SCIENCE BASED TARGETS

DRIVING AMBITIOUS CORPORATE CLIMATE ACTION

SBTi CHEMICAL SECTOR PATHWAYS AND IMPLEMENTATION CRITERIA

VERSION 1.0

DECEMBER 2025

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VERSION HISTORY

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Version 1.0	Initial release of SBTi Chemical Sector Pathways and Implementation Criteria	December 2, 2025	June 2, 2025

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EXECUTIVE SUMMARY

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THE GLOBAL CHEMICALS SECTOR HAS A CRITICAL ROLE TO PLAY IN THE NET-ZERO TRANSFORMATION.

As one of the largest industrial sources of carbon dioxide (CO_2) emissions, the sector ranks third after cement and iron and steel (IEA, 2021). It is also the world's largest industrial consumer of energy products, due to the sector's reliance on energy (i.e., hydrocarbon) products as feedstock to many processes, and its use for energy production (IEA, 2020). Because the chemicals sector's complex and heterogeneous value chains touch nearly every segment of the economy, including energy, transportation, the built environment, consumer goods, and agriculture, reducing greenhouse gas (GHG) emissions in this sector and its value chains is essential for meeting global climate goals, while remaining economically competitive.

The Science Based Targets initiative (SBTi) has developed the SBTi Chemical Sector Pathways and Implementation Criteria (hereafter referred to as "pathways criteria document") to help companies in the sector set robust, science-based climate targets. The document provides pathways and calculation criteria for addressing several of the most significant sources of emissions in the sector, both direct and across the value chain. While not every activity within the sector scope is included, due to the high level of specialty and heterogeneity within, the pathways cover the most impactful segments and establish clear expectations for companies.

The pathways offer companies an expanded set of options to set targets aligned with a net-zero ambition. This pathways criteria document outlines activity-specific pathways for setting near-term and/or net-zero targets using either cross-sector or sector-specific methods for in-scope key activities and sources of emissions. Some pathways are optional, while others are mandatory for companies that meet the applicability thresholds defined in each criterion.

This pathways criteria document is designed to be used together with the SBTi's Corporate Net-Zero Standard and/or the SBTi Near-Term Criteria, ensuring companies cover all relevant sources of emissions. Where emissions from activities and sources are not explicitly included in this pathways criteria document, companies may use the SBTi's cross-sector criteria, including the SBTi Corporate Net-Zero Standard and/or SBTi Corporate Near-Term Criteria, to meet minimum requirements for target coverage.

INTRODUCTION

INTRODUCTION

A.1 INTRODUCTION TO THE 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 GHG emissions reductions targets in line with what is needed to keep global heating below catastrophic levels and reach net-zero by 2050 at the latest. The SBTi is incorporated as a UK charity, with a subsidiary SBTi Services Limited, which hosts target validation services (together with SBTi, the "SBTi Group").

A.2. PURPOSE OF THIS PATHWAYS CRITERIA DOCUMENT

The 2015 Paris Agreement established a goal to limit average global temperature rises to well below 2°C above pre-industrial levels and to pursue efforts to limit the increase to 1.5°C. Climate science has strongly emphasized the importance of limiting global warming to 1.5°C and achieving net-zero GHG emissions globally by mid-century to limit the risk of irreversible climate impacts. Achieving net-zero emissions at the global level requires significant transformation across all sectors of the economy, and companies can play a crucial role in driving this transformation. The SBTi's Standards aim to enable companies to transition toward business models that are compatible with a net-zero economy by encouraging them to address emissions across their operations and value chains, and to align activities to a net-zero future.

The rate at which the chemicals sector can reduce its direct and indirect emissions 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, 2021), (Kremer, et. al, 2022)]. Additionally, the use of feedstock carbon of alternative origins, such as biomass or circular materials, provides an opportunity to mitigate the full value chain impacts of virgin fossil-based carbon sources. For these reasons, the SBTi has developed the dedicated pathways contained in this document to assist chemical companies to set targets on emissions and other metrics related to their activities. Additional information on the development of these pathways can be found in the SBTi Chemical Sector Pathways and Implementation Criteria Explanatory Document.

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 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, 2023).

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 feedstocks (e.g., coal, natural gas, natural gas liquids) or feedstocks that are products of crude oil refineries (e.g., naphtha) as 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, 2021).

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 end-of-life via incineration or decomposition. The upstream emissions associated with the extraction and production of the fossil-based feedstocks, fuels, and their alternatives, including land-related and production emissions to obtain biomaterials, emissions from waste recycling processes, and emissions from obtaining carbon dioxide (CO_2) via Carbon Capture & Utilization (CCU) processes, are just as critical.

A.3 TERMINOLOGY

Within this pathways criteria document, the terms "shall", "should" and "may" are used as follows:

1. **"Shall"** indicates criteria that are required as conditions for organizations that decide to submit science-based targets to the SBTi for validation.
2. **"Should"** indicates a recommendation. Recommendations are important as they reflect adherence to best practices, but are not required for validation.
3. **"May"** indicates an option that is permitted, allowed, or permissible.

The terms "can" and "must" are used with distinct meanings. "Can" indicates possibility or capability, referring to options or actions available to the user. "Must" denotes external constraints that are not requirements of this document but are provided for informational purposes. For instance, "must" could pertain to compliance with applicable laws in a user's country, region, or sector, while "can" might describe permissible actions that do not affect validation—such as using a specific technology or approach to mitigate GHG emissions.

For terms and definitions used in SBTi standards, criteria, and guidance, please refer to the SBTi Glossary. Additional definitions of terms specific to this document are included in the Annex A.

A.4 FRAMEWORK OF SBTi STANDARDS

SBTi Standards are structured in a modular framework that includes cross-sector standards (the SBTi Corporate Net-Zero Standard and SBTi Corporate Near-Term Criteria) and several sector-specific resources, including this pathways criteria document, with pathways and criteria specific to each sector or to specific activities. Sector-specific criteria may be additional to or supersede the SBTi Corporate Net-Zero Standard criteria and SBTi Corporate Near-Term Criteria on the activities they cover.

How to use the SBTi Chemical Sector Pathways and Implementation Criteria document

The pathways in this document are complementary to the SBTi Corporate Net-Zero Standard and SBTi Corporate Near-Term Criteria. Companies shall adhere to the criteria in the SBTi Corporate Net-Zero Standard and SBTi Corporate Near-Term Criteria, except where explicitly superseded in this document. This document includes one mandatory pathway that shall be used for setting targets on the relevant source of emissions by all companies meeting its applicability criteria. This document also includes several optional pathways that may be applied by companies to set targets on emissions from the relevant activities. Given the diversity in the chemical sector, applicability of specific pathways in this document to activities or certain sources of emissions is specified in each criterion; therefore, not all criteria are applicable to all chemical companies.

Companies choosing to utilize optional pathways shall follow all associated criteria and sub-criteria. Criteria are the rules that companies shall adhere to in order to be validated by the SBTi-designated validation body. This document also includes recommendations that companies are encouraged to pursue. Companies should carefully read the description of activities that may be addressed using each pathway to ensure proper application.

Companies shall follow these steps when using this pathways criteria document:

1. Determine whether there are operations or activities within their organizational boundary or value chain that are within the scope of this pathways criteria document as defined in section A.5.

2. If so, determine which of the pathways in this document are applicable to relevant activities or operations. This document includes one mandatory pathway and several optional pathways for setting targets on emissions from relevant activities, as described in Table 1.

3. If the mandatory pathway is applicable, set a target on the relevant sources of emissions following all applicable criteria associated with the pathway.

4. If any optional pathways are applicable, decide whether the pathway(s) will be used to set targets on relevant emissions.

    a. If any optional pathway(s) are used, follow all associated criteria in full, not partially. Recommendations should also be followed but are not required.

    b. If optional pathway(s) are not used, set targets on the relevant emission sources using other methods, such as the SBTi Corporate Net-Zero Standard and/or SBTi Corporate Near-Term Criteria,[1] as needed, in order to meet the minimum target coverage requirements described in those documents.

5. Set target(s) using any other applicable criteria, such as the SBTi Corporate Net-Zero Standard and/or SBTi Corporate Near-Term Criteria, for any remaining emissions necessary to meet the minimum target coverage requirements described in those documents.

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

A.5 SCOPE OF THIS PATHWAYS CRITERIA DOCUMENT

This pathways criteria document broadly applies to emissions from the manufacture of chemicals via the following activities, defined as the "chemicals sectoral boundary". Each activity is defined in Annex A.

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

For the purposes of this pathways criteria document, companies are considered to manufacture any of the chemical products listed above if these manufacturing activities fall within the company's operational boundary used to calculate its scope 1 corporate GHG inventory, as outlined in the GHG Protocol's Corporate Accounting and Reporting Standard (GHG Protocol, 2004).

This pathways criteria document addresses certain GHG emissions exclusively associated with these activities; however, companies may also have activities within their value chain that fall outside the chemicals sector or are not specifically addressed in this document. For such activities, companies shall follow any other applicable SBTi guidance or standards to meet both the minimum ambition and minimum coverage for scope 1, 2, and 3 emissions of the SBTi Corporate Net-Zero Standard and/or SBTi Corporate Near-Term Criteria.

Due to the extremely diverse and heterogeneous nature of the chemicals sector, certain pathways that have been established in this document only apply 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 activities. 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 detailed in the SBTi Chemical Sector Pathways and Implementation Criteria Explanatory Document.

The pathways shall be applied modularly, at the activity level. This means that the pathways and associated criteria or recommendations within this document may be applicable even if a company, as a whole, is not classified as a chemical company under widely used industry classification frameworks.[2]

Table 1 includes a summary of the applicability of each criterion by activity in the scope.

2 E.g. Global Industry Classification System (GICS), Industrial Classification Benchmark (ICB), North American Industry Classification System (NAICS), etc.

Table 1. Summary of criteria and applicable activities

APPLICABLE ACTIVITY	TARGET METRIC	APPLICABLE CRITERIA	REQUIREMENT TYPE
All activities not defined below	Varies.	SBTi Corporate Net-Zero Standard and SBTi Corporate Near-Term Criteria, or any other applicable SBTi Sector Standard or criteria document.	Applicable, as needed, to ensure that all applicable SBTi criteria are met.
Scope 1 emissions benchmark pathway for N_2O from nitric acid production			
Nitric acid production in company operations	Scope 1 N_2O emissions from nitric acid production.	CHEM-C1	Mandatory pathway if scope 1 N_2O emissions (on a CO_2e basis) from nitric acid production represent at least 5% of the sum of total scope 1 GHG emissions.
Activity-specific pathways for primary chemicals production			
Ammonia production in company operations or value chain[3]	GHG emissions from ammonia production for non-energy purposes only.	CHEM-C2	Optional pathway. Other pathways may be used to ensure that all applicable SBTi criteria are met.
	GHG emissions from ammonia production for non-energy and energy carrier purposes.		
Methanol production in company operations or value chain	GHG emissions from methanol production.		Optional pathway. Other pathways may be used to ensure that all applicable SBTi criteria are met.
High value chemical (HVC) production in company operations or value chain	GHG emissions from HVC production.		Optional pathway. Other pathways may be used to ensure that all applicable SBTi criteria are met.
Scope 1 emissions target setting for non-primary chemical production			
Non-primary chemical production in company operations	Scope 1 GHG emissions from non-primary chemical production.	CHEM-C3	Optional pathway if scope 1 emissions from combined non-primary chemical production represent at least 5% of the sum of total scope 1 GHG emissions.

3 This document includes two optional pathways for emissions from ammonia production, depending on whether the ammonia produced is intended for non-energy purposes only (e.g., fertilizers) or for both non-energy and energy purposes. The SBTi Chemicals Sector Pathways Synthesis Report includes more detail on why two pathways have been developed for emissions from ammonia production activities.

APPLICABLE ACTIVITY	TARGET METRIC	APPLICABLE CRITERIA	REQUIREMENT TYPE
Scope 3 category 11 N_2O emissions from sold nitrogen fertilizers			
Nitrogen fertilizer production in company operations	Scope 3 category 11 N_2O emissions from the use-phase of sold nitrogen fertilizers.	CHEM-C4	Optional pathway if scope 3 category 11 emissions of N_2O (on a CO_2e basis) represent at least 5% of the sum of total scope 3 GHG emissions. Other pathways may be used to ensure that all applicable SBTi criteria are met.
Target setting on alternative sources of feedstocks			
Purchase and use of carbon-based materials as feedstocks for the manufacture of products in scope	Target on weight % of carbon (wt % of C) of purchased alternative feedstock.	CHEM-C5	Recommended alignment pathway if combined scope 1, 2, and 3 emissions from production of carbon-based chemical products represent at least 5% of the sum of total scope 1, 2, and 3 GHG emissions.

Exclusions from the scope

The scope of this pathways in this document does not include:

- Emissions from the production of final products that may be manufactured using the chemicals listed above, if these activities do not involve the synthesis of new chemical products, such as plastic packaging or the blending of cosmetics, textiles, detergents, paints, or inks.
- Emissions from mechanical recycling activities.
- Emissions from the production of biofuels.
- Emissions from the production of chemicals in refineries.

Other users for which this pathways criteria document may be relevant

Companies that do not have direct emissions from activities within the chemicals sectoral boundary may use elements of this pathways criteria document where relevant. For example, a company that purchases significant volumes of 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.

A.6 STRUCTURE OF THIS PATHWAYS CRITERIA DOCUMENT

This pathways criteria document is organized as follows:

- Introduction
- About this document
- General criteria outlining the relevant pathways:
  - Mandatory activity-specific pathway and method for target-setting for N_2O emissions from nitric acid production.
  - Optional activity-specific pathways for target-setting on emissions from the production of primary chemicals.
  - Optional activity-specific pathway and method for target-setting on scope 1 emissions from non-primary chemical production.
  - Optional activity-specific pathway for target-setting on scope 3 category 11 N_2O emissions from the use-phase of sold nitrogen fertilizers.
  - Optional alignment pathway and method for target-setting on alternative sources of feedstocks.
- Activity-specific criteria for implementing the pathways.
- Normative annexes that contain additional information, such as key definitions or required steps to follow when developing a target. The included normative annexes are:
  - Annex A - Key terms.
  - Annex B - Setting targets on shares of alternative feedstocks.
  - Annex C - Activity-specific pathway data.

The pathways, criteria, and normative annexes contain the normative elements that companies shall adhere to when using the pathways in order to be validated by the SBTi-designated validation body. Recommendations contain best practices that companies are encouraged to follow. The criteria are identified by "CHEM-C" followed by whole numbers and sub-criteria by "C" followed by decimal numbers. Recommendations are identified with an "R" followed by numbers.

Supporting documentation

The following informative documents have also been published to accompany this normative pathways criteria document:

- **The SBTi Chemical Sector Pathways and Implementation Criteria Explanatory Document** contains additional information on applying the pathways in this document, calculating GHG emissions inventories, and developing and setting targets for chemical companies.
- **The SBTi Chemicals Sector Pathway Synthesis Report** includes a description of how the pathways were developed.
- **The SBTi Chemicals Sector Target-Setting Tool** is used to calculate targets using the activity-specific pathways and methods described in this document.

A.7 DEVELOPMENT PROCESS

The SBTi developed this pathways criteria document with support from Guidehouse. Any decision on the content was exclusively taken by the SBTi. The development of this pathways criteria document began prior to the adoption of the Standard Operating Procedures (SOP) for the Development of SBTi Standards. As such, the development of this document is not subject to such procedures. Nevertheless, the project has been developed following the principles of a transparent multi-stakeholder process that is central to all SBTi's technical developments.[4] The project was partially funded via generous donations from the organizations noted in the Acknowledgements section of this document. Funding did not confer any special status in drafting the content of this document.

Overall, the development process involves the following phases: project initiation, research, drafting, consultation and pilot testing, approval, implementation, and monitoring & evaluation. Stakeholders were able to submit feedback during the public consultation phase and via direct communication with the SBTi, such as through emails. The 1st public consultation was held from May 15 - August 1, 2024. The SBTi made revisions to the 1st consultation draft based on stakeholder feedback. Responses to feedback were published in the 1st Public Consultation Feedback Report, the Project Feedback log and the Main Changes Document. The 2nd public consultation was held from November 12, 2024 - January 10, 2025 and a period of pilot testing was held from January 2025 - March 2025. The pathways and criteria were reviewed and approved by the SBTi Technical Council on September 18, 2025.

The project team was advised by an Expert Advisory Group (EAG) composed of individuals from industry, an industry association, civil society, and academia to provide detailed input during the development of this pathways criteria document. EAG members were selected based on their expertise, position within the sectoral value chain, and geographic location. Members of the EAG are listed on the sectoral webpage. The EAG's role was advisory, and any decision on the content included within this document is exclusively within the remit of the 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 from stakeholders that have provided input via the public consultation process.

This pathways criteria document is subject to a periodic review to ensure its continued relevance and accuracy. The review will occur within a minimum of one year 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.

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

A.8 COMPLIANCE WITH REGULATORY REQUIREMENTS

In addition to meeting the criteria within this document, companies are responsible for meeting or exceeding the national, subnational, and regional legislation and regulation in the countries where the criteria are applied on topics covered in the criteria.

A.9 LANGUAGE AND TRANSLATIONS

The working language for SBTi Standards, guidance, and criteria documents is English. As necessary, the SBTi may arrange translations of SBTi Standards, guidance, and criteria documents into languages other than English. Translated versions of Standards, guidance, or criteria documents are for information purposes only. In case of doubt, the official English language version of SBTi Standards, guidance, or criteria documents shall be deemed definitive.

GENERAL CRITERIA

GENERAL CRITERIA

This section specifies the criteria applicable to companies using the pathways. Additional requirements for using the pathways are included in Section 2. Informative guidance on using the pathways is included in the SBTi Chemical Sector Pathways and Implementation Criteria Explanatory Document.

CHEM-C1. Companies shall address scope 1 N_2O emissions from the production of nitric acid using the activity-specific pathway and method for nitric acid production described in this document, if scope 1 N_2O emissions from nitric acid production activities (on a CO_2e basis) represent at least 5% of the sum of their total scope 1 GHG emissions.

CHEM-C1. 1. Once a company's average emissions intensity for N_2O emissions from nitric acid production has reached the benchmark emissions intensity, a separate emissions intensity target on these emissions is no longer required. This may occur before or at the target year.

CHEM-C2. Companies may address GHG emissions from the production of methanol, ammonia, and/or HVC in their value chain using any applicable activity-specific pathways described in this document.

CHEM-C3. Companies may address scope 1 GHG emissions from the production of non-primary chemicals using the activity-specific pathway described in this document, if scope 1 GHG emissions from non-primary chemical production activities represent at least 5% of the sum of their total scope 1 GHG emissions.

CHEM-C4. Companies may address scope 3 category 11 emissions of N_2O from the use-phase of their sold nitrogen fertilizers using the activity-specific pathway for these emissions described in this document, if scope 3 category 11 emissions of N_2O (on a CO_2e basis) represent at least 5% of the sum of their total scope 3 GHG emissions.

CHEM-C5. Companies may set a target on shares of alternative feedstock purchased for use in activities within the scope of the chemicals sectoral boundary using the activity-specific pathway described in this document, if combined scope 1, 2, and 3 emissions associated with such activities represent at least 5% of the sum of their total scope 1, 2, and 3 GHG emissions.

CHEM-C6. When setting targets using an activity-specific pathway, companies shall adhere to the boundary of activities for the pathway and any other applicable target calculation requirements described in this document.

CHEM-C7. When setting targets using an activity-specific pathway, companies shall use the SBTi Chemicals Sector Target-Setting Tool to establish the minimum level of ambition for their target(s).

CHEM-C8. When setting additional targets for activities or emissions not covered within the activity-specific pathways, companies shall use other applicable metrics, methods, and pathways from relevant SBTi Standards, guidance, and/or criteria.

ACTIVITY-SPECIFIC CRITERIA FOR IMPLEMENTING PATHWAYS

ACTIVITY-SPECIFIC CRITERIA FOR IMPLEMENTING PATHWAYS

2.1 SCOPE 1 N_2O EMISSIONS FROM NITRIC ACID PRODUCTION

Pathway description and use

This mandatory pathway is intended for modeling of targets on scope 1 N_2O emissions from nitric acid production activities. The benchmark value used in target formulation is shown in Table 2. For background on how this value was calculated, please see the SBTi Chemicals Sector Pathways Synthesis Report. This value is integrated into the SBTi Chemicals Sector Target-Setting Tool that is to be used when formulating targets.

Table 2. Activity-specific benchmark value for scope 1 N_2O emissions from nitric acid production.

Scope 1 N_2O emissions intensity (kg N_2O / t nitric acid)	0.5

CHEM-C1.2. When using the pathway, emissions from the sources defined in Table 3 shall be included (or excluded) in the target boundary.

Table 3. Target boundary requirements for activity-specific target on N_2O emissions from nitric acid production.

BOUNDARY REQUIREMENT	DESCRIPTION OF EMISSIONS SOURCES
Emissions sources and related production which shall be included in the activity-specific nitric acid pathway target:	All scope 1 emissions of N_2O from the production of nitric acid.
Emissions sources which shall not be included in the activity-specific nitric pathway target: These emissions sources may need to be addressed via other applicable pathways, as needed, to ensure the minimum target coverage criteria from the SBTi Corporate Net-Zero Standard and/or Corporate Near-Term Criteria are met.	Scope 2 emissions, scope 3 emissions, and scope 1 CO_2 emissions associated with the production of nitric acid.
	Upstream emissions associated with feedstocks or fuels.

CHEM-C1.3. Companies shall determine the following when establishing a target using the activity-specific pathway:

- 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 and the year chosen as the basis for target formulation.
- Estimated nitric acid production five years from the year chosen for target formulation, if their base year emissions intensity is greater than 0.5 kg N_2O / t nitric acid.

2.2 GHG EMISSIONS FROM AMMONIA PRODUCTION FOR NON-ENERGY PURPOSES

Pathway description and use

This optional pathway is intended for modeling of targets on GHG emissions from ammonia production activities for exclusively non-energy uses. Companies wishing to address emissions from the production of ammonia for both non-energy and energy carrier purposes may instead use the pathway described in section 2.3. Emissions from these activities may be addressed via other pathways, as applicable, to ensure the minimum target coverage criteria from the SBTi Corporate Net-Zero Standard and/or Corporate Near-Term Criteria are met.

Pathway values based on the underlying emissions scenario are shown in Table 4. For background on how these data were calculated, please see the SBTi Chemicals Sector Pathways Synthesis Report. An expanded data table for all years is provided in Annex C. The pathway data is integrated into the SBTi Chemicals Sector Target-Setting Tool that is to be used when formulating targets.

Table 4 Activity-specific pathway data for emissions intensity from ammonia production for non-energy purposes.

YEAR	TOTAL EMISSIONS FROM HEAT, PROCESS, AND ELECTRICITY *Mt CO_2*	AMMONIA PRODUCTION (NON-ENERGY PURPOSES ONLY) *Mt ammonia*	TOTAL EMISSIONS INTENSITY (NON-ENERGY PURPOSES ONLY) *t CO_2 / t ammonia*
2020	483.5	185	2.61
2030	360	205	1.76
2040	157.9	220	0.72
2050	20.6	230	0.0

CHEM-C2.1.1. Companies shall use this pathway or the pathway that includes ammonia production for both non-energy and energy carrier purposes, but not both.

CHEM-C2.1.2. When using the pathway, emissions from the sources defined in Table 5 shall be included (or excluded) regardless of whether these emissions occur within scope 1, 2, or 3.

Table 5. Target boundary requirements for activity-specific ammonia pathway target for non-energy uses.

BOUNDARY REQUIREMENT	DESCRIPTION OF EMISSIONS SOURCES
Emissions sources and related production which shall be included in the activity-specific ammonia pathway target:	Heat, process, and electricity-related emissions from the production of hydrogen used to produce the ammonia, regardless of whether these emissions occur from processes operated by the company or from imported heat or electricity. This shall include all GHG emissions that are associated with the heat consumption of the hydrogen production process.
	Heat, process, and electricity-related emissions from the production of nitrogen used to produce the ammonia, regardless of whether these emissions occur from processes operated by the company or from imported heat or electricity. This shall include all GHG emissions that are associated with the heat consumption of the ammonia production process.
	Heat, process, and electricity-related emissions from the synthesis of ammonia, regardless of whether these emissions occur from processes operated by the company or from imported heat or electricity.
	Production of ammonia for non-energy end purposes only.
Emissions sources which shall not be included in the activity-specific ammonia pathway target: *These emissions sources may need to be addressed via other applicable pathways, as needed, to ensure the minimum target coverage criteria from the SBTi Corporate Net-Zero Standard and/or Corporate Near-Term Criteria are met.*	Any emissions associated with the production of ammonia that is produced for use as an energy carrier.
	Upstream emissions associated with feedstocks or fuels (e.g., CH_4 emissions from purchased natural gas production and transport).
	Emissions of CO_2 from the use of urea-containing products (e.g., fertilizers). Such emissions shall be considered within a company's scope 3 emissions inventory outside of the activity-specific target boundary per the GHG Protocol.

CHEM-C2.1.3. Companies shall estimate production of ammonia intended for non-energy purposes in the chosen target year when establishing a target using the activity-specific pathway. This shall include all production from all of the processes included within the target boundary. This 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 five-year review that the estimate is inaccurate, it shall revise its target using the updated estimate.

Recommendations for use of the pathway:

CHEM-R2.1.1. Companies should use primary data when calculating emissions within the ammonia activity-specific pathway boundary; however, secondary sources or average data may be used in the absence of primary data for calculating scope 3 emissions within the boundary.

CHEM-R2.1.2. Companies should use primary data when estimating the amount of ammonia sold for non-energy purposes. In the absence of primary data, companies may make estimates for the amount of ammonia sold for non-energy purposes based on best available data.

2.3 GHG EMISSIONS FROM AMMONIA PRODUCTION FOR ALL PURPOSES

Pathway description and use

This optional pathway is intended for modeling of targets on GHG emissions from ammonia production activities for non-energy and energy carrier purposes. Companies wishing to address emissions from the production of ammonia for exclusively non-energy purposes may use the pathway described in section 2.3. Emissions from these activities may be addressed via other pathways, as applicable, to ensure the minimum target coverage criteria from the SBTi Corporate Net-Zero Standard and/or Corporate Near-Term Criteria are met.

Pathway values based on the underlying emissions scenario are shown in Table 5. For background on how these data were calculated, please see the SBTi Chemicals Sector Pathways Synthesis Report. An expanded data table for all years is provided in Annex C. The pathway data is integrated into the SBTi Chemicals Sector Target-Setting Tool that is to be used when formulating targets.

Table 6. Activity-specific pathway data for emissions intensity from ammonia production for all uses.

YEAR	TOTAL EMISSIONS FROM HEAT, PROCESS, AND ELECTRICITY *Mt CO_2*	AMMONIA PRODUCTION (ALL PURPOSES) *Mt ammonia*	TOTAL EMISSIONS INTENSITY (ALL PURPOSES) *t CO_2 / t ammonia*
2020	483.5	185	2.61
2030	360	283	1.27
2040	157.9	424	0.37
2050	20.6	560	0.04

CHEM-C2.2.1. Companies may use this pathway or the pathway that includes ammonia production for non-energy purposes only, but not both.

CHEM-C2.2.2. When using the pathway, emissions from the sources defined in Table 7 shall be included (or excluded) regardless of whether these emissions occur within scope 1, 2, or 3.

Table 7. Target boundary requirements for activity-specific ammonia pathway target for all uses.

BOUNDARY REQUIREMENT	DESCRIPTION OF EMISSIONS SOURCES
Emissions sources and related production which shall be included in the activity-specific ammonia pathway target:	Heat, process, and electricity-related emissions from the production of hydrogen used to produce the ammonia, regardless of whether these emissions occur from processes operated by the company or from imported heat or electricity. This shall include all GHG emissions that are associated with the heat consumption of the hydrogen production process.
	Heat, process, and electricity-related emissions from the production of nitrogen used to produce the ammonia, regardless of whether these emissions occur from processes operated by the company or from imported heat or electricity. This shall include all GHG emissions that are associated with the heat consumption of the ammonia production process.
	Heat, process, and electricity-related emissions from the synthesis of ammonia, regardless of whether these emissions occur from processes operated by the company or from imported heat or electricity.
	Production of ammonia for all end purposes.
Emissions sources which shall not be included in the activity-specific ammonia pathway target: *These emissions sources may need to be addressed via other applicable pathways, as needed, to ensure the minimum target coverage criteria from the SBTi Corporate Net-Zero Standard and/or Corporate Near-Term Criteria are met.*	Upstream emissions associated with feedstocks or fuels (e.g., CH_4 emissions from purchased natural gas production and transport).
	Emissions of CO_2 from the use of urea-containing products (e.g., fertilizers). Such emissions shall be considered within a company's scope 3 emissions inventory outside of the activity-specific target boundary per the GHG Protocol.

CHEM-C2.2.3. Companies shall estimate production of ammonia intended for all purposes in the chosen target year when establishing a target using the activity-specific pathway. This shall include all production from all of the processes included within the target boundary. This shall also be based on the company's best estimates of future production. If a company concludes that the estimate is inaccurate, after its target has been set but before the mandatory five-year review, it shall revise its target using the updated estimate.

Recommendations for use of the pathway:

CHEM-R2.2.1. Companies should use primary data when calculating emissions within the ammonia activity-specific pathway boundary; however, secondary sources or average data may be used in the absence of primary data for calculating scope 3 emissions within the boundary.

CHEM-R2.2.2. Companies should use primary data when estimating the amount of ammonia produced. In the absence of primary data, companies may make estimates for the amount of ammonia produced based on the best available data.

2.4 GHG EMISSIONS FROM METHANOL PRODUCTION

Pathway description and use

This optional pathway is intended for modeling of targets on GHG emissions from methanol production activities for non-energy purposes. Emissions from these activities may be addressed via other pathways, as applicable, to ensure the minimum target coverage criteria from the SBTi Corporate Net-Zero Standard and/or Corporate Near-Term Criteria are met.

Pathway values based on the underlying emissions scenario are shown in Table 8. For background on how these data were calculated, please see the SBTi Chemicals Sector Pathways Synthesis Report. An expanded data table for all years is provided in Annex C. The pathway data is integrated into the SBTi Chemicals Sector Target-Setting Tool that is to be used when formulating targets.

Table 8. Activity-specific pathway data for emissions intensity from methanol production.

YEAR	TOTAL EMISSIONS FROM HEAT, PROCESS, AND ELECTRICITY *Mt CO_2*	METHANOL PRODUCTION (NON-ENERGY PURPOSES ONLY) *Mt methanol*	TOTAL EMISSIONS INTENSITY (NON-ENERGY PURPOSES ONLY) *t CO_2 / t methanol*
2020	255.5	99	2.58
2030	242.0	127	1.91
2040	140.4	136	1.03
2050	12.3	133	0.09

CHEM-C2.3.1. When using the pathway, emissions from the sources defined in Table 9 shall be included (or excluded) regardless of whether these emissions occur within scope 1, 2, or 3.

Table 9. Target boundary requirements for activity-specific methanol pathway target.

BOUNDARY REQUIREMENT	DESCRIPTION OF EMISSIONS SOURCES
Emissions sources and related production which shall be included in the activity-specific methanol pathway target:	Heat, process, and electricity-related emissions from the production of hydrogen and/or syngas used to produce the methanol, regardless of whether these emissions occur from processes operated by the company or from imported heat or electricity. This shall include all GHG emissions that are associated with the heat consumption of the hydrogen and/or syngas production processes.
	Heat, process, and electricity-related emissions from the synthesis of methanol, regardless of whether these emissions occur from processes operated by the company or from imported heat or electricity. This shall include all GHG emissions that are associated with the heat consumption of the methanol production process.
	Heat, process, and electricity-related emissions associated with the production or capture of the CO_2, if a supplemental source of CO_2 is used to synthesize methanol, regardless of whether these emissions occur from processes operated by the company or from imported heat or electricity.
Emissions sources which shall not be included in the activity-specific ammonia pathway target: *These emissions sources may need to be addressed via other applicable pathways, as needed, to ensure the minimum target coverage criteria from the SBTi Corporate Net-Zero Standard and/or Corporate Near-Term Criteria are met.*	Any emissions associated with the production of methanol that is produced for direct energy supply purposes (e.g., as a fuel)[5]. Emissions from such production shall be covered using the SBTi Corporate Net-Zero Standard and SBTi Corporate Near-Term Criteria.
	Upstream emissions associated with feedstocks or fuels (e.g., CH_4 emissions from purchased natural gas production and transport).

CHEM-C2.3.2. Companies shall estimate production of methanol intended for non-energy purposes in the chosen target year when establishing a target using the activity-specific pathway. This shall include all production from all of the processes included within the target boundary. This shall also be based on the company's best estimates of future production. If a company concludes that the estimate is inaccurate, after its target has been set but before the mandatory five-year review, it shall revise its target using the updated estimate.

Recommendations for use of the pathway:

CHEM-R2.3.1. Companies should use primary data when calculating emissions within the methanol activity-specific target boundary; however, secondary sources or average data may be used in the absence of primary data for calculating scope 3 emissions within the boundary.

CHEM-R2.3.2. Companies should use primary data when estimating the amount of methanol sold for non-energy and energy purposes (if applicable). 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.

5 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.

2.5 GHG EMISSIONS FROM HVC PRODUCTION

Pathway description and use

This optional pathway is intended for modeling of targets on GHG emissions from HVC production activities. Emissions from these activities may be addressed via other pathways, as applicable, to ensure the minimum target coverage criteria from the SBTi Corporate Net-Zero Standard and/or Corporate Near-Term Criteria are met.

Pathway values based on the underlying emissions scenario are shown in Table 10. For background on how these data were calculated, please see the SBTi Chemicals Sector Pathways Synthesis Report. An expanded data table for all years is provided in Annex C. The pathway data is integrated into the SBTi Chemicals Sector Target-Setting Tool that is to be used when formulating targets.

Table 10. Activity-specific pathway data for emissions intensity from HVC production.

YEAR	TOTAL EMISSIONS FROM HEAT, PROCESS, AND ELECTRICITY *Mt CO_2*	HVC PRODUCTION *Mt HVC*	TOTAL EMISSIONS INTENSITY *t CO_2 / t HVC*
2020	260.3	245	1.06
2030	255.4	309	0.83
2040	152.5	330	0.46
2050	14.1	325	0.04

CHEM-C2.4.1. When using the pathway, emissions from the sources defined in Table 11 shall be included (or excluded) regardless of whether these emissions occur within scope 1, 2, or 3. Companies 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.

CHEM-C2.4.2. 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 pathway. The boundary of targets set using the activity-specific pathway for HVC production shall include 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 shall be included.

Table 11. Target boundary requirements for activity-specific HVC pathway target.

BOUNDARY REQUIREMENT	DESCRIPTION OF EMISSIONS SOURCES
Emissions sources and related production which shall be included in the activity-specific HVC pathway target:	Heat, process, and electricity-related emissions from the direct production of HVC, regardless of whether these emissions occur from processes operated by the company or from imported heat or electricity. This shall include all GHG emissions that are associated with the heat consumption of the HVC production process.
Emissions sources which shall not be included in the activity-specific HVC pathway target: *These emissions sources may need to be addressed via other applicable pathways, as needed, to ensure the minimum target coverage criteria from the SBTi Corporate Net-Zero Standard and/or Corporate Near-Term Criteria are met.*	Emissions from production of HVC that occur within refineries. Emissions from such production shall be covered using other available target-setting methods.
	Upstream emissions associated with feedstocks or fuels (e.g., emissions from refining of crude oil into naphtha).

CHEM-C2.4.3. Companies shall estimate production of HVC in the chosen target year when establishing a target using the activity-specific pathway. This shall include all production from all of the processes included within the target boundary. This shall also be based on the company's best estimates of future production. If a company concludes that the estimate is inaccurate, after its target has been set but before the mandatory five-year review, it shall revise its target using the updated estimate.

Recommendations for use of the pathway:

CHEM-R2.4.1. Companies should use primary data when calculating emissions within the HVC activity-specific pathway boundary; however, secondary sources or average data may be used in the absence of primary data for calculating scope 3 emissions within the boundary.

2.6 SCOPE 1 GHG EMISSIONS FROM NON-PRIMARY CHEMICAL PRODUCTION

Pathway description and use

This optional pathway is intended for modeling of targets on scope 1 GHG emissions from non-primary chemical production activities. Emissions from these activities may be addressed via other pathways, as applicable, to ensure the minimum target coverage criteria from the SBTi Corporate Net-Zero Standard and/or Corporate Near-Term Criteria are met.

Pathway values based on the underlying emissions scenario are shown in Table 12. For background on how these data were calculated, please see the SBTi Chemicals Sector Pathways Synthesis Report. An expanded data table for all years is provided in Annex C. The pathway data is integrated into the SBTi Chemicals Sector Target-Setting Tool that is to be used when formulating targets.

Table 12. Activity-specific pathway data for scope 1 CO_2 emissions from non-primary chemical production.

YEAR	TOTAL EMISSIONS *Mt CO_2*	ABSOLUTE EMISSIONS REDUCTION FROM 2020 REFERENCE YEAR *%*
2020	373	–
2030	355	4.8
2040	224	39.9
2050	20	94.6

CHEM-C3.1. When using the pathway, emissions from the sources defined in Table 13 shall be included (or excluded) in the target boundary.

Table 13. Target boundary requirements for activity-specific non-primary chemical production pathway target.

BOUNDARY REQUIREMENT	DESCRIPTION OF EMISSIONS SOURCES
Emissions sources that may be included in the activity-specific non-primary chemical pathway target:	Scope 1 heat and process[6] emissions of CO_2 from the direct production of non-primary chemical products that fall within the chemicals sectoral boundary.
	Scope 1 emissions of CH_4 and N_2O from combustion associated with the direct production of non-primary chemical products that fall within the chemicals sectoral boundary.
Emissions sources which shall not be included in the activity-specific non-primary chemical pathway target: *These emissions sources may need to be addressed via other applicable pathways, as needed, to ensure the minimum target coverage criteria from the SBTi Corporate Net-Zero Standard and/or Corporate Near-Term Criteria are met.*	Scope 2 emissions associated with the purchase of power, steam, or heat used in the production of non-primary chemical products that fall within the chemicals sectoral boundary. These emissions shall be covered using other available target-setting methods.
	Scope 1 GHG emissions associated with self-generated electricity, even if this electricity is used in the production of non-primary chemicals. These emissions shall be covered using other available target-setting methods.
	Scope 1, 2, or 3 emissions from the production of primary chemicals. This includes emissions from the production of ammonia for use as an energy carrier. Emissions from such production shall be covered using other available target-setting methods.
	Scope 1 process emissions from non-CO_2 GHGs.
	Emissions from production of chemicals that occur within refineries. Emissions from such production shall be covered using other available target-setting methods.
	Upstream emissions associated with feedstocks or fuels (e.g., emissions from refining of crude oil into naphtha).

6 The pathway on which the activity-specific non-primary chemicals pathway is based does not consider direct CO_2 process emissions within the model scope. However, for ease of target implementation, companies may include process emissions within the non-primary chemical activity-specific target boundary.

2.7 SCOPE 3 CATEGORY 11 N_2O EMISSIONS FROM SOLD NITROGEN FERTILIZERS

Pathway description and use

This optional pathway is intended for modeling of targets on scope 3 category 11 N_2O emissions from the use-phase of sold nitrogen fertilizers. Emissions from these activities may be addressed via other target-setting methods, as applicable, to ensure the minimum target coverage criteria from the SBTi Corporate Net-Zero Standard and/or Corporate Near-Term Criteria are met.

Near-term and long-term targets set using this pathway are based on the levels of ambition calculated, as shown in Table 14. The pathway data is integrated into the SBTi Chemicals Sector Target-Setting Tool that is to be used when formulating targets.

Table 14. Activity-specific pathway data for scope 3 category 11 emissions of N_2O from sold nitrogen fertilizers.

% reduction applicable for near-term targets	Near-term ambition based on 13% reduction between 2020 and 2030 from the reference pathway.
% reduction applicable for net-zero targets	Long-term ambition based on 17% reduction between 2020 and 2050 from the reference pathway.

CHEM-C4.1. When using the pathway, emissions from the sources defined in Table 15 shall be included (or excluded) in the target boundary.

Table 15. Target boundary requirements for activity-specific scope 3 category 11 N2O emissions from sold nitrogen fertilizers target

BOUNDARY REQUIREMENT	DESCRIPTION OF EMISSIONS SOURCES
Emissions sources that may be included in the activity-specific scope 3 category 11 N_2O emissions target from sold nitrogen fertilizers:	Scope 3 emissions of N_2O that occur in the use-phase of nitrogenous fertilizers sold by the company.
Emissions sources which shall not be included in the activity-specific scope 3 category 11 N_2O emissions target from sold nitrogen fertilizers. These emissions sources may need to be addressed via other applicable pathways, as needed, to ensure the minimum target coverage criteria from the SBTi Corporate Net-Zero Standard and/or Corporate Near-Term Criteria are met.	Scope 3 emissions of GHGs other than N_2O that occur in the use-phase of nitrogenous fertilizers sold by the company (e.g., CO_2 emissions from urea-based products).

CHEM-C4.2. Emissions of N_2O in scope 3 category 11 from the use of sold nitrogen fertilizers shall not count toward the calculation of the 20% applicability threshold for the SBTi FLAG Guidance. If companies have other FLAG related emissions, these shall be considered toward the 20% applicability threshold. Also, companies shall follow the FLAG Guidance if they trigger any other direct applicability criteria in the FLAG Guidance.

CHEM-C4.3. If a company's calculated near-term target exceeds the level of ambition of a long-term target for the same base year, companies may set their near-term level of ambition equivalent to the long-term level of ambition. Companies are not required to set a net-zero target in order for this sub-criterion to apply.

Recommendations for use of the pathway:

CHEM-R4.1. 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.

2.8 TARGET-SETTING ON SOURCING OF ALTERNATIVE FEEDSTOCKS

Pathway description and use

This optional pathway is intended for the recommended modeling of alignment targets on shares of purchased alternative feedstocks.

Pathway values based on the underlying emissions scenario are shown in Table 16. For background on how these data were calculated, please see the SBTi Chemicals Sector Pathways Synthesis Report. The pathway data is integrated into the SBTi Chemicals Sector Target-Setting Tool that is to be used when formulating targets.

Table 16. Activity-specific pathway data for alignment targets on % of purchased alternative feedstock

YEAR	MINIMUM SHARE OF PURCHASED ALTERNATIVE FEEDSTOCKS EXCLUDING MECHANICAL RECYCLING *wt % of Carbon*	MINIMUM SHARE OF PURCHASED ALTERNATIVE FEEDSTOCKS INCLUDING MECHANICAL RECYCLING *wt % of Carbon*
2020	0	4
2021	2	6
2022	4	8
2023	7	11
2024	9	13
2025	11	15
2026	11	16
2027	12	17
2028	12	17
2029	13	18
2030	14	19
2031	14	20
2032	15	21
2033	16	22

YEAR	MINIMUM SHARE OF PURCHASED ALTERNATIVE FEEDSTOCKS EXCLUDING MECHANICAL RECYCLING *wt % of Carbon*	MINIMUM SHARE OF PURCHASED ALTERNATIVE FEEDSTOCKS INCLUDING MECHANICAL RECYCLING *wt % of Carbon*
2034	17	23
2035	18	25
2036	19	27
2037	21	29
2038	23	31
2039	24	33
2040	26	34
2041	27	37
2042	29	39
2043	30	41
2044	32	42
2045	33	44
2046	35	47
2047	36	48
2048	37	50
2049	39	51
2050	42	55

CHEM-C5.1. Companies shall set the target(s) on the total company-wide share of alternative carbon-based feedstocks they utilize via the activities in the scope of this pathways criteria document.

CHEM-C5.2. Feedstocks that are purchased in the reporting year, but stockpiled for use in future years, shall not be included in either the alternative feedstocks nor virgin fossil-based feedstocks portion when calculating the company's share of alternative feedstocks until those materials are utilized.

7 Mechanical recycling itself as an activity is still excluded from the scope of the chemicals sector for the purposes of this document.

CHEM-C5.3. Companies may exclude the feedstocks used for production of ammonia for purposes other than conversion to urea from the scope of this target.

CHEM-C5.4. Companies shall calculate and report the proportion (expressed as a wt % of carbon) of alternative feedstocks from all sources, within the boundary of this target, in their chosen base year. This proportion is relative to the sum of total carbon (from both virgin fossil and alternative feedstocks) used as feedstock in the company's operational boundary.

CHEM-C5.5. 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.

CHEM-C5.6. Target(s) shall be calculated in line with the normative instructions provided in Annex B.

CHEM-C5.7. Companies including material outputs from mechanical recycling technologies as alternative feedstocks 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.[7]

CHEM-C5.8. Companies shall define a strategy to achieve the target percentage of alternative feedstocks.

Recommendations for use of the pathway:

CHEM-R5.1. Companies setting a company-wide net-zero target should include a net-zero target set using this pathway.

CHEM-R5.2. Companies should use primary data when calculating the share of feedstocks within the target boundary; however, secondary sources or average data may be used in the absence of primary data.

ANNEX A: KEY TERMS

ANNEX A: KEY TERMS

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 SBTi Chemical Sector Pathways and Implementation Criteria development is provided here:

TERM	DEFINITION
Alternative feedstocks	Carbon-based feedstocks to chemical processes that are of the following origin: • Bio-based (e.g., bio-oils, bioethanol, dry biomass, wet biomass). • Feedstocks produced from chemical recycling technologies (e.g., pyrolysis oil) based on post-consumer wastes. • Material outputs from mechanical recycling technologies based on post-consumer wastes. • CO_2 and/or CO from Carbon Capture and Utilization (CCU) sources (point-source captured CO_2), regardless of whether the CO_2 or CO has a fossil or a bio-origin, provided the CO_2 or CO 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).[8] • 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 that is used as maritime fuel or as a long-distance energy carrier for hydrogen.
Alternative feedstocks	Biobased feedstocks are those containing biogenic carbon, defined as carbon derived from living organisms or biological processes, but not fossilized materials or from fossil sources.[9]
Chemical recycling technologies	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.
Chemicals sectoral boundary	Production activities that synthesize products falling within the following activity categories. Each activity is defined in this Annex A. • The production of primary chemicals. • The production of other base chemicals. • The production of intermediate chemicals. • The production of specialty chemicals. • The production of consumer chemicals. • The production of pharmaceuticals. • Chemical recycling activities.

8 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 feedstocks".

9 Definition partially adapted from the GHG Protocol's DRAFT Land Sector and Removals Guidance (GHG Protocol, 2022) (https://ghgprotocol.org/land-sector-and-removals-guidance).

TERM	DEFINITION
Consumer chemicals	Chemicals for use in personal care and household purposes, such as cleaning products, cosmetics, and hygiene products.[10]
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.[11]
High value chemicals (HVCs)	The following chemicals are considered HVCs for the purpose of this pathways criteria document: ethylene and propylene (together classified as olefins), benzene, toluene, and mixed xylenes (together classified as aromatics).
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, urea, ammonium nitrate, 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 hydrogen produced from fossil fuels equipped with CCS technology. Production from fossil fuels with CCS is only included 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.[12,13]
Mechanical recycling technologies	Recycling technologies that do not alter the basic chemical structure of a material.
Merchant hydrogen	Hydrogen produced by one company to sell to others.[14]
Methanol as an energy carrier	Methanol that is produced for the purpose of being used as a fuel or (as methanol) as a fuel additive. Methanol converted to fuel additives, such as MTBE, is not considered an energy carrier in this definition.
Non-primary chemicals	All chemicals, other than primary chemicals or nitric acid, that fall within the chemicals sectoral boundary, as defined in this pathways criteria document.
Other base chemicals	Base chemicals not included in the definition of primary chemicals, such as acids, bases, alkalis, and industrial gases.

10 Definitions adapted from CDP's Activity Classification System (CDP-ACS).

11 Definition from the GHG Protocol (GHG Protocol, 2004).

12 Definitions adapted from IEA (IEA, 2023).

13 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", e.g., the United Kingdom's (UK) Low Carbon Hydrogen Standard.

14 Definition adapted from IEA (IEA, 2021).

TERM	DEFINITION
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).
Primary data	Data from specific activities within a company's value chain (e.g., data provided by suppliers related to their specific activities) (GHG Protocol, 2011).
Process emissions from chemical processes	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, such as 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.
Secondary data	Data that is not from specific activities within a company's value chain (e.g., industry averages, proxy data, etc.) (GHG Protocol, 2011).
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.[15]

15 Definitions adapted from CDP's Activity Classification System (CDP-ACS).

ANNEX B: SETTING TARGETS ON SHARES OF ALTERNATIVE FEEDSTOCKS

ANNEX B: SETTING TARGETS ON SHARES OF ALTERNATIVE FEEDSTOCKS

This annex outlines the steps to calculate targets using the activity-specific alignment pathway for the sourcing of alternative feedstocks, which is an option introduced in this document as a recommendation.

The percentage of alternative feedstocks in each year shall be calculated based on the share of carbon content from alternative feedstock sources 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 feedstocks 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 shall be included within the alternative feedstocks category, and the calculated target threshold shall 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.

$$\textit{Mass C-content Feedstock (Mt C)} = \textit{Mass Ethane Feedstock (Mt } C_2H_6\textit{) x (24 g/mol C)/ (30.1 g/mol } C_2H_6\textit{)}$$

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

$$\textit{Wt. \% Alternative Feedstock} = \frac{\textit{Sum of Mass of C-content of All Alternative Feedstocks (Mt)}}{\textit{Sum of Mass of C-content of All Alternative Feedstocks (Mt)} + \textit{Sum of Mass of C-content of All Virgin Fossil-based feedstocks (Mt)}}$$

If setting near-term targets only:

2. Establish the near-term target year.

3. Calculate the minimum target percentage of alternative feedstocks, 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 feedstocks.

4 The target will be set based on the following considerations:

a. If the company's percentage of alternative feedstocks 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 feedstocks range in the target year in the tool

b. If the company's percentage of alternative feedstocks 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 feedstocks. 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, toward the alternative feedstocks target.[16]

If setting a net-zero target:

5 Follow the steps outlined above for setting a near-term target. Interim near-term targets shall be set as part of a net-zero target.

6 Establish the net-zero target year being used for all relevant net-zero targets. The net-zero target year shall be no later than 2050.

7 The target will be set based on the following considerations:

a. If the company's percentage of alternative feedstocks in the base year is lower than the minimum percentage required in 2050 from the tool, the company shall set a net-zero target at or above the minimum value from the pathway for 2050. The target shall be in units of wt % carbon of alternative feedstocks purchased. Companies are recommended to set a net-zero target at least at the level of the recommended value in the tool and may set a target up to 100% of alternative feedstocks.

b. If the company's percentage of alternative feedstocks in the base year is higher than the minimum percentage required in 2050 from the tool, the company shall, at a minimum, establish a maintenance target to maintain their base year share of alternative feedstocks. Companies are recommended to set a net-zero target at least at the level of the recommended value in the tool and may set a target up to 100% of alternative feedstocks.

8 Companies may count alternative feedstocks that are partially used as fuel in their processes, due to the inherent process dynamics of the chemical process, toward the alternative feedstocks target.

16 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.

ANNEX C: ACTIVITY-SPECIFIC PATHWAY DATA

ANNEX C: ACTIVITY-SPECIFIC PATHWAY DATA

This annex contains the underlying data for each activity-specific pathway included in the SBTi Chemical Sector Pathways and Implementation Criteria.

Data in Tables C.1, C.2, C.3, and C.4 in bold font are directly taken from, or calculated based on, the data sources underlying the pathway, as described in the SBTi Chemicals Sector Pathways Synthesis Report.

Table C.1 Activity-specific pathway data for emissions from ammonia production.

YEAR	TOTAL EMISSIONS FROM HEAT, PROCESS, AND ELECTRICITY *Mt CO_2*	AMMONIA PRODUCTION (NON-ENERGY PURPOSES ONLY) *Mt ammonia*	AMMONIA PRODUCTION (ALL PURPOSES) *Mt ammonia*	TOTAL EMISSIONS INTENSITY (NON-ENERGY PURPOSES ONLY) *t CO_2 / t ammonia*	TOTAL EMISSIONS INTENSITY (ALL PURPOSES) *t CO_2 / t ammonia*
2020	**483.5**	**185**	**185**	**2.61**	**2.61**
2021	472.5	187	194.8	2.53	2.43
2022	461.5	189	204.6	2.44	2.26
2023	450.5	191	214.4	2.36	2.10
2024	439.5	193	224.2	2.28	1.96
2025	428.5	195	234	2.20	1.83
2026	416.9	197	243.8	2.12	1.71
2027	403.5	199	253.6	2.03	1.59
2028	389.5	201	263.4	1.94	1.48
2029	375	203	273.2	1.85	1.37
2030	**360**	**205**	**283**	**1.76**	**1.27**
2031	340.5	206.5	297.1	1.65	1.15
2032	321	208	311.2	1.54	1.03
2033	301.5	209.5	325.3	1.44	0.93
2034	282	211	339.4	1.34	0.83
2035	262.5	212.5	353.5	1.24	0.74

YEAR	TOTAL EMISSIONS FROM HEAT, PROCESS, AND ELECTRICITY *Mt CO_2*	AMMONIA PRODUCTION (NON-ENERGY PURPOSES ONLY) *Mt ammonia*	AMMONIA PRODUCTION (ALL PURPOSES) *Mt ammonia*	TOTAL EMISSIONS INTENSITY (NON-ENERGY PURPOSES ONLY) *t CO_2 / t ammonia*	TOTAL EMISSIONS INTENSITY (ALL PURPOSES) *t CO_2 / t ammonia*
2036	243	214	367.6	1.14	0.66
2037	223.5	215.5	381.7	1.04	0.59
2038	203.1	217	395.8	0.94	0.51
2039	180.8	218.5	409.9	0.83	0.44
2040	**157.9**	**220**	**424**	**0.72**	**0.37**
2041	144.8	221	437.6	0.66	0.33
2042	131.5	222	451.2	0.59	0.29
2043	118.1	223	464.8	0.53	0.25
2044	104.5	224	478.4	0.47	0.22
2045	90.8	225	492	0.40	0.18
2046	77	226	505.6	0.34	0.15
2047	63.1	227	519.2	0.28	0.12
2048	49	228	532.8	0.22	0.09
2049	34.9	229	546.4	0.15	0.06
2050	**20.6**	**230**	**560**	**0.09**	**0.04**

Data for direct emissions and production for ammonia in years between 2020, 2030, 2040, and 2050 were calculated based on linear interpolation. Data for electricity usage in years between 2020, 2030, 2040, and 2050 were calculated based on linear interpolation, modified with an assumption that there is no increase in electricity-related emissions from the prior year. This has been done to prevent temporary increases in total emissions from electricity generation that occur as a result of rapid increases in electricity usage projected due to a rise in the use of electrolysis to produce hydrogen.

Table C.2 Activity-specific pathway data for emissions from methanol production.

YEAR	TOTAL EMISSIONS FROM HEAT, PROCESS, AND ELECTRICITY *Mt CO_2*	METHANOL PRODUCTION (NON-ENERGY PURPOSES ONLY) *Mt methanol*	TOTAL EMISSIONS INTENSITY (NON-ENERGY PURPOSES ONLY) *t CO_2 / t methanol*
2020	**255.5**	**99**	**2.58**
2021	255.5	101.8	2.51
2022	255.5	104.6	2.44
2023	255.5	107.4	2.38
2024	255.5	110.2	2.32
2025	255.5	113	2.26

YEAR	TOTAL EMISSIONS FROM HEAT, PROCESS, AND ELECTRICITY *Mt CO_2*	METHANOL PRODUCTION (NON-ENERGY PURPOSES ONLY) *Mt methanol*	TOTAL EMISSIONS INTENSITY (NON-ENERGY PURPOSES ONLY) *t CO_2 / t methanol*
2026	254.9	115.8	2.20
2027	252.5	118.6	2.13
2028	249.5	121.4	2.06
2029	246.0	124.2	1.98
2030	**242.0**	**127**	**1.91**
2031	232.5	127.9	1.82
2032	222.9	128.8	1.73
2033	213.1	129.7	1.64
2034	203.1	130.6	1.56
2035	193.0	131.5	1.47
2036	182.7	132.4	1.38
2037	172.3	133.3	1.29
2038	161.8	134.2	1.21
2039	151.2	135.1	1.12
2040	**140.4**	**136**	**1.03**
2041	127.8	135.7	0.94
2042	115.1	135.4	0.85
2043	102.3	135.1	0.76
2044	89.5	134.8	0.66
2045	76.7	134.5	0.57
2046	63.9	134.2	0.48
2047	51.0	133.9	0.38
2048	38.1	133.6	0.29
2049	25.2	133.3	0.19
2050	**12.3**	**133**	**0.09**

Data for direct emissions and production for methanol in years between 2020, 2030, 2040, and 2050 were calculated based on linear interpolation. Data for electricity usage in years between 2020, 2030, 2040, and 2050 were calculated based on linear interpolation, modified with an assumption that there is no increase in electricity-related emissions from the prior year. This has been done to prevent temporary increases in total emissions from electricity generation that occur as a result of rapid increases in electricity usage projected due to a rise in the use of electrolysis to produce hydrogen.

Table C.3 Activity-specific pathway data for emissions from HVC production.

YEAR	TOTAL EMISSIONS FROM HEAT, PROCESS, AND ELECTRICITY *Mt CO_2*	HVC PRODUCTION *Mt HVC*	TOTAL EMISSIONS INTENSITY *t CO_2 / t HVC*
2020	**260.3**	**245**	**1.06**
2021	260.3	251.4	1.04
2022	260.2	257.8	1.01
2023	260.0	264.2	0.98
2024	259.7	270.6	0.96
2025	259.2	277	0.94
2026	258.7	283.4	0.91
2027	258.0	289.8	0.89
2028	257.3	296.2	0.87
2029	256.4	302.6	0.85
2030	**255.4**	**309**	**0.83**
2031	245.3	311.1	0.79
2032	235.2	313.2	0.75
2033	225.0	315.3	0.71
2034	214.8	317.4	0.68
2035	204.5	319.5	0.64
2036	194.2	321.6	0.60
2037	183.8	323.7	0.57
2038	173.4	325.8	0.53
2039	163.0	327.9	0.50
2040	**152.5**	**330**	**0.46**
2041	138.8	329.5	0.42
2042	125.0	329	0.38
2043	111.2	328.5	0.34
2044	97.4	328	0.30
2045	83.6	327.5	0.26
2046	69.7	327	0.21
2047	55.8	326.5	0.17
2048	41.9	326	0.13
2049	28.0	325.5	0.09
2050	**14.1**	**325**	**0.04**

Data for direct emissions, production, and electricity usage for HVC in years between 2020, 2030, 2040, and 2050 were calculated based on linear interpolation.

Table C.4 Activity-specific pathway data for scope 1 emissions from non-primary chemical production.

YEAR	TOTAL EMISSIONS *Mt CO_2*	ABSOLUTE EMISSIONS REDUCTION FROM 2020 REFERENCE YEAR *%*
2020	**373**	–
2021	371.2	0.5
2022	369.4	1.0
2023	367.6	1.4
2024	365.8	1.9
2025	364	2.4
2026	362.2	2.9
2027	360.4	3.4
2028	358.6	3.9
2029	356.8	4.3
2030	**355**	**4.8**
2031	341.9	8.3
2032	328.8	11.8
2033	315.7	15.4
2034	302.6	18.9
2035	289.5	22.4
2036	276.4	25.9
2037	263.3	29.4
2038	250.2	32.9
2039	237.1	36.4
2040	**224**	**39.9**
2041	203.6	45.4
2042	183.2	50.9
2043	162.8	56.4
2044	142.4	61.8
2045	122	67.3
2046	101.6	72.8
2047	81.2	78.2
2048	60.8	83.7
2049	40.4	89.2
2050	**20**	**94.6**

Data for direct emissions from non-primary chemical production in years between 2020, 2030, 2040, and 2050 were calculated based on linear interpolation.

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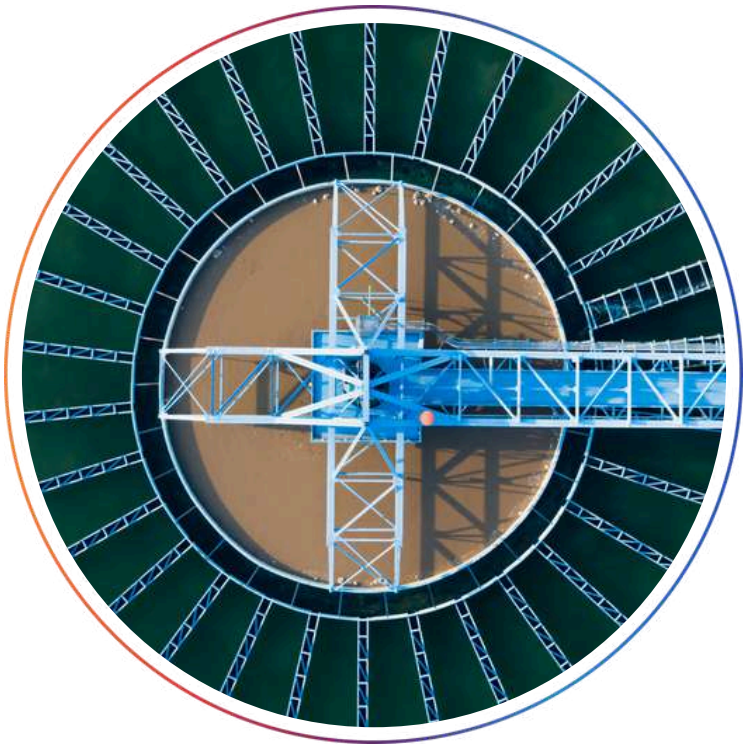

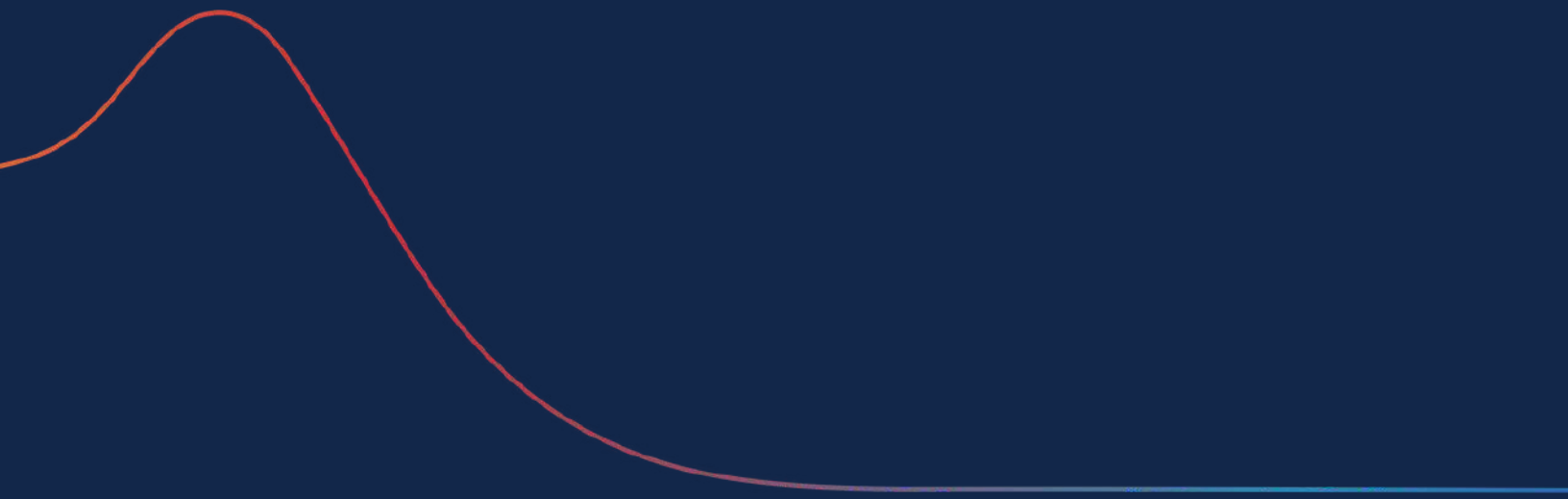

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