example calculations above would be:
*Company A commits to reduce GHG emissions from the production of methanol for non-energy purposes, the production of HVC, and scope 1 and 2 GHG emissions from all other sources 25.7% by 2030 from a 2020 base year. This combined target was determined from SDA targets set on emissions from the production of methanol and HVC, and a 1.5°C aligned absolute reduction target set on other scope 1 and 2 emissions.*

*Within this target, Company A commits to reduce GHG emissions from the production of methanol for non-energy purposes 26.1% per tonne of methanol produced by 2030 from a 2020 base year.*

*Within this target, Company A commits to reduce GHG emissions from the production of HVC by 22.2% per tonne of HVC produced by 2030 from a 2020 base year.*

## Annex C: Additional information on scope 3 accounting

In this annex we provide information on several key scope 3 accounting issues relevant to the chemicals sector. This information is not intended to replace the GHG Protocol as the standard companies shall use to develop their corporate GHG emission inventories; rather, this is intended to supplement the GHG Protocol by providing chemicals-sector specific guidance on relevant topics.

### Accounting for downstream use-phase and end-of-life emissions from products (scope 3 categories 11 and 12)

Accurately tracking scope 3 emissions downstream of a company's operational boundary poses a challenge. Yet, it's essential to meticulously consider the function and ultimate fate of all products, including intermediate ones, generated by chemical companies when estimating downstream emissions impacts.

Chemical products find application in diverse sectors such as foods, pharmaceuticals, hygiene products, plastics and various consumer goods. Emissions occurring during the use phase or at the end-of-life of these products can often be estimated using available guidance. For instance, there are calculation methods specifically designed to estimate emissions from products landfilled at the end of their life, with a focus on consumer items typically used and discarded by end-users. However, estimating downstream emissions for products like pharmaceuticals, food additives and personal hygiene items can be more intricate due to the varied ways they are consumed or disposed of.

Pharmaceuticals and food additives may be either discarded or consumed, potentially entering wastewater systems and contributing to greenhouse gas emissions during treatment processes or being released into the environment. Personal hygiene products are also likely to end up in wastewater systems after use.

To develop a comprehensive scope 3 inventory, chemical companies should make a concerted effort to estimate downstream emissions, including those associated with consumable products. A key recommendation is the detailed mapping of the downstream value chain to ensure accurate estimates. Collaborative initiatives with other companies or experts can further enhance research and data availability, fostering methodological consistency across the sector.

This concerted effort to estimate downstream emissions is relevant for hydrocarbons, but also for $N_2O$ from fertilizer from the field emissions (scope 3 category 11). For this sector and category, developing better methodologies to quantify emissions and emission reductions would help fertilizer companies to quantify improvements.

### Accounting for emissions in scope 3 categories 10, 11 and 12

Many chemical companies produce and sell intermediate products that may be further processed into hundreds of additional products. In certain cases, the company selling the intermediate product may not reasonably know all the downstream processing steps, or the

exact end use for their intermediate product; therefore, accurately estimating the full downstream GHG profile for their products can be difficult.

The SBTi expects companies to account for all scope 3 categories including downstream emissions from intermediate products and services, where relevant. The use of primary data is preferred, but secondary data is also acceptable when calculating scope 3 emissions[28]. In the instance that a company faces barriers to calculating emissions from one category of scope 3, the company should demonstrate its best efforts to calculate these emissions, and this shall not preclude them from providing reasonable estimates of emissions in other categories.

For example, if a company faces barriers to calculating emissions from the processing of sold intermediate products (scope 3 category 10) because the uncertainty in potential processing steps is too large, they may be potentially able to justifiably exclude these emissions from their inventory as outlined in the GHG Protocol (GHG Protocol, 2011). However, the company should demonstrate its best efforts to calculate these emissions, and this shall not preclude them from providing an estimate of emissions in other categories (e.g. emissions at end-of-life in scope 3 category 12).

### Using the mass balance approach in GHG accounting

New materials from circular, bio-based, and CCU-based origin are expected to increase within the chemicals value chain as alternatives to fossil feedstocks and fuels. The life cycle GHG impacts of these different materials can vary widely, but in many cases the feedstocks or materials produced from these alternatives are practically indistinguishable from those produced using traditional feedstocks. Additionally, different materials can often be integrated into existing production equipment as “drop-in” alternatives. To accurately estimate the GHG emissions impacts associated with these materials, companies must have a way to accurately estimate the proportion of alternative materials in the products they purchase, the products they manufacture, and the products they sell.

The mass balance approach is a GHG accounting method by which the attributes of an alternative feedstock can be applied to the resulting products, while ensuring that outputs are balanced with inputs on a mass or energy balance basis[29]. This allocation of attributes is then available to subsequent customers to understand the material origin of the products they purchase, and any subsequent products they produce and sell from these materials. The mass balance approach can be operationalized via chain of custody systems that track the flow of materials between entities. Without such an attribution method, the only way companies could determine the content of alternative materials in their products would be through certain analytic testing techniques, or through a complete physical and process segregation of these materials, which is impractical and an inefficient use of existing infrastructure.

[28] Primary data comes from specific activities within a company’s own value chain. Secondary data is not specific to a company’s value chain, for example industry or geographic averages.
[29] Conceptually, the mass balance approach intends to connect the allocation of material attributes in outputs to the materials used as inputs. Mass balance mechanisms may utilize characteristics other than only mass to accurately balance inputs and outputs, such as energy content or carbon. This is because alternative materials may be utilized differently within chemical processes, resulting in different transformation efficiencies.

While the mass balance approach usually describes a particular accounting mechanism as described below, sources also describe similar mechanisms under the umbrella of the mass balance approach (Beers et al., 2022). These include:

- Mass balance itself, in which materials or products with specified characteristics are mixed with materials or products without the same or all of the same characteristics, resulting in a claim on a part of the output, proportional to the input.
- Controlled blending, in which different materials are physically mixed via a controlled set of criteria. The result is a known proportion of characteristics from each material in the final output, due to the controlled and known ratio of inputs for all outputs.
- Book and claim, which is a fully administrative model applied when there is not a physical connection between the certified supply and the final product. Under book and claim, credits are issued when materials or products enter the market and may be traded and sold independently of the physical delivery of those materials or products. (Beers, et al., 2022)

The GHG Protocol recognizes the utility of using mass balances in collecting data for GHG emissions calculations (GHG Protocol, 2013), but it does not specifically address approaches for allocating material attributes using the mass balance method. Additionally, both the GHG Protocol and the SBTi are developing further guidance on the use of market-based instruments, such as the book and claim approach, and the use of environmental attribute certificates (EACs), which may include products that have been certified via the mass balance approach. The mass balance approach can be a practical method for differentiating the origin of materials in products, and thus estimating the GHG impacts of those materials. Thus, this document includes criteria that are compatible with current GHG accounting principles, pending further guidance from the GHG Protocol and the SBTi. These guidelines are not intended to preclude or supersede existing or future guidance from either the GHG Protocol or the SBTi; rather, they are intended to recognize the current reality of chemicals manufacturing that may use a variety of material input sources. Until the SBTi or the GHG Protocol publishes additional guidance on the mass balance approach, chemical companies may utilize the mass balance approach in calculating GHG emissions for use in setting and achieving science-based targets, if they adhere to the requirements in criterion CHEM-C12.

While the mass balance approach allows for companies to distinguish between materials that are integrated within products, it does not *inherently* assign environmental attributes, such as life-cycle emission factors, to those materials. Companies should utilize best accounting practices when accounting for the value chain emissions associated with alternative materials, such as bio-based and CCU-based materials. Any attributes that include certified characteristics, such as a cradle-to-gate carbon footprint for the material, must be substantiated if used in the GHG inventory calculation.

### Accounting for emissions from bio-based materials within a company's value chain

Feedstocks and fuels derived from biological carbon may offer promising alternatives to fossil-based materials. These bio-based materials and biofuels can originate from crops cultivated for this specific purpose or from agricultural and other residual wastes of organic materials. Bio-based materials present potential climate benefits compared to their fossil

counterparts because their carbon content originates from the atmosphere. Consequently, the eventual release of $CO_2$ during a product's use phase or at end-of-life through incineration or decomposition does not lead to a net addition of $CO_2$ to the atmosphere.

However, the overall impact of these materials throughout their life cycle can be substantial. This impact encompasses environmental burdens and GHG emissions from land use change, land management, and additional non-biogenic emissions generated during the processing of biomass into usable products. Emissions of other GHGs such as $CH_4$ from the combustion or decomposition of bio-based products must also be accounted for within GHG inventories. Therefore, conducting a robust accounting of life cycle emissions associated with biogenic materials is crucial.

Chemical companies incorporating bio-based products into their value chain should adhere to the current guidance from the GHG Protocol regarding the accounting of GHG emissions in scopes 1, 2 and 3 related to these materials. This guidance necessitates a comprehensive assessment of GHG emissions linked to purchased bio-based materials across all scopes, encompassing both net biogenic emissions and non-biogenic emissions. Specifically, companies must factor in emissions from the land sector attributable to the biogenic material they are acquiring. This includes, but is not limited to, emissions resulting from land use change and net biogenic $CO_2$ emissions from land management.

### Accounting for emissions from carbon capture and utilization within a company's value chain

Carbon capture, utilization and storage (CCUS) refers to the process of removing $CO_2$ from an industrial emissions point source or directly from the atmosphere and then using it in other processes (e.g. integrated into a product or fuel) or sequestering it in permanent storage (e.g. geologic reservoirs).

However, corporate-level accounting for emissions related to Carbon Capture and Utilization (CCU), where $CO_2$ is utilized as a carbon source for products, lacks detailed guidance. For example, the GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard does not provide specific requirements or recommendations for the accounting of emissions associated with CCU-based products, as of the publication of this document.

To provide clarity, this section offers guidance based on GHG Protocol accounting principles. The GHG Protocol dictates that emissions from sold products should be accounted for in the reporting company's scope 3 inventory. The same principle applies when $CO_2$, captured and sold as a product, is utilized downstream in the value chain. The captured $CO_2$ would not be included in the original emitting company's scope 1 emissions as it has not been emitted within the company's operational boundary. However, the downstream scope 3 impacts of the sold $CO_2$ would need to be included in scope 3 category 11 by the company that sells it. This shift from scope 1 to scope 3 aligns with the GHG Protocol Scope 3 Accounting and Reporting Standard. The emissions associated with the capture of the $CO_2$ (e.g. from the energy consumed in the capture process) remain part of the capturing companies' scope 1 emissions, while they are accounted for in scope 3 category 1 for the company using the $CO_2$.

A practical representation of this method is urea-based fertilizer production, in which $CO_2$ is captured (typically during ammonia production) and utilized subsequently to produce urea but is eventually emitted in the fertilizer's use-phase.

Figure C.1 and Table C.1 below illustrate a simplified example on how companies would account for fossil-based CCU related emissions. This example, adjusted from the Global $CO_2$ Initiative, represents hypothetical emissions associated with the production of 1 t of methanol (Michailos, et al., 2018). Company A captures 1.45 t of $CO_2$ from the emissions from their steam cracker and sells the $CO_2$ as a product to Company B. Company A's scope 2 emissions associated with the energy used to capture the $CO_2$ itself are 0.05 t of $CO_2$, and 0.22 t of $CO_2$ are not captured and are therefore emitted directly from Company A's process. Company B utilizes the $CO_2$ from Company A to manufacture methanol and emits 0.08 t of $CO_2$ within their scope 1 (from process emissions, not emissions from incineration of other fuels). The sold methanol is burned as a fuel downstream the value chain outside the companies' boundaries. Thus, the $CO_2$ from the fuel combustion is accounted within scope 3 category 11 (emissions from the use of sold products) for both Company A and Company B.

*Figure C.1. Sample of carbon flow for CCU-based applications*

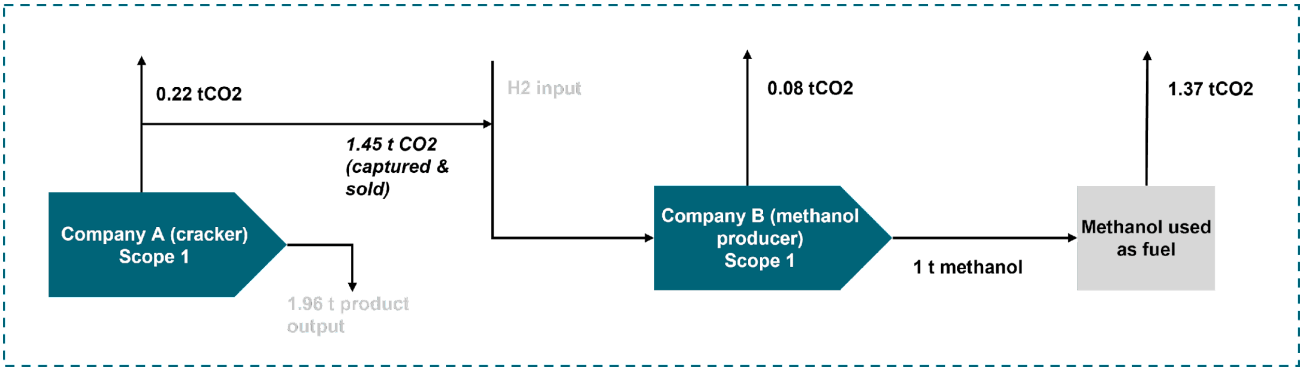



*Table C.1. Sample of GHG inventory calculations for CCU-based applications*

| COMPANY | SCOPE 1 & 2 EMISSIONS | SCOPE 3 EMISSIONS | | |
|---|---|---|---|---|
| | | *CATEGORY 1 - EMISSIONS FROM PURCHASED PRODUCTS* | *CATEGORY 10 – PROCESSING OF SOLD PRODUCTS* | *CATEGORY 11 - EMISSIONS FROM SOLD PRODUCTS* |
| Company A | 0.27 t* | --** | 0.08 t | 1.37 t |
| Company B | 0.08 t | 0.05 t** | -- | 1.37 t |

** Includes 0.05 t of scope 2 emissions associated with the carbon capture process.*
*** Company A and B should also account for any scope 3 category 1 emissions associated with other purchased products; however these emissions are outside the scope of this example.*

Captured $CO_2$ that is integrated into products may also be emitted at the end-of-life of the product, rather than during the use phase. In this case, a similar method as above would apply, with the captured $CO_2$ instead being accounted for within scope 3 category 12

(emissions from the end-of-life of sold products) for both the emitting and the utilizing companies. Existing requirements and guidance on scope 3 emissions accounting should be used when estimating these emissions.

This guidance on accounting for value chain emissions associated with CCU-based products should be combined with guidance on accounting for bio-based materials if the initial captured $CO_2$ is of biogenic origin. Requirements from the GHG Protocol on how to account for emissions of biogenic carbon should take precedence, while the scope classification of captured and sold biogenic $CO_2$ in the value chain should align with this guidance.

### Accounting for emissions from recycling processes within a company's value chain

Increasing the circularity of the chemicals value chain holds the potential for environmental benefits. However, accounting for emissions related to recycling processes poses challenges for companies purchasing recycled materials, those producing recyclable products, and those involved in both. Two ways in which recycling can offer emissions advantages include:

- The difference in emissions between extracting and processing virgin material versus preparing recycled material for reuse; and
- A reduction in emissions that would otherwise have occurred if the waste had been sent to a landfill or other waste treatment method (GHG Protocol, 2013).

Accounting methodologies for allocating emissions from recycling processes propose system cuts that allocate the emissions burden appropriately, since recycling extends the usefulness of the material from a linear life cycle to a circular one. This ensures that companies purchasing recycled content and producing recyclable materials do not double-count the emissions associated with multiple use cycles of their products. However, some methodologies may not balance the benefits from recycling between the recycling companies and the companies whose products are recycled, and not all companies are incentivized to pursue circularity based solely on the reduction in scope 3 emissions compared to a linear lifecycle model.

For instance, the recycled content accounting method recommended by the GHG Protocol (GHG Protocol, 2013) allocates emissions from recycling processes to scope 3 category 1 of the company purchasing the recycled material. The company would not account for any emissions in scope 3 category 5 or category 12 that are themselves recycled. A benefit in overall scope 3 emissions for this company could be seen as compared to a linear fossil alternative if:

- Emissions from the recycling process are lower than the upstream (category 1) emissions associated with the linear alternative; and/or
- There are emissions from the end-of-life processes for non-recycled products, and the company can accurately estimate these emissions; and/or
- The company can accurately estimate the quantity of their products that are recycled at the end-of-life, and thus assume no end-of-life emissions to these products.

In practice, emissions benefits from increased circularity can be difficult to quantify. Companies may be limited by data availability in accurately estimating the end-of-life fate of their own products, especially if they are producing primary or intermediate products that are eventually sold and disposed of across different global regions. Additionally, emissions from end-of-life processes for non-recycled wastes may carry low or no emissions burden, making the alternative circular route less advantageous. For example, in the World Business Council for Sustainable Development (WBCSD) Guidance for Accounting & Reporting Corporate GHG Emissions in the Chemical Sector Value Chain, guidance is given that no emissions should be attributed to products at the end-of-life when a product is landfilled, if the product is known not to degrade within 100 years (WBCSD, 2013). Thus, durable plastic products that are landfilled would be attributed no end-of-life emissions. Further, the GHG Protocol Standards state that companies should not account for emissions from the incineration of wastes for energy recovery (waste-to-energy) in their scope 3 category 5 or category 12 inventory; rather, these emissions are allocated to the users of the energy produced. These challenges regarding calculation of emissions in scope 3 category 5 and category 12 contributed to the rationale for requiring companies to set an alternative feedstock target (Criterion CHEM-C11).

Additional collaboration between interested stakeholders to further develop accounting methodologies that fairly and accurately quantify emissions from recycling of products derived from chemicals may provide an opportunity to further incentivize a move toward a circular chemical value chain.

To fully account for and maximize the positive impacts of recycling, companies should:

- Fully account for emissions from the recycling processes for products in their value chain, without double-counting.
- Source recycled materials that are produced with minimal direct GHG emissions, preferably using renewable electricity as the primary energy source.
- Fully and accurately account for upstream emissions associated with virgin alternatives to recycled materials, to ensure the benefits of circular alternatives are properly captured.
- Increase visibility into the end-of-life fate of products sold for more accurate accounting of end-of-life emissions.
- Collaborate with downstream customers, communities, and governments to increase recycling collection rates and material handling efficiency.

Maximize the recyclability of the products being sold to boost the likelihood of diversion from waste streams and successful recycling.

## Annex D: Setting targets on shares of alternative feedstocks

This annex outlines the steps to calculate targets in adherence with criterion CHEM-C11.

The percentage of alternative feedstock in each year shall be calculated based on the share of alternative-based carbon content, by weight of carbon. As the metric is based on carbon content (C-content), this share does not include hydrogen produced via the electrolysis of water. For the production of hydrogen used in ammonia, methanol or urea, the share of alternative feedstock shall be calculated based on the mass of carbon in the alternative sources of hydrocarbons (e.g. biomethane) within the total mass of carbon of all hydrocarbons used. If a company chooses to include mechanically recycled feedstocks within the target, these feedstocks should be included within the alternative feedstock category, and the calculated target threshold should include mechanically recycled feedstocks.

1. Calculate the total mass and percentage, by weight, of virgin fossil-based carbon and alternative-based carbon in feedstocks used in production within their operational boundary in the chosen base year, expressed as wt. % C. This may require a conversion from mass of feedstock to the equivalent mass of C. An example of this calculation for ethane feedstock is provided below.

   *Mass C-content Feedstock (Mt C) = Mass Ethane Feedstock (Mt $C_2H_6$) x (24 g/mol C)/ (30.1 g/mol $C_2H_6$)*

   The wt % of alternative feedstock shall be calculated as follows:

   *Wt. % Alternative Feedstock = (Sum of Mass of C-content of All Alternative Feedstocks (Mt)) / (Sum of Mass of C-content of All Alternative Feedstocks (Mt) + Sum of Mass of C-content of All Virgin Fossil-based feedstocks (Mt))*

2. Establish the near-term target year.
3. Calculate the minimum target percentage of alternative feedstock, in wt. % carbon, in the target year(s) using the SBTi Chemicals Sector Target-Setting Tool. The target shall be set at or above the minimum value for the chosen target year. Companies are recommended to set a target at least at the level of the recommended value in the tool and may set a target up to 100% of alternative feedstock.
4. The target will be set based on the following considerations:
   a. If the company's percentage of alternative feedstock in the base year is lower than the minimum percentage required in the chosen target year, the minimum target percentage shall be the minimum value of the alternative feedstock range in the target year in the tool.
   b. If the company's percentage of alternative feedstock in the base year is higher than the minimum percentage required in the chosen target year, the company shall, at a minimum, establish a maintenance target to maintain their base year share of alternative feedstock. Companies are recommended to set a target to increase their share of alternative feedstocks in the target year.

c. Companies may count alternative feedstocks that are partially used as fuel in their processes due to the inherent process dynamics of the chemical process towards the alternative feedstock target[30].

Samples of language for a target set using this criterion is as follows:

*Company A will increase its share of purchased feedstocks that are composed of alternative non-virgin fossil sources from 10% by weight of carbon to 14% by weight of carbon by 2030 from a base year of 2022. This target excludes mechanically recycled feedstocks.*

*Company A will increase its share of purchased feedstocks that are composed of alternative non-virgin fossil sources from 10% by weight of carbon to 19% by weight of carbon by 2030 from a base year of 2022. This target includes mechanically recycled feedstocks.*

[30] For example, when using naphtha as feedstock in steam crackers, part of the feedstock is typically collected as process gases and used as fuel to provide heat for the process. A company can thus choose to consider all naphtha input to the cracker as feedstock under this criterion.

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