Industrial Sectors

Transition planning for companies operating in manufacturing industries – except food industry

2026



About this Guideline

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The recommendations and examples are for guidance only. They should be applied proportionately, considering each organisation's circumstances, sector, business model, and ambitions. They do not prescribe specific targets, timelines, technologies, business decisions, or financing outcomes. Each organisation remains responsible for complying with applicable requirements and deciding which measures are appropriate.

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1. Background

This annex covers specific transition planning aspects for businesses engaged in industrial processes and manufacturing different goods – construction materials, plastics, chemicals, electronic goods, etc. The annex does not cover food manufacturing or processing which is covered by a separate annex.

1.1 Climate impact of the sector

Based on the national GHG emissions inventories, the climate impact of the manufacturing sector mainly occurs in two stages – energy consumption in production process and emissions caused by industrial processes (such as chemical reactions).

Table 1. Industrial sector's GHG emissions in the Baltic states

Estonia[1]	Latvia[2]	Lithuania[3]
~228 kt CO_2e **~2.1% of Estonia's total GHG emissions (energy related)** **and** **~265 kt CO_2e** **~2.4% of total GHG emissions (Industrial process-related emissions)**	**~643 kt CO_2e** **~6.4% of Latvia's total GHG emissions (energy related)** **and** **~867 kt CO_2e** **~8.7% of total GHG emissions (Industrial process-related emissions)**	**~1,087 kt CO_2e** **~6.1% of Lithuania's total GHG emissions (energy related)** **and** **~2,049 kt CO_2e** **~11.5% of total GHG emissions (Industrial process-related emissions)**

[1] Greenhouse gas emissions and removals inventories datasets, EEA
[2] Greenhouse gas emissions and removals inventories datasets, EEA
[3] Greenhouse gas emissions and removals inventories datasets, EEA

1.2 Sector-specific considerations

As noted above, there are two types of GHG emissions occurring in industrial processes. Most manufacturers will create energy-related emissions which depend on the energy resource they use and the energy efficiency of their equipment. However, some industries will have specific industrial emissions that occur during the production processes and due to chemical reactions or physical changes emit GHGs and other substances (such as NOx, SOx, etc.). These industries are usually included in the EU Emission Trading System (EU ETS) due to their significant impact on climate.

This annex will consider both types of emissions and provide information on target setting in these industries according to the specific emission types. The following section includes specific information on mineral production and chemical industries which are present in the Baltic states.

Iron and steel production which is among the high-impact industries is not directly present in our region, however, these products are used in construction and other processes and are some of the most emission-intensive materials worldwide. Thus, companies using this material (as well as cement which is produced in several Baltic states) are indirectly accountable for the emissions created in production of these materials. You can find more information about these so-called embodied emissions in the Real estate and construction annex.

Where relevant, the annex also includes references to several other sectoral annexes – such as Energy, Road transport, and Waste management.

2. Baseline considerations

2.1 Emission scopes

Compared to several other annexes, for manufacturing industry the focus is not so much on different types of companies but rather on different processes in the production cycle – from acquisition of the raw materials to processing, packaging and distributing the end-product, as well as the characteristics of the end-product itself. In Table 2 you can follow the main aspects to be considered in each process and how they relate to the emission categories. Additional environment-related aspects are also included in the matrix – to consider at certain operational stages.

In general terms, for manufacturing companies:

- Scope 1 and Scope 2 emissions play the most significant role in internal processes – manufacturing of the goods which create both energy-related (Scope 2 and sometimes, if the company has its own energy production units – Scope 1) and process-related emissions (Scope 1);
- Scope 3 is usually a significant driver of industrial companies' emissions – through upstream supplies of raw materials (sometimes very emission-intensive themselves, e.g. cement for concrete production) and downstream logistics and use of the end-product. Therefore, careful selection of suppliers and logistics partners, as well as sustainable-by-design product development[4] is crucial for manufacturing companies to control and decrease their GHG emissions.

[4] Why is sustainable product design and innovation important?

2.2 Climate risks

While emission reduction is at the forefront of the climate agenda, the companies need to consider their climate risks too. For manufacturing industries, transition risks put an increasing emphasis on less emission-intensive technologies and processes, while physical risks may disrupt operations of the sector.

Transition risks:

- Manufacturing industries and, in particular, heavy industries (such as producers of cement, steel, chemicals, etc.) face **increasing carbon-related costs**. Many of these industries already are part of the EU ETS system (or other global ETS systems) which has recently been expanded to ETS2 to include more industries[5]. A recent study by the OECD shows that between 2018 and 2023 GHG emissions facing carbon tax or an ETS have increased from 15% to 27% (i.e. more and more emitting economic activities are being taxed), the effective carbon rate that exceeds EUR 60/tCO2e applies now to 11% of GHG emissions instead of 7% in 2018 (i.e. carbon becomes more expensive), and the estimates for 2025 show that the industrial sector's GHG coverage by ETSs will have increased most rapidly (from ~15% in 2018 to ~37% in 2025)[6].
- To level out the situation in the EU and elsewhere, the EU has introduced **Carbon Border Adjustment Mechanism**[7] (CBAM) which becomes fully operational in 2026. The mechanism intends to align **carbon prices for industrial products** manufactured in the EU and **imported from third countries** – the importer needs to declare the embedded emissions and either prove that a corresponding carbon price has been already paid or pay it (or the difference) to ensure equal approach to domestic and imported production. With that, the companies willing to operate in the EU market cannot anymore rely on imported goods which may be cheaper due to unpaid carbon taxes.

[5] ETS2. Buildings, road transport and additional sectors
[6] Effective Carbon Rates 2025
[7] Carbon Border Adjustment Mechanism (CBAM)

- For other types of products which are not subject to ETS, product design requirements are still relevant. The EU has adopted the **Ecodesign for Sustainable Products Regulation**[8] which requires manufacturers to **design and release to the market products which are durable, repairable, energy-efficient and resource-efficient, recyclable at the end of their life-cycle** thus limiting the resulting waste, and information about the product, its carbon and environmental footprint, substances the product contains, and other aspects is easily accessible and understandable. That will significantly impact production of many sectors where shorter product lifespans have been applied before.
- Depending on the manufacturer's sector of operations and the necessity to invest in further development, equipment, and technologies, industrial companies are expected to face higher scrutiny by the financial institutions – including alignment of their operations and investments with the EU Taxonomy Regulation[9] which defines criteria for economic activities that support environmental objectives, including climate change mitigation. Manufacturers may face questions on their alignment with both Climate Delegated Act and the Environmental Delegated Act (in particular, circular economy section)[10] of the Taxonomy Regulation.
- An increasing trend during the last years which may affect larger, in particular, industrial and energy-related market players significantly is **climate litigations**[11] – i.e. court cases where companies are blamed for failing to comply with certain climate-related requirements, engaging in greenwashing[12] (i.e. communicating positive news about their climate efforts without actual or insufficient proof thus deceiving the audience), or not having relevant transition plans, relevant transition targets, or not paying sufficient effort to their implementation[13]. An overview of climate litigation development and trends in 2025 is available here. Researchers note that such litigations can not only damage the reputation of a company in short-term but also have impact on the company's value[14].

[8] Ecodesign for Sustainable Products Regulation; Regulation text
[9] EU taxonomy for sustainable activities; EU Taxonomy Regulation
[10] Implementing and delegated acts - Taxonomy Regulation
[11] Climate Risks in the Industrials Sector
[12] Greenwashing – the deceptive tactics behind environmental claims
[13] The Shell Case and the Corporate Climate Transition Plan Obligation
[14] Impacts of climate litigation on firm value

- For emission-intensive products, one of the transition risks (technological risk) and opportunities at the same time is related to **introduction of carbon capture and storage solutions** which are still in their initial development phases and require major investment but may prove effective in climate mitigation efforts[15]. Although their implementation requires regulatory, legal, and cost effectiveness improvements, some businesses have already started to implement such solutions – including the Baltic states' companies[16],[17]. Lithuania has established a Carbon Capture and Storage (CCS/CCUS) Platform to drive the necessary changes allowing industries to use the solution on a wider scale[18].
- Other technological and also market risks (and opportunities) are related to **alternative product solutions** across industries – e.g. "green" steel, concrete, ammonia, bio-concrete, bioplastics, etc.[19],[20],[21],[22] If the company is not keeping up with the technological development in its sector and adjusting its manufacturing processes and equipment, it may lose its competitiveness. (At the same time, when introducing such innovations, the companies need to make sure that other environmental and social side-effects are properly assessed and managed.)
- In addition, the **clients**, in particular in construction sector, **increasingly require lower-emission alternatives** to the conventional products (e.g., concrete, structural components, etc.) and thus, if the company does not keep up with the demand and does not have EPDs in place for its products, it may lose its place in the market. That is strengthened by external regulations such as Energy Performance of Buildings Directive[23] which, along with the buildings' energy efficiency requires decrease in embodied emissions from materials used in its construction. Although there is no clear evidence yet for private customers' preference for more circular and sustainable products, there are certain consumer categories which prioritise product sustainability or certain aspects of it over price or other factors.[24],[25]
- Transition risks stemming from energy efficiency requirements, the necessity to transition from fossil resources to renewables, or decrease transport emissions in product logistics are not covered in detail in this annex. You can look these up in the respective Energy or Transport annexes, or the general guidelines.

[15] Carbon capture, utilization, and storage (CCUS) technologies: Evaluating the effectiveness of advanced CCUS solutions for reducing CO2 emissions
[16] Pioneering Carbon Capture and Storage Project in the Baltics
[17] SCHWENK launches the first carbon capture test base in Latvia
[18] Carbon Removal Policy in Lithuania
[19] Climate Risks in the Industrials Sector
[20] Barriers and Enablers for Green Concrete Adoption: A Scientometric Aided Literature Review Approach
[21] How green will the green-steel production be?
[22] Bioplastics and the environment: Solution or Green Illusion?
[23] Energy Performance of Buildings Directive
[24] Consumer Demand for Circular Products: Identifying Customer Segments in the Circular Economy
[25] How Consumer Needs Drive Circular Cosmetics Supply Chains

Physical risks:

- Considering the regional climate projections for the Baltics, the most prominent local physical risks are related to storms and floods which may affect manufacturing facilities, warehouses, and product logistics. The amount of economic losses from climate disasters has increased during the last years, and that affects industrial areas and businesses too[26].
- At the same time, manufacturing companies may be affected by climate hazards in their supply chain which can delay supplies or make you change a supplier in case of more dramatic changes. Heat stress, water scarcity, natural disasters and other climate-related events can destroy your partners' factories and facilities, decrease work productivity, affect the conventional logistics routes, and increase costs in global supply chains[27],[28].
- A specific case is manufacturing companies which expand their operations or internalise part of their supply chain by establishing or buying other companies in areas where their raw materials come from, thus, on one hand, ensuring better vertical integration but, on the other hand, exposing them to increased risks. If a company chooses this business development model, it is highly advisable besides other business aspects to analyse the climate change profile of the respective country or area[29],[30],[31].

[26] Climate-related economic losses
[27] Climate risks to global supply chains
[28] Reframing Climate Risk in the Supply Chain
[29] Climate Risk Country Profiles
[30] Climate Risk Index 2026
[31] Country profiles overview

2.3 Summary

The following matrix covers key considerations on significance of Scope 1, 2, and 3 emissions for the sector – split according to the key processes for a manufacturing company. Respectively:

- “High” significance scopes and emission categories are those that contribute most to total emissions. These should be calculated as accurately as possible and are usually the priority emission categories to focus on in your transition plan;
- “Moderate” significance means that emissions in the respective scope or category are relatively important but are not the most important part and, potentially, not the first priority for emission reduction;
- “Low” significance means that the emissions in the respective scope or category are rather insignificant in general or compared to other scopes and can be either left out of the transition plan priorities or dealt with at a later stage.

Table 2. Summary on key considerations for each role

Scope	Sourcing	Manufacturing	Packaging	Logistics	End-product
Scope 1	–	**High.** Fuel combustion from owned or controlled machinery and equipment used for production processes. Emission levels depend on what fuel is used to operate the equipment. Additional emissions may occur if the material produced emits GHGs as a by-product (e.g., if the company produces cement, chemicals, etc.)	**Moderate/Low.** Applies if packaging is automated and conducted using machinery	**Variable.** Application of this scope depends on the logistics approach the company uses – if it distributes the products itself with its own or controlled vehicles, it can create a significant amount of Scope 1 emissions. If logistics is performed by external business partners, the emissions will be attributed to Scope 3	–

Scope 2	–	**High/Moderate.** Purchased energy for onsite operations (e.g., grid electricity)	**Moderate/Low.** Purchased energy for operating the machinery (if such is used for packaging)	**Variable.** The only case when Scope 2 applies is when the company distributes products itself with electric vehicles and includes charging of those vehicles in this scope	–
Scope 3	**High/Moderate.** Category 1 (Purchased goods and services) – may include emission-intensive products and then the overall emissions in this category will be high, thus increasing the embodied emissions in your end-product; **Category 4** (Upstream transportation & distribution) – if delivery is not included in Category 1	**Moderate/High.** Category 2 (Capital goods) – purchased equipment manufacturing of which also creates certain emissions; **Category 3** (Fuel- and energy-related emissions not included in Scope 1 and 2 or so-called Well-to-Tank (WTT) emissions) – in relation to energy consumed for production processes; **Category 5** (Waste generated in operations)	**High/Moderate.** **Category 5** (Waste generated in operations) and/or **Category 12** (End-of-life treatment of sold products). Emissions in this category depend on the amount and type of packaging used	**High/Moderate.** **Categories 4 or 9** (Upstream or downstream transportation and distribution – depending on which business party pays for the service). If the company distributes products itself (see above), then **Category 3** applies (Fuel- and energy-related emissions not included in Scope 1 and 2 or so-called Well-to-Tank (WTT) emissions)	**High/Moderate.** Emissions depend on the type of product, its further use and utilisation method. **Category 10** (Processing of sold products) applies if the company produces an intermediary product which is further processed by the next manufacturer in the value chain. The more energy the next company needs to apply the larger emissions. **Category 11** (Use of sold products) applies if the use of the product requires energy consumption – e.g., if the product is an electric appliance or a house that requires heating. **Category 12** (End-of-life treatment of the sold products) depends on the longevity and recyclability of the product.

Climate risks	**Transition:** related to embodied emissions; products imported from outside the EU may be additionally taxed under CBAM (for certain products) **Physical:** climate hazards in suppliers' countries which may affect their operations and logistics	**Transition:** increased carbon costs; pressure to transition to renewable resources in manufacturing; necessity to embed circular design in the core products; requirements from clients to produce less emission-intensive alternatives **Physical:** climate hazards having potential impact on the manufacturing facilities – storms, floods	**Transition:** requirements to reduce packaging and the resulting waste **Physical:** climate hazards having potential impact on the manufacturing facilities – storms, floods	**Transition:** requirements to reduce transport emissions changing to zero- or low-emission vehicles and/or multimodal transport with lower overall emissions **Physical:** climate-induced damage to logistics routes causing delay or change of routes	**Transition:** requirements to improve product circularity, energy efficiency, recyclability **Physical:** not relevant for the manufacturing company

Depending on the type of entity and emission sources as highlighted above, there are several decarbonisation measures that companies can implement. Those are considered in Section 4.2.

3. Relevant EU and national targets

Carbon pricing is being progressively extended to encompass virtually all manufacturers in Europe and, respectively, the Baltic states. Larger industrial installations are already subject to the EU ETS and, starting from 2028, smaller operators and sectors not covered today also will be affected through the newly established ETS2 framework. This section outlines what obligations arise from these regulations and what they mean in practice for transition planning.

EU ETS and Direct Carbon Pricing for Heavy Industries

The EU sets a strict limit on the total amount of greenhouse gases that industrial companies across Europe are allowed to emit each year. This limit, called a "cap", gets smaller every single year, like a budget that gets cut annually – this is EU ETS. By 2030, the total allowed emissions will be 61% lower than they were in 2005. The pace of that annual cut is also accelerating, so the pressure increases over time rather than staying the same. The practical effect is that there are fewer and fewer pollution permits available in the market each year, which makes them more expensive. This is intentional, as it is designed to make polluting progressively more costly and investing in cleaner technology progressively more attractive. The overall cap is set to deliver a 61% reduction in covered-sector emissions by 2030 compared to 2005. Under the Fit for 55 package, the EU ETS linear reduction factor was increased from 2.2% to 4.3% from 2024 and will increase to 4.4% from 2028[32].

Each of these pollution permits is called an EU Allowance (EUA), and one allowance gives a company the right to emit one tonne of CO2. Every year, a covered company must hand back, or surrender, exactly as many allowances as the tonnes of CO2 it actually emitted that year. Companies can obtain allowances in three ways, either receiving some for free (though this is being reduced), buying some at government auctions, or purchasing them from other companies on the open market. As the cap tightens each year, free allocation shrinks and the cost of emitting GHGs rises, making decarbonisation investments progressively more attractive relative to paying the carbon price.[33]

Free allocation is also being phased out for sectors subject to the Carbon Border Adjustment Mechanism (CBAM), including iron and steel, cement, fertilisers, and aluminium, making carbon price exposure increasingly direct for those industries.[34]

[32] 'Fit for 55': delivering the EU's 2030 Climate Target on the way to climate neutrality
[33] EU ETS Directive
[34] CBAM Regulation

A manufacturing company falls under ETS if it operates installations listed in Annex I of the EU ETS Directive[35]. This typically includes:

- Combustion installations above a certain thermal threshold (many larger industrial boilers and combined heat and power (CHP) units).
- Mineral industry: cement clinker, lime, glass, ceramics, and related high-temperature processes.
- Metal industry: iron and steel production; certain non-ferrous metals including aluminium.
- Chemicals: ammonia, nitric acid, hydrogen, and other processes.
- Pulp and paper production above certain thresholds.

In the Baltic states, installations within the EU ETS scope range from small district heating units to large industrial emitters, such as cement manufacturers, which account for a large share of the covered emissions.[36]

What this means for transition planning: if your company is ETS-covered, your transition plan must go beyond a simple sustainability narrative. It should address your carbon price exposure, your allowance procurement strategy, and a quantified pathway to reduce verified emissions over time, through energy efficiency, electrification, fuel switching, process changes, circularity. This is a cost and competitiveness driver.

[35] EU ETS Directive
[36] LITHUANIA'S FIRST BIENNIAL TRANSPARENCY REPORT under the Paris Agreement

ETS2 from 2028 and Carbon Pricing for Other Industries

From 2028[37], ETS2[38] introduces carbon pricing for fuel combustion in buildings, road transport, and additional sectors, described by the European Commission as covering mainly small industry not included in the existing ETS. The mechanism is upstream: fuel suppliers, not the end users, are the regulated entities. However, the carbon cost is expected to pass through into fuel prices, making it a real operational cost for manufacturers operating on fossil fuels.[39]

This means that no manufacturer in the Baltic states can assume it sits entirely outside carbon pricing. The question is timing and mechanism, not whether the cost arrives.

Table 3. Targets & Strategic directions

Theme	Estonia[40]	Latvia[41]	Lithuania[42]
Industrial process (IPPU) GHG trajectory	Projected ~82% below 1990 by 2030 (structural change + fluorinated gas phase-down). Projected ~84% below 1990 by 2050 under existing measures.	IPPU emissions projected slightly above 1990 baseline by 2030 due to fluorinated gas growth. Flat trajectory to 2050 under WEM scenario without carbon capture. Sector is measure-based rather than target-based.	Non-ETS industry reduction target applies. Delivery instruments include energy efficiency, technology replacement and circularity measures.
Fluorinated gas (F-gas) management	EU Regulation 2024/573: phase-down quotas and equipment bans. Sulphur hexafluoride (SF6) switchgear emissions projected to peak ~2037 then decline under ban provisions.	General EU fluorinated gas Regulation compliance. Fluorinated gas and process emissions persist, contributing to IPPU remaining above 1990 baseline.	Dedicated fluorinated gas measure (P1-E) targeting phase-down of HFCs with import quotas and equipment bans.
Best available techniques / industrial emissions	State Environment Agency checks BAT compliance in all permits; Industrial Activities Act enforcement.	BAT benchmarks under the EU Industrial Emissions Directive across all sub-sectors.	BAT-compliant technology replacement programme (P5-E) paired with renewable electricity investment.
2050 direction	~84% reduction vs 1990 by 2050 under existing measures. Low-carbon technology, renewable energy, carbon capture.	Full decarbonisation via electrification, renewable heat, CCS. Fluorinated gas persistence remains a challenge without additional measures.	Net-zero process emissions; CCS deployment; circular manufacturing.

[37] EU officially adopts the 2040 climate target, postpones ETS 2 by one year
[38] Amendments to the EU ETS Directive
[39] LITHUANIA'S FIRST BIENNIAL TRANSPARENCY REPORT under the Paris Agreement
[40] Updated National Energy and Climate Plan to 2030 (Estonia)
[41] Updated National Energy and Climate Plan 2021–2030 (Latvia)
[42] Final Updated National Energy and Climate Action Plan 2021–2030 (Lithuania)

4. Target setting

4.1 Science-based approach

The international transition pathways are mostly set for the most emission-intensive sectors – if your company produces cement, steel, or chemicals, you should follow either the SBTi sectoral guidance or IEA Net Zero Roadmap sectoral guidance. The same sectors are covered by the EU Climate-Law aligned sectoral decarbonisation pathways, which also include lime production, paper production, and "other" manufacturing areas. The EU targets mostly focus on maximum reduction of Scope 1 emissions, increase of relative electricity consumption in the overall energy mix, and improvement of energy efficiency of the manufacturing processes.

In addition to these aspects, the company may also consider the national targets for renewable energy sector and, respectively their use in manufacturing processes – i.e., gradual increase in renewable energy sources by 2030, 2040, and 2050 as described in the energy sector annex.

The following subsections provide you with guidance on target setting in specific industrial sectors.

Cement (SBTi)[43]

Companies in the cement and concrete value chain should set targets covering all relevant emission scopes, following both the general SBTi Criteria and the sector-specific criteria described below.

- **Sectoral Decarbonisation Approach (SDA):** An intensity convergence method specific to the cement sector. It requires all companies to converge to the same emissions intensity level as the global sector average by 2050. A company's individual target depends on its base-year intensity relative to the sector average, as well as its projected business activity growth. The SDA is the recommended method for **Scope 1 and 2** emissions from cement/clinker production.
- **Cross-sector absolute reduction approach:** Requires absolute emissions reductions at a fixed annual rate. This method is used for emissions not covered by the cement SDA (e.g. non-cement activities, **Scope 3** emissions where the SDA is not applicable).

How to define if Cement SDA should be used:

Clinker share in your Scope 1 emissions	Target-setting method
≥95%	Cement SDA recommended to use for the entirety of Scope 1 and 2 emissions.
5% to <95%	Cement SDA for clinker/cement Scope 1 and 2 emissions; cross-sector absolute reduction for all other activities.
<5%	Cement SDA shall not be used. Use cross-sector absolute reduction approach.

Companies that do not produce clinker at all (e.g. pure grinding/blending operations or concrete producers) shall not use the Cement SDA for their own Scope 1 and 2 emissions. However, they may use the Cement SDA for Scope 3 targets covering purchased clinker and cement.

[43] CEMENT SCIENCE BASED TARGET SETTING GUIDANCE

Scope-Specific Target Setting

The SBTi provides 1.5°C-aligned cement sector intensity pathways for Scope 1 and 2. These pathways are based on the IEA Net Zero by 2050 scenario and are used with the Sectoral Decarbonisation Approach (SDA) to define company-level targets.
The intensity denominator shall be t CO_2 / t cementitious product (preferred) or t CO_2 / t cement. The “cementitious product” definition includes clinker, cement and cement substitutes produced by the reporting company, as per the Cement CO_2 Protocol v3.0[44].

Table 4. Cement target from SBTi

Scope	Target Type	Unit	2030 Target	2040 Target	2050 Target
Scope 1	Cement SDA intensity	tCO_2e/t cement	0.445984	0.219424	0.032986
Scope 2	Electricity decarbonisation target (set separately)	tCO_2e/t cement	0.016768	≥95% reduction	
Scope 1+2	Combined production intensity	tCO_2e/t cement	0.462752		
Scope 3	Absolute contraction (general SBTi)	tCO_2e	~2.5% annual reduction in emissions from baseline		≥95% reduction

[44] CO2 and Energy Accounting and Reporting Standard for the Cement Industry

Cement companies are expected to set targets covering all relevant emission scopes. The table below summarises the requirements for each scope.

Table 5. Scope boundary

Scope	Relevance	Target-setting method	Key notes
Scope 1	Most material source of emissions: process (geogenic) emissions from clinker production, fuel combustion in kilns and non-kiln activities.	Cement SDA (1.5°C) or cross-sector absolute reduction.	Targets must be in "gross" terms (including emissions from waste-derived fuels). Near-term targets: 5–10 year timeframe as per original guidelines. The required reduction is company specific and depends on your baseline emissions intensity. As per the Cement SDA 1.5°C pathway you should aim at 35-45% intensity reduction by 2030 and 65-75% reduction by 2040. **Long-term target: ≥95% reduction by 2050 or earlier.**
Scope 2	Electricity and heat used in cement plants, grinding and other facilities.	Cement SDA (1.5°C), cross-sector absolute reduction, or renewable electricity target.	Targets to actively source renewable electricity at a rate consistent with 1.5°C scenarios are an acceptable alternative. See Energy sector annex for Scope 2 reduction measures consistent with 1.5°C scenario. Combined Scope 1 and 2 targets are permitted if ambition for each component can be verified separately.
Scope 3	Purchased clinker and cement (mandatory); upstream fuel emissions (recommended); other value chain emissions.	Cement SDA (1.5°C) for purchased clinker/cement; cross-sector methods or physical intensity for other categories.	Required: Specifically for the cement sector, set a Scope 3 target for purchased clinker and cement (Category 1) that covers at least 95% of the direct and energy-related emissions associated with these purchases. This requirement applies even if your total Scope 3 emissions are below 40% of total GHG emissions (which is the general threshold as per SBTi to include Scope 3 in target setting). Recommended: Scope 3 target covering upstream fuel emissions (Category 3). For near-term targets, cover (include in target-setting) at least 67% of relevant Scope 3 emissions. For long-term net-zero targets, cover at least 90% of relevant Scope 3 emissions.

Minimum inputs required:

- Define base year
- Calculate base-year emissions by Scope 1, 2, and 3
- Calculate base-year activity levels (e.g. tonnes of cement produced)
- Calculate base-year emissions intensity to understand how much you should reduce it by the chosen target year
- Define target year and target year activity level (i.e. volume of cement produced)

Example for carbon budget 2030 (Scopes 1-3) for a cement producer using emission intensity target indicators and Scope 3 annual reduction rate from Table 4:

$$Emissions_{(t=2030)} = Intensity(Scope1)_t \times Activity_t + Intensity(Scope2)_t \times Activity_t + Emissions(Scope3)_{2025} \times (1 - 2.5\% \times 5)$$

Thus, you will obtain the total amount of acceptable GHG emissions for the target year.

If a company does not produce cement but, for example, concrete and cement production sits in its Scope 3 emissions:

$$Emissions_{(t=2030)} = Emissions_{(base=2025)} \times (1\text{-}5\times2.5\%)$$

Chemicals (SBTi)[45]

Unlike sectors with a single homogeneous product (e.g., cement, steel), the chemicals sector encompasses thousands of diverse products. The SBTi has therefore developed multiple activity-specific pathways covering primary chemical production (ammonia, methanol, high-value chemicals), non-primary chemical production, nitric acid N_2O emissions, use-phase fertiliser emissions, and alternative feedstock sourcing.

The SBTi offers several target-setting methods for the chemicals sector[46]. The choice of method depends on which chemical activities the company is involved in:

- **Activity-specific intensity convergence:** Used for primary chemicals (ammonia, methanol, High Value Chemicals (HVC)). Company targets are set using the Sectoral Decarbonisation Approach, which requires companies to converge to sector-average emissions intensity by 2050. A company's individual target depends on its base-year intensity relative to the sector average and its projected business activity growth.
- **Activity-specific absolute contraction:** Used for Scope 1 emissions from non-primary chemical production and for Scope 3 Category 11 (N_2O emissions from sold nitrogen fertilisers). Companies are expected to set absolute emissions reduction targets aligned with the activity-specific pathway's proportionate reduction between base year and the target year.
- **Cross-sector absolute contraction:** Used for emissions not covered by activity-specific pathways (e.g., non-chemical activities, residual Scope 3 categories). Requires absolute emissions reductions at a fixed annual rate consistent with a 1.5°C trajectory.
- **Nitric acid N_2O benchmark:** A mandatory separate target for companies producing nitric acid with average N_2O emissions intensity above 0.5 kg N_2O/t nitric acid. Companies below this benchmark may include nitric acid N_2O emissions in their company-wide target instead.

[45] SBTi CHEMICAL SECTOR PATHWAYS AND IMPLEMENTATION CRITERIA: EXPLANATORY DOCUMENT
[46] Sector Resources Summary

Coverage of Chemical activities

The SBTi has disaggregated the chemicals sector into distinct activity groups for the purpose of pathway development. Each group has its own target-setting method:

Table 6. Target setting for chemicals

Activity	Products Covered	Pathway Type	Scope Coverage
Primary chemicals – Ammonia	Ammonia (for non-energy and energy uses)	Activity-specific SDA (intensity)	Scope 1 and 2 + relevant Scope 3 categories
Primary chemicals – Methanol	Methanol (for non-energy uses)	Activity-specific SDA (intensity)	Scope 1 and 2 + relevant Scope 3 categories
Primary chemicals – HVC	Ethylene, propylene, benzene, toluene, mixed xylenes	Activity-specific SDA (intensity)	Scope 1 and 2 + relevant Scope 3 categories
Nitric acid production	N_2O emissions from nitric acid	Benchmark (0.5 kg N_2O/t)	Scope 1 only
Non-primary chemicals	All other chemical production (non-primary, non-refinery)	Activity-specific absolute contraction	Scope 1 only
Sold N-fertilisers (use-phase)	N_2O from field application of sold synthetic N-fertilisers	Activity-specific absolute contraction	Scope 3 Category 11 only

Chemicals produced within oil refineries are excluded from the chemicals sector scope, as allocating emissions between energy and chemical co-products is impractical. Hydrogen production is addressed within the ammonia, methanol, and iron/steel pathways rather than as a standalone pathway.

Scope-specific target setting

Table 7. Scope boundary

Scope	Target method	Boundary requirements
Scope 1	Covered by activity-specific pathways (primary chemicals SDA, nitric acid benchmark, non-primary absolute)	Process emissions, combustion for heat (self-generated or imported), electricity generation (if on-site). Excludes CO_2 captured for urea production or sold to other industries.
Scope 2	Included within primary chemical activity-specific pathway boundaries (ammonia, methanol, HVC)	Emissions from purchased/self-generated energy used in the production process. Reported separately as energy-related emissions in the SBTi Chemicals Sector Target-Setting Tool.
Scope 3	Cross-sector approach for general Scope 3 categories; activity-specific pathways for purchased hydrogen inputs and N_2O from sold fertilisers	For primary chemical pathways, upstream Scope 3 emissions within the activity boundary must be included (e.g., purchased H_2 for ammonia production is included in Scope 3 Category 1). For N_2O from sold N-fertilisers downstream emissions in Scope 3 Category 11 need to be calculated. All other Scope 3 categories are included depending on their relevance and targets are set as per general SBTi Corporate Net-Zero Standard[47] (approach described in the general guidelines).

[47] The new Corporate Net-Zero Standard Version 2.0

Activity-Specific Pathways for Primary Chemicals

Primary chemical production (ammonia, methanol, and HVC) accounts for approximately two-thirds of all direct CO_2 emissions from the chemicals industry. Each primary chemical has a dedicated activity-specific pathway based on the IEA NZE scenario[48]:

- **Ammonia production pathway:** Includes CO_2 process emissions, GHG emissions from combustion to supply heat (self-generated or imported), and GHG emissions from electricity used in the process. The boundary covers hydrogen production (SMR, electrolysis, gasification, etc.), nitrogen production (air separation), and the Haber-Bosch process. CO_2 used for urea production or sold as a product is excluded from Scope 1.
- **Methanol production pathway:** Covers CO_2 process emissions, heat-related GHG emissions, and electricity-related emissions. The boundary includes hydrogen/syngas production, CO_2 capture as feedstock, and methanol synthesis.
- **HVC production pathway:** Covers CO_2 process emissions, heat-related GHG emissions, and electricity-related emissions. Includes steam cracking (naphtha, ethane, LPG), catalytic cracking, ethanol dehydration, propane dehydrogenation, MTO (Methanol-to-Olefins), and MTA (Methanol-to-Aromatics) processes. For MTO/MTA routes, only the final HVC production step is within the boundary.

Table 8. SBTi Intensity targets for chemicals

Primary chemical pathway	Unit	2030	2040	2050
HVCs	tCO2 per t product	0.8123	0.4576	0.04308
Methanol		1.7480	0.9853	0.09023
Ammonia, all uses		1.2014	0.3420	0.03571
Ammonia, non-energy only		1.6585	0.6591	0.08696

To find more information on how to set targets for nitric acid (N_2O) and other non-primary chemical production consult the SBTi Chemicals guidelines[49].

[48] Net Zero Roadmap: A Global Pathway to Keep the 1.5 °C Goal in Reach
[49] SBTi Criteria for the Implementation of Chemicals Sector Pathways Explanatory Document

Minimum inputs required:

- Define base year
- Calculate base-year emissions by Scope 1,2
- Calculate base-year activity levels (e.g. tonnes of primary chemical produced)
- Define target year and target year business activity levels

Example for carbon budget 2030 (Scopes 1 and 2) for an ammonia producer using emission intensity target indicators from Table 8:

$$Emissions_{(t=2030)} = Activity_t \times Intensity(Scope1,2)_t = Activity_t \times 1.2014$$

Thus, you will obtain the total amount of acceptable GHG emissions for the target year.

For Scope 3 target setting follow general guideline approach (absolute contraction method).

Other Manufacturing (SBTi)

For manufacturing subsectors that are not covered by SBTi sector-specific guidance, companies should follow the general SBTi Corporate Net-Zero Standard[50] and near-term target criteria.

Table 9. General considerations for manufacturing sector

Scope	Relevance for manufacturing companies (other than cement and chemicals)	Target focus	Annual decrease to state in targets
Scope 1	Often material due to on-site fuel- and process-related emissions	Absolute reduction of direct emissions from production processes, thermal energy use, and onsite equipment	Overall direction towards net zero emissions by 2050 (or earlier if required, for example, by sectoral regulation or client demands). Annual emission reduction trajectory to be updated every five years based on the approach described in the general guidelines.
Scope 2	Material where electricity and heat demand is significant and it is purchased from external suppliers	Reduce emissions from purchased electricity and heat through efficiency improvements and renewable electricity supply	
Scope 3	Usually material due to upstream materials, logistics, and sometimes emissions from use of sold products	Address largest value chain emission sources with quantitative reductions and/or supplier engagement	Scope 3 emission categories creating at least 5% of the total Scope 3 emissions should be included in target setting. Overall direction towards net zero emissions by 2050 (or earlier if required, for example, by sectoral regulation or client demands). Annual emission reduction trajectory to be updated every five years based on the approach described in the general guidelines.

[50] The new Corporate Net-Zero Standard Version 2.0

4.2 Key emission reduction measures

Sourcing. Depending on type of raw materials purchased and the type of logistics, the company may consider three types of actions:

- **For embodied carbon.** If your manufacturing company uses emission-intensive raw materials (for example, cement or steel which are among the most emission-intensive materials worldwide), you should consider alternatives which fulfil the same function but embed less GHGs. For example, cement produced from clinker[51] with reduced GHG emissions or less carbon-intensive steel (so-called green steel produced without fossil energy resources[52] at least partly made from recycled metal[53]). The same applies to recycled plastics and other materials. You can visit Section 3 of the Climate Delegated Act of the EU Taxonomy Regulation which lists manufacturing outputs that are compliant with the climate mitigation requirements. In case of doubt, ask your supplier if it can provide such products (and supporting evidence that the materials comply with the requirements).
- **For all materials.** To make sure what type of material you purchase and what is the GHG emission amount created in its extraction and production, ask your suppliers to provide the Environmental Product Declarations (EPDs)[54]. These declarations provide product-specific information on GHG emissions of a certain item (e.g., emissions per square metre, tonne or single item of the product). You can compare this information with the other competitors or average industry practices and choose the least emission-intensive alternative. (Having EPDs from your suppliers will also help you calculate more accurate Scope 3 emissions of your product.)
- **For logistics.** Try to source materials from less distant areas to decrease the distance travelled to deliver you the products. The closer a product is to you, the less emissions its transportation will create. Thus, cooperation with local producers is a good choice for climate. If, nevertheless, products need to be transported across larger distances choose less emission-intensive modes of transport if possible (sea and/or rail instead of road transport or air)[55]. Consider the possibility to set up industrial symbiosis[56] with other companies in your area – that is a system where one company's waste becomes a resource for another company, thus ensuring a longer life-cycle for a specific resource. There are examples in Europe of whole industrial parks being built based on industrial symbiosis principle[57]. Thus, the companies operating in such parks decrease emissions for logistics and increase innovation potential through new collaborations.

[51] Limestone and clay mixture – the main ingredient of cement
[52] *What is green steel and why does the world need more of it?*
[53] *Metal Recycling Factsheet*
[54] *Assessment of environmental product declaration and databases: Towards ensuring data quality assurance practices*
[55] *Sustainable Transport Logistics – the Types of Freight in Comparison*
[56] *Industrial Symbiosis*
[57] *Closing the Loop: Advancing Circular Economy with Eco-Industrial Parks*

Manufacturing. The key impact most manufacturing industry companies have on climate is related to energy consumption during the manufacturing process. Sawing, welding, heating, melting and performing many other operations on an industrial scale requires energy. It may be autonomous (e.g., generated by own boiler plants or combusted locally) or acquired from the grid (e.g., electricity or heating purchased from its suppliers). In any case, the company should consider the following emission reduction options[58]:

- Improve energy efficiency of its operations to consume less resources regardless of their source (that may include both energy efficiency of the equipment as well as process efficiency – for example, finding ways to use lower temperature for processing while maintaining the same product quality);
- Decrease or totally phase out use of fossil resources (such as natural gas) replacing it with renewable resources instead – electrification or replacement with bioenergy or green hydrogen where feasible;
- Transition its operations from combustion fuels to electricity (preferably green electricity from the grid and/or installing solar or other renewable technologies to generate own electricity)[59]. However, all processes cannot be electrified for the time being as they require very high temperatures for certain production processes (e.g. glass, cement, and other materials' production) – for those processes bioenergy or green hydrogen is still a better option[60].
- In addition to that, heavy industries (from climate perspective also called "hard to abate" industries) need to consider introducing carbon capture and storage mechanisms to capture GHG emissions that are created by their production processes[61] – and can further be used to generate synthetic fuels[62].

[58] Decarbonisation strategies for manufacturing: A technical and economic comparison
[59] Direct electrification and decarbonisation of industrial processes
[60] Overcoming All Barriers To Industrial Electrification
[61] Overcoming All Barriers To Industrial Electrification
[62] A review of the synthetic transport fuels as a solution for carbon neutrality

Packaging. The key climate impact of packaging is related to its production and, further, the waste it creates. According to the EU Packaging and Packaging Waste Regulation[63], a company shall take the following actions:

- Eliminate and optimise packaging. Use the minimum needed to meet product quality and safety needs;
- Choose packaging materials which do not contain substances of concern (the European Chemicals Agency will prepare a report on presence of such substances in packing and its components by the end of 2026);
- Choose reusable and/or recyclable or, if relevant, compostable packaging;
- Ensure that plastic packaging complies with the requirements of the Regulation on presence of recycled materials in it;
- Specifically for food packaging – choose packaging with limited (according to thresholds defined in the Regulation) or no per- and polyfluorinated alkyl substances (PFAS) in its content.

Implementation of reforms in packaging may also require dialogue and close cooperation with other stakeholders – e.g., distributors, retailers, and waste management companies to find the best options that satisfy all needs and are climate-friendly.

Logistics. Similar to sourcing, the closer a client is to you, the less emissions its transportation will create. Try to choose zero-emission or low-emission modes of transport and partners which can ensure such distribution. If, nevertheless, products need to be transported across larger distances choose less emission-intensive modes of transport if possible (sea and/or rail instead of road transport or air).

For more details on logistics, review the Road transport annex.

[63] Packaging and Packaging Waste Regulation

End-product. As noted in Table 2, a manufacturing company's total climate impact may largely depend on the product it releases. There are three basic considerations the companies need to make:

- If you produce an intermediate product (e.g., details, components, partly processed materials, etc.) which are further incorporated into the end-product by another manufacturer, you may consider how to decrease additional effort (and energy consumption) needed to further process your output. For example, if you manufacture components for furniture and they may be used for different types of furniture, you may consider applying the principle of modularity to simplify further use of these components. You may also use materials which require less energy for their further processing. Engage your suppliers and, in particular, clients in finding the most efficient solution to decrease product processing emissions across the value chain[64];
- If you produce a product which cannot be used without energy, your core concern should be energy efficiency and energy resource required for use of this product[65]. For example, if your output is a coffee machine you may want to find a solution for that machine to operate with lesser energy, switch off automatically when not used, and have shorter cleaning periods (without compromising the quality). And if you produce a lawn mower you may opt for chargeable electricity-powered solutions rather than diesel-powered machines.
- Last but not least, your total climate impact depends on recyclability of the end-product too. You may want to include components which are made from recyclable materials – and you have made sure that they are practically recycled[66]. One of the greenwashing risks is claiming use of materials which are theoretically recyclable but are not recycled in reality. You may also want to introduce a return policy for your customers, thus getting their outdated products for recycling or repair (introducing circularity in your actions!) and, at the same time, establishing significantly closer and long-standing client relations with your clients.

In addition, it is worth noting that your end-user may also be interested in emission-intensity of the product you deliver. Therefore, it is advisable to have EPDs for your key products available. You can use this information to compare your performance with the competitors and assess how to decrease the climate impact of your product thus increasing its competitiveness.

[64] Scope 3 Category 10: Understanding Emissions from Processing of Sold Products
[65] Value Change in the Value Chain: BEST PRACTICES IN SCOPE 3 GREENHOUSE GAS MANAGEMENT
[66] Recyclable vs Recycled: What you need to know and why it matters

5. Important questions

Key questions you should be able to answer your financial partner (a bank, investor, etc.) or other cooperation partners:

- **Where you are now:** What are the most energy consuming processes in your production facilities? What type of energy resources do you use? Do you use (or manufacture) energy-intensive and emission-intensive products? How do they compare to your competitors / market average?
- **Where do you see the largest improvement opportunities:** Is it possible to change the energy sources and what are the most suitable options? When do you plan to implement them? When do you plan to phase out fossil resources from your energy mix? What are the facilitating and/or hindering factors for that? Is it technically possible to adjust the technology to decrease intensity? Do you see potential actions that require engagement of other stakeholders – logistics partners, energy suppliers, renewable energy developers, suppliers, consumers? Are there instruments in place to engage them and how do you plan to approach that?
- **What are the key climate risks for your business and how do you manage those?** What are the key regulatory, technological, and market risks you see in relation to your business? Are there supply-chain related risks you may face in nearer or more distant future? Do you already prepare for them? Do you see the necessity to adjust your products and/or production processes or use of the facilities due to climate risks?
- **What do the clients require of you?** Do clients require low-emission products? Do you have EPDs for your key product categories? How do you compare your product to other alternatives? Do you plan to improve the product performance?
- **What investment do you need to achieve the climate targets and what is your business plan for that?** What could be the drawbacks or uncertainties for its implementation? How do you plan to overcome them? What is your investment plan and the financing mix for that?

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