

Manufacturing Industry (CNAE C)

BRAZILIAN SUSTAINABLE TAXONOMY

SECRETARIAT OF
ECONOMIC POLICY

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Manufacturing Industry (CNAE C)

Sector overview

The manufacturing industry in Brazil plays a key role in the national economy, accounting for about 15.3% (CNI, 2024a) of the Gross Domestic Product (GDP). This sector is particularly important, as it contributes 46% of Brazil's exports of goods and services. The manufacturing sector is one of Brazil's largest employers, accounting for approximately 14.7% (CNI, 2024) of the economy's formal jobs, establishing itself as a vital area for both job creation and promotion of sustainable economic growth.

This economic importance is also reflected in the complexity and diversity of Brazilian industries, which strengthens Brazil's role as a major player in global supply chains.

Nevertheless, Brazilian companies face significant competitiveness challenges due to global competition, whether from countries with lower operating costs, which offer more competitive prices, or from those with more concentrated industrial hubs, strong innovation, and a prominent presence in cutting-edge sectors. This encourages national companies to improve their efficiency and invest in technological innovation in order to remain competitive. The rapid technological evolution requires that the industry sector innovate by adopting Industry 4.0 technologies, which requires significant investment and retraining of the workforce.

Issues related to climate crisis, energy efficiency and just energy transition have led to the development of sustainable technologies aimed at reducing greenhouse gas emissions and decarbonizing the production chain.

The growth of emerging economies and the expansion of international markets offer opportunities for Brazilian companies to diversify their exports and benefit from the demand for sustainable and innovative products. This diversification strengthens resilience and enables entry into less saturated markets. To achieve this, it is necessary to invest in research, development and innovation (RD&I) to create new processes and products, as well as the improvement of existing ones, differentiating companies through innovation and increasing competitiveness.

Thus, the adoption of advanced technologies with low greenhouse gas (GHG) emissions and little or no dependence on fossil fuels has the potential to transform production processes, making them more efficient, as well as creating new business models. These innovations provide competitive advantages and facilitate integration into global markets.

The economic activities included in the National Classification of Economic Activities (*Classificação Nacional de Atividades Econômicas* - CNAE) traditionally have a significant dependence on fossil fuels, which gives them a high potential for decarbonization. This can be achieved by replacing these resources with renewable energy sources, such as bioenergy and biofuels, as well as by implementing new technologies and electrifying production processes.

Industrial activities emit GHGs when burning fuels to obtain energy. These emissions are then allocated to the energy sector. However, there are also GHG emissions resulting from physicochemical transformations that occur during the manufacturing of materials or as a consequence of product use. Such emissions are allocated to the IPPU sector. Thus, in 2022, considering emissions from energy use by the industrial sector (69.1 MtCO₂e) and IPPU (102.3 MtCO₂e), industry came to represent about 8.4% of the country's total GHG emissions (BRAZIL. MCTI, 2024).

Concerning the consumption of water resources, although industry is responsible for 9.4% of total water withdrawals in Brazil (ANA, 2021), this percentage also has ample potential for reduction, especially using alternative supply sources, such as the reuse of treated effluents, desalination of brackish water, among other techniques. Likewise, proper management of industrial solid waste can both reduce negative environmental impacts and public health risks and, by treating waste as a valuable resource, it can serve as an alternative in times of natural resource scarcity.

Regarding industrial solid waste, this could reach 13 million tonnes per year (IBER, 2022). Proper management of this waste reduces negative environmental impacts and risks to public health. Furthermore, from a circular perspective, waste serves as an alternative to reducing the use of natural resources and greenhouse gas emissions from production processes.

Therefore, the implementation of circular economy principles is essential, including actions that help maintain the flow of materials — adding, retaining, and recovering the value of these resources. The use of renewable energy and smart automation is key to promoting greater efficiency. Similarly, promoting the bioeconomy helps to replace fossil resources with biological resources using innovative technologies.

By integrating practices such as the reuse and recycling of materials, along with the redesign of products to facilitate reuse, the sector can reduce GHG emissions. This also reduces dependence on virgin resources and strengthens companies' resilience in the face of raw material price volatility.

These initiatives not only mitigate environmental impacts but also add value to companies, allowing them access to new markets in a scenario where consumers and investors are increasingly attentive to sustainability.

These principles align with the objectives of the New Industry Brazil (NIB) initiative. The industrial policy formulated by the Brazilian government has an investment of BRL 300 billion in financing between 2024 and 2026, aimed at tackling deindustrialization and increasing the competitiveness of Brazilian industry. The policy sets specific targets for six missions, which aim to promote the modernization of the country's industrial sector. The fifth mission, in particular, focuses on advances in bioeconomy, decarbonization, national energy transition and security.

Prioritization of activities

The prioritization of economic activities in the sectors of the Brazilian Sustainability Taxonomy (TSB) Action Plan was carried out through a quantitative and qualitative analysis, considering available data. The indicators used for this assessment include a five-year historical series of the following indicators: 1) Gross Domestic Product (GDP), employment, and the Economic Complexity Index, which measure the social and economic relevance of activities; 2) GHG emissions and other climate indicators based on scenarios from the Intergovernmental Panel on Climate Change (IPCC) and the International Energy Agency (IEA), which assess the potential for Climate change mitigation; 3) the existence of economic activities in other taxonomies, which favors interoperability; and 4) an expert assessment, that considers climate priorities and sector regulations, reflecting the importance in the Brazilian context. The data were normalized and scored, with different weights according to sectoral importance, in order to prioritize activities according to a standardized system. In addition to the prioritized activities, a common activity was also established for the entire manufacturing industry: activity C9: Energy efficiency improvement activities applicable to manufacturing

activities. At the end of the chapter, there is also a list of facilitating activities, which are essential for enabling other initiatives to achieve emissions reductions, although they do not necessarily reduce emissions directly. This list comprises a wide range of activities, ranging from, for example, the manufacture of glass for solar panels to the production of electrical wires, cables and conductors, among other activities that are fundamental to enabling the energy and industrial transition. Precisely because of the diversity and scope of these activities, the list does not have specific CNAEs. Instead, initiatives that demonstrably relate to the types of enabling activities described are considered qualified.

Public consultation updates and considerations for future editions

The preliminary proposals for the first edition of the TSB were submitted for public consultation between November 16, 2024 and March 31, 2025, structured in two stages of disclosure. The first stage of the consultation included introductory taxonomy documents, while the second stage provided technical and thematic technical chapters, with technical criteria for mitigation and adaptation, sectoral safeguards and adjustments to economic activities. Civil society was able to contribute freely throughout the process.

This technical chapter incorporates the contributions received and the adjustments made during the public consultation. Below are specific considerations for future updates:

- **Low-Emission Vehicle Manufacturing Sectors:** The inclusion of these sectors in the TSB was considered during the public consultation process. However, their inclusion in the list of eligible activities will not be immediate, given the need for further technical analysis of their specificities. The diversity of types, technologies and production processes requires a careful approach, in line with the criteria already established in the CNAE H — Transportation, Storage and Postal Services technical chapter. This sector features a robust value chain in Brazil and high potential to contribute to the decarbonization of both urban and logistics mobility, especially through the adoption of technologies such as electric and hybrid propulsion, and lower-impact biofuels.
- **Critical or Strategic Minerals Refining Sector:** The inclusion of these sectors in the TSB was considered during the public consultation process. However, their inclusion in the list of eligible activities will not be immediate, given the need for further technical analysis of their specificities. The production of critical or strategic materials — such as niobium, nickel, lithium, copper, rare earths, graphite and silicon — plays a central role in enabling clean technologies, such as batteries, wind turbines, and solar panels. Although not always major sources of greenhouse gases, these activities require detailed assessment of environmental and social risks, including criteria of do no significant harm, due to potential impacts on water resources, biodiversity and local communities.

Both sectors are fundamental for strengthening Brazilian production chains. By advancing from mere mineral extraction or the import of technologies towards the domestic production of components and final goods, Brazil can add value, create skilled jobs, and reduce its external vulnerability in key sectors of the energy transition. Economic and financial stakeholders are encouraged to follow future Taxonomy developments, as these sectors will be incorporated in subsequent updates, as robust technical criteria aligned with the objectives of the TBS are consolidated.

Objective 1 — Climate change mitigation

Categories of eligible activities

- C1: Manufacture of iron and steel
- C2: Manufacture of aluminum
- C3: Manufacture of cement
- C4: Manufacture of biomass and biofuels
- C5: Manufacture of organic chemical products — basic and intermediate petrochemicals, alcohols, organic solvents, carbon black, ketones, aldehydes, resins, and elastomers
- C6: Manufacture of inorganic chemical products — chlorine, sodium carbonate, ammonia, nitric acid, industrial gases, and sulphuric acid
- C7: Manufacture of cellulose and paper
- C8: Manufacture of glass
- C9: Energy efficiency improvement activities applicable to manufacturing activities
- C10: Research, development and innovation activities for the sector

Sector-specific activities

C1: Manufacture of iron and steel

CNAEs:

- 24.11-3: Production of pig iron
- 24.21-1: Production of semi-finished steel products
- 24.22-9/01: Production of carbon steel flat-rolled products, coated or uncoated
- 24.22-9/02: Production of specialty steel flat-rolled products
- 24.23-7/01: Production of seamless steel pipes
- 24.23-7/02: Production of long rolled steel products, except pipes
- 24.24-5/01: Production of steel wire
- 24.24-5/02: Production of re-rolled, drawn and profiled steel products, except wires

Description:

Manufacture of metallic iron and steel from the reduction of iron ore through blast furnaces or alternative processes.

Examples of activities:

- Production of crude steel through the integrated coke-based blast furnace–basic oxygen furnace (BF-BOF) route
- Production of sponge iron through direct reduced iron (DRI)
- Production of crude steel via the integrated charcoal route
- Production of crude steel via electric arc furnace (EAF) operation

Out-of-scope activities:

- Iron ore pelletizing
- Production of coke when carried out in facilities separate from the steelmaking complex
- Production of iron and steel tubes and poles
- Production of other iron and steel products

- Installation of new production units for the manufacture of iron via coal coke
- Expansion of facilities using the blast furnace (BF) and BF-BOF route with coal coke

Substantial contribution to Objective 1 — Climate change mitigation

To qualify as a substantial contribution, the activity must meet criterion A in conjunction with at least one of the technical criteria B, C, D, or E:

- A. Mandatory submission of annual reports:**
- Including the quantification of Scope 1 and 2 GHG emissions and following the criteria established in the NBR ISO 14064-1 standard.
 - Including the quantification of the percentages of renewable energy use.
 - Including the quantification of the percentages of use of renewable and circular raw materials.¹
- B. Applicable only after the baseline is established: criteria relating to the GHG emissions intensity limit for production via the BF-BOF route using mineral coal as a reducing agent (all criteria must be met):**
- The baseline must take into consideration Scope 1 and 2 GHG emissions and following the criteria established in the NBR ISO 14064-1 standard.
 - Production of pig iron and/or primary steel must meet the maximum emissions limit defined by the baseline and follow the same calculation pattern as the baseline.
 - If Carbon Capture and Storage (CCS) or Carbon Capture and Utilization (CCU) are used, the baseline for emissions intensity must be respected and the criteria defined in the Cross-cutting Appendix: Carbon Capture and Utilization (CCU) and Bioenergy with Carbon Capture and Storage (BECCU) must be met.
- C. Production of pig iron and primary steel via the integrated BF-BOF or BF- EAF route using charcoal or other types of biomass as a reducing agent is qualified based on proof of the origin of the biological raw material, following the same criteria established for the activity C4: Manufacture of biomass and biofuels or the activity of Production of biogas and biomethane from the CNAE D — Electricity and Gas technical chapter.**
- D. Production of direct reduced iron (DRI) and steel via the DRI route must meet one of the following technical criteria:**
- Replacement of blast furnace (BF) using coal as a reducing agent;
 - Production of direct reduced iron where the reducing agent is hydrogen (as established in activity D11: Low-carbon hydrogen production), biogas, or biomethane (as established in activity D12: Biogas and biomethane production in the CNAE D – Electricity and Gas technical chapter), or a combination thereof.;
 - Production of iron via DRI or of steel via DRI-EAF, when the primary reducing agent is natural gas, will be directly considered a transitional route until 2030;
 - This component of the criterion must be updated with maximum scope 1 GHG emissions limits based on a national baseline, should this technology begin to be deployed in Brazil.
- E. Secondary steel production must meet all of the following technical criteria:**
- The steel must come from at least 70% recycled material.
 - Evidence of the origin and quantity of recycled steel incorporated must be provided.²

Investments in projects, facilities and specific stages of the production processes covered by this activity are qualified when they meet criterion F in conjunction with G.

- F. Mandatory submission of annual reports:**

¹ For the application of these criteria, renewable raw materials refer to biomass, industrial biowaste or municipal biowaste. Circular raw materials refer to recycled scrap metal, as well as industrial by-products reused in the steelmaking process, such as recyclable slags and ore fines.

² The acquisition of steel for recycling can be verified through the submission of an invoice.

- i. Including the quantification of the intensity of Scope 1 and 2 GHG emissions and following the criteria established in the ABNT NBR ISO 14064-1 standard.
- ii. Including the quantification of the percentages of renewable energy use.
- iii. Including the quantification of the percentages of use of renewable and circular raw materials.³

G. Development of an adaptation or retrofit project to enable the substitution of fossil energy sources or reducing agents with renewable sources, provided that at least one of the following criteria is met:

- i. In the case of biomass, charcoal, and biofuels, the origin of the biological raw material must be proven, following the same criteria established for activity C4: Manufacture of biomass and biofuels.
- ii. In the case of hydrogen, the same criteria defined by the Low-carbon emission hydrogen production activity in the CNAE D — Electricity and Gas technical chapter must be met.
- iii. In the case of biogas or biomethane, the same criteria defined for the biogas and biomethane production activity in the CNAE D — Electricity and Gas technical chapter must be met.
- iv. A minimum percentage of fossil fuels must be replaced by alternative fuels, as to be defined by the baseline established for renewable energy consumption.⁴

H. For electrification activities, see List of enabling activities in this technical chapter.

I. For CCU or BECCU facilities, see Cross-cutting Appendix: Carbon Capture and Utilization (CCU and BECCU).

J. For the purchase of energy and industrial inputs, see List of enabling activities in this technical chapter.

Do no significant harm

The DNSH criteria for this activity complement the substantial contribution criteria to ensure that its implementation does not cause adverse impacts on the TSB's other climate, environmental and socio-economic objectives.

Do no significant harm (to any of the following objectives):

Climate change adaptation	<ul style="list-style-type: none"> • If possible, secure multiple suppliers from different regions of the country to reduce the risks of climate change-induced disruptions (e.g., droughts or storms), while weighing up other possible cost and risk factors in the supply chains. • Where necessary and technically and economically feasible, design and build plants with flood barriers, improved drainage systems, and elevated equipment to withstand any rise in water levels. • Use construction materials and equipment designed to operate efficiently at higher temperatures. • If possible and considered technically and economically feasible, prioritize diversification of steel suppliers and inputs from various regions to reduce vulnerability to climate impacts in a single area. • Prepare and update Solid Waste Management Plans and contingency plans to address risks associated with climate change. (For example, mine closures due to flooding or extreme heat.)
Protection and restoration of biodiversity and ecosystems	<ul style="list-style-type: none"> • Use sustainable charcoal or other types of sustainable biomass and promote responsible forest management.

³ For the application of these criteria, renewable raw materials refer to biomass, industrial biowaste or municipal biowaste. Circular raw materials refer to recycled scrap metal, as well as industrial by-products reused in the steelmaking process, such as recyclable slags and ore fines.

⁴ The baseline must be defined by January 1, 2028, and the methodology for establishing the baseline must be defined by an independent third party and approved by the TSB regulatory body.

Do no significant harm (to any of the following objectives):

Conservation and sustainable management and use of soil and forests	<ul style="list-style-type: none"> • Use certified sustainable charcoal and promote responsible forest management.
Sustainable use and protection of water and marine resources	<ul style="list-style-type: none"> • Implement water reuse and treatment systems to avoid contamination. • Encourage levels of freshwater circulation above the sector average.
Transition to a circular economy	<ul style="list-style-type: none"> • Promote the recycling of steel and co-products. • Promote the application of steel aggregates from the steelworks and other waste (blast furnace and steelworks slag).
Pollution prevention and control	<ul style="list-style-type: none"> • Reduce CO₂ emissions and atmospheric pollutants to meet current National Air Quality Standards. • Prepare and update Solid Waste Management Plans and contingency plans to address risks associated with climate change.
Reduction of socio-economic inequalities, including racial and gender disparities	<ul style="list-style-type: none"> • Annex A1: Do No Significant Harm criteria for socio-economic Objective 9.

C2: Manufacture of aluminum**CNAEs:**

- 24.41-5/01: Production of aluminum and aluminum alloys in primary forms
- 24.41-5/02: Production of aluminum rolled products

Description:

Metallurgy of aluminum and its alloys. Production of primary aluminum through the electrolysis of alumina. Production of secondary aluminum from the recycling of aluminum scrap⁵.

⁵ Aluminum scrap: recyclable aluminum materials from industrial or post-consumer processes, the use of which must meet tax, fiscal, labor and environmental compliance requirements.

Examples of activities:

- Production of aluminum in primary forms (ingots, billets and slabs)
- Production of bars, tubes, profiles, plates, and other aluminum laminates
- Production of aluminum alloys

Out-of-scope activities:

- Production of aluminum forgings
- Production of aluminum household items

Substantial contribution to Objective 1 — Climate change mitigation

To qualify as a substantial contribution, the activity must meet criterion A in conjunction with at least one of the technical criteria between B and C:

- A.** Mandatory submission of annual reports:
- i. Including the quantification of Scope 1 and 2 GHG emissions and following the criteria established in the NBR ISO 14064-1 standard.
 - ii. Including the quantification of the percentages of renewable energy use.
 - iii. Including the quantification of the percentages of use of renewable and circular raw materials.⁶
 - iv. Including the quantification of electricity consumption in the electrolysis process to produce primary aluminum.
- B.** Applicable only after the baseline is established:⁷ criteria regarding the GHG emissions intensity limit for primary aluminum production, all of the following criteria must be met:
- i. The baseline must take into consideration Scope 1 and 2 GHG emissions and following the criteria established in the NBR ISO 14064-1 standard.
 - ii. Primary aluminum production must meet the maximum emissions limit defined from the baseline and follow the same calculation pattern as the baseline.
 - iii. If CCS-CCU are used, the baseline for emissions intensity must be respected and the criteria defined in the Cross-cutting Appendix: Carbon Capture and Utilization (CCU and BECCU) must be met.
 - iv. Primary aluminum production must meet the maximum electricity consumption limit for the electrolysis process defined from the baseline.
- C.** The production of secondary aluminum, i.e., from scrap, is directly qualified.

Investments in projects, facilities, and specific stages for the production of products covered by this activity are qualified when they meet criterion D in conjunction with at least one of the other technical criteria E, F, G, or H.

- D.** Mandatory submission of annual reports:
- i. Including the quantification of Scope 1 and 2 GHG emissions and following the criteria established in the NBR ISO 14064-1 standard.
 - ii. Including the quantification of the percentages of renewable energy use.

⁶ For the application of these criteria, renewable raw materials refer to biomass, industrial biological waste, or municipal biological waste. Circular raw materials refer to aluminum scrap (industrial or post-consumer) reused in the process of producing secondary aluminum through melting. For primary aluminum production, the reuse of waste from the production process itself (ingot offcuts) and the incorporation of recyclable inputs from other production chains can be considered circular, provided they are technically validated and traceable.

⁷ The baseline must be defined by January 1, 2028, and the methodology for establishing the baseline must be defined by an independent third party and approved by the TSB regulatory body.

- iii. Including the quantification of the percentages of use of renewable and circular raw materials.⁸
 - iv. Including the quantification of electricity consumption in the electrolysis process to produce primary aluminum.
- E.** Adaptation or retrofit projects to replace fossil energy sources or reducing agents with renewable ones qualify directly if the following criteria are met:
- i. In the case of biomass, charcoal, and biofuels, the origin of the biological raw material must be proven, following the same criteria established for activity C4: Manufacture of biomass and biofuels.
 - ii. In the case of hydrogen, the same criteria defined by the Low-carbon emission hydrogen production activity in the CNAE D — Electricity and Gas technical chapter must be met.
 - iii. In the case of biogas or biomethane, the same criteria defined for the biogas and biomethane production activity in the CNAE D — Electricity and Gas technical chapter must be met.
 - iv. A minimum percentage of fossil fuels must be replaced by alternative fuels, as to be defined by the baseline established regarding renewable energy consumption for the product.⁹
- F.** For electrification activities, see List of enabling activities in this technical chapter.
- G.** For CCU or BECCU installations, see Cross-cutting Appendix: Carbon Capture and Utilisation (CCU and BECCU).
- H.** For the purchase of energy and industrial inputs, see List of Enabling Activities.
- I.**

Do no significant harm

The DNSH criteria for this activity complement the substantial contribution criteria to ensure that its implementation does not cause adverse impacts on the TSB's other climate, environmental and socio-economic objectives.

Do no significant harm (to any of the following objectives):

Climate change adaptation	<ul style="list-style-type: none"> • Prioritize the use of systems that promote the best energy efficiency, considering the climate conditions to which the plants are exposed. • If possible and technically and economically feasible, secure multiple suppliers from different regions to reduce the risks of climate-induced disruptions (e.g., droughts or storms). • Prepare and update Solid Waste Management Plans and contingency plans to address risks associated with climate change.
Protection and restoration of biodiversity and ecosystems	<ul style="list-style-type: none"> • Bauxite mining must avoid damaging critical habitat and restore mined areas.

⁸ For the application of these criteria, renewable raw materials refer to biomass, industrial biological waste, or municipal biological waste. Circular raw materials refer to aluminum scrap (industrial or post-consumer) reused in the process of producing secondary aluminum through melting. For primary aluminum production, the reuse of waste from the production process itself (ingot offcuts) and the incorporation of recyclable inputs from other production chains can be considered circular, provided they are technically validated and traceable.

⁹ The baseline must be defined by January 1, 2028, and the methodology for establishing the baseline must be defined by an independent third party and approved by the TSB regulatory body.

Do no significant harm (to any of the following objectives):

Conservation and sustainable management and use of soil and forests	<ul style="list-style-type: none"> N/A
Sustainable use and protection of water and marine resources	<ul style="list-style-type: none"> Reduce water consumption and treat effluents; prevent contamination of water bodies.
Transition to a circular economy	<ul style="list-style-type: none"> Recycle aluminum and optimize waste use.
Pollution prevention and control	<ul style="list-style-type: none"> Control GHG emissions, particulate matter, and toxic waste in accordance with current National Air Quality Standards. Prepare and update Solid Waste Management Plans and contingency plans to address risks associated with climate change.
Reduction of socio-economic inequalities, including racial and gender disparities	<ul style="list-style-type: none"> Annex A1: Do no significant harm criteria for economic-social objective 9.

C3: Manufacture of cement**CNAEs:**

- 23.20-6: Production of cement

Description:

Production of clinker through the calcination of raw materials, followed by grinding the clinker, gypsum, and mineral additions to obtain cement.

Examples of activities:

- Production of ordinary Portland cement
- Production of white Portland cement, including artificially colored varieties
- Production of blended Portland cement
- Production of high-early-strength Portland cement
- Production of blast-furnace Portland cement
- Production of pozzolanic Portland cement
- Production of clinker for Portland cement

Out-of-scope activities:

- Production of refractory cement
- Production of dental cement

Substantial contribution to Objective 1 — Climate change mitigation

To qualify as a substantial contribution, the activity must meet criterion A in conjunction with at least one of the technical criteria between B and C:

- A. Mandatory submission of annual reports:
 - i. Including the quantification of Scope 1 and 2 GHG emissions and following the criteria established in

the NBR ISO 14064-1 standard.

- ii. Including the quantification of the percentages of alternative fuel¹⁰ and renewable energy use.
- iii. With the quantification of the percentages of use of renewable and circular, or low-carbon raw materials.¹¹

B. The limit for the intensity of specific direct emissions associated with the production processes of Portland cement and clinker for Portland cement until 2030, with revisions expected from 2031, is:¹²

- i. 0.58 tCO₂/t for cement;
- ii. 0.80 tCO₂/t of clinker.

C. The production of Portland cement with substitution of clinker with alternative materials (additions and substitutes) is directly qualified, as long as it is produced with materials recognized by ABNT NBR 16697 and has a composition of alternative material that is equivalent to the upper limit established in the standard.

Investments in projects, facilities, and specific stages for the production of products covered by this activity are qualified when they meet criterion D in conjunction with at least one of the other technical criteria E, F, G, or H:

D. Mandatory submission of annual reports:

- i. Including the quantification of Scope 1 and 2 GHG emissions and following the criteria established in the NBR ISO 14064-1 standard.
- ii. Including the quantification of the percentages of renewable energy use.
- iii. Including the quantification of the percentages of use of alternative fuels and renewable energy.¹³

E. Adaptation, retrofit, or alternative material development projects aimed at replacing fossil energy sources, reducing agents, or clinker with alternative materials or sources will be directly qualified provided that the following criteria are met:

- i. In the case of biomass, charcoal, and biofuels, the origin of the biological raw material must be proven, following the same criteria established for activity C4: Manufacture of biomass and biofuels.
- ii. In the case of hydrogen, the same criteria defined by the Low-carbon emission hydrogen production activity in the CNAE D — Electricity and Gas technical chapter must be met.
- iii. In the case of biogas or biomethane, the same criteria defined for the biogas and biomethane production activity in the CNAE D — Electricity and Gas technical chapter must be met.
- iv. A minimum percentage of fossil fuels must be replaced by lower-emission alternative fuels, as to be defined by the baseline established regarding alternative energy consumption for the product.¹⁴

¹⁰ For the application of these criteria, alternative fuels refer to those that replace non-renewable fossils (that is, petroleum coke), such as biomass, unserviceable tires, industrial waste, and lower-emission municipal waste.

¹¹ For the application of these criteria, renewable raw materials refer to biomass, industrial biowaste or municipal biowaste. Circular and low-carbon raw materials refer to by-products of other activities or alternative inputs used as substitutes for clinker, such as limestone filler, blast furnace slag, fly ash, industrial or natural pozzolans, and other materials with cementitious properties that promote decarbonization of the process.

¹² Between 1990 and 2022, the Brazilian cement industry managed to reduce its carbon emissions by 17%, from 700 kg CO₂/t cement to 580 kg CO₂/t cement — compared to a world average of 608 kg CO₂/t cement (SNIC, 2023).

¹³ For the application of these criteria, renewable raw materials refer to biomass, industrial biowaste or municipal biowaste. Circular and low-carbon raw materials refer to by-products of other activities or alternative inputs used as substitutes for clinker, such as limestone filler, blast furnace slag, fly ash, industrial or natural pozzolans, and other materials with cementitious properties that promote decarbonization of the process.

¹⁴ The baseline must be defined by January 1, 2028, and the methodology for establishing the baseline must be defined by an independent third party and approved by the TSB regulatory body.

F. For electrification activities, see List of Enabling Activities.

G. For CCU or BECCU installations, see Cross-cutting Appendix: Carbon Capture and Utilisation (CCU and BECCU)

H. For the purchase of energy and industrial inputs, see List of Enabling Activities

Development of alternative raw materials to clinker, provided they have lower emissions intensity than clinker.

Do no significant harm

The DNSH criteria for this activity complement the substantial contribution criteria to ensure that its implementation does not cause adverse impacts on the TSB's other climate, environmental and socio-economic objectives.

Do no significant harm (to any of the following objectives):	
Climate change adaptation	<ul style="list-style-type: none"> • Implement advanced dust suppression systems in cement plants to deal with the increase in dust due to hotter and drier conditions. • Prioritize the supply of raw materials, such as limestone and clay, from local or diverse geographic regions to avoid dependence on areas vulnerable to climate impacts. • Use flexible means of transportation (e.g., alternating between railroads, roads, or waterways) that can operate under variable weather conditions, such as floods or extreme temperatures. • Prepare and update Solid Waste Management Plans and contingency plans to address risks associated with climate change.
Protection and restoration of biodiversity and ecosystems	<ul style="list-style-type: none"> • The producer discloses the origin of the limestone and adopts supply chain policies to ensure that there is no irreversible damage to the ecosystem, including the implementation of restoration projects in mined areas.
Conservation and sustainable management and use of soil and forests	<ul style="list-style-type: none"> • Implement reforestation and recovery programs for degraded areas in regions affected by the extraction of raw materials.
Sustainable use and protection of water and marine resources	<ul style="list-style-type: none"> • Adopt an integrated water resources management system, with an emphasis on preserving water sources and minimizing consumption in cement production. • Implement the collection, treatment, and reuse of rainwater and effluents in production.
Transition to a circular economy	<ul style="list-style-type: none"> • Dematerialization and circularity in the cement sector aim to lower clinker content in the final product, replacing it with alternative materials such as pozzolans (additives in concrete that partially replace clinker, composed of siliceous or siliceous-aluminum materials), fly ash, blast furnace slag, or limestone filler, many of which are industrial by-products. • When using raw materials of biological origin, the recommendations of the Circular Economy hierarchy should be observed. • Incorporation of industrial waste, such as blast furnace slag and fly ash, into the cement production process to promote the circular economy and reduce waste sent to landfills.

Do no significant harm (to any of the following objectives):

Pollution prevention and control	<ul style="list-style-type: none"> • Reduce CO₂ and pollutant emissions; implement carbon capture technologies; encourage greater use of cement additions and alternative fuels; establish tests to evaluate the efficiency in the destruction and removal of hazardous organic compounds (POHCs) in cement kilns. • Prepare and update Solid Waste Management Plans and contingency plans to address risks associated with climate change.
Reduction of socio-economic inequalities, considering racial and gender aspects	<ul style="list-style-type: none"> • Annex A1: Do No Significant Harm criteria for socio-economic Objective 9.

C4: Manufacture of biomass and biofuels**CNAEs:**

- 19.31-4: Production of alcohol
- 19.32-2: Production of biofuels, except alcohol
- 02.10-1/08: Production of charcoal (planted forests)

Description:

Production of alcohol (CNAE 19.31-4/00) refers to the production of ethanol, mainly from fermenting sugar- or starch-rich crops such as sugarcane, corn, and beets. The ethanol produced can be used as a fuel (biofuel) or in industrial and pharmaceutical applications. The production of biofuels, except alcohol (CNAE 19.32-2/00) involves the production of biofuels that do not include ethanol, such as biodiesel (from vegetable oils or animal fats) and other renewable fuels. The production of charcoal from planted forests (CNAE 02.10-1/08) refers to the transformation of wood from planted forests into charcoal. These compounds are mainly used as substitutes for fossil fuels, with the aim of reducing carbon emissions in various sectors, including transport and energy.

Examples of activities:

- Production of ethanol from sugarcane
- Production of ethanol from corn
- Production of biodiesel from soy
- Production of sustainable aviation fuel (SAF)
- Forest biomass gasification
- Production of biomass pellets and briquettes
- Bio-oil

Out-of-scope activities:

- Biogas and biomethane production¹⁵
- Activities that use fossil fuels as the primary source of energy in the production cycle

¹⁵ See activity Production of biogas and biomethane, from CNAE D - Electricity and Gas technical chapter

Substantial contribution to Objective 1 — Climate change mitigation

To qualify as a substantial contribution, biomass and biofuel production must meet at least one of the following technical criteria:

- A. Bioenergy is produced from waste (e.g., agricultural, forestry, or municipal — as classified by the ISCC);¹⁶ or
- B. Bioenergy is derived from third-generation biofuels based on microalgae; or
- C. The raw materials used for bioenergy production meet the criteria of substantial contribution to the corresponding activities at the rural property level in the CNAE A — Agriculture, Livestock, Forestry, Fishing and Aquaculture sector; or
- D. The raw materials for bioenergy production are certified by one of the recognized sustainability standards:
 - i. Forest Stewardship Council (FSC);
 - ii. Biomass Biofuel Sustainability Voluntary Scheme (2BSvs);
 - iii. Bonsucro;
 - iv. International Sustainability and Carbon Certification (ISCC);
 - v. Roundtable on Sustainable Biomaterials (RSB) (RSB, 2018);
 - vi. Round Table on Responsible Soy (RTRS);
 - vii. SAF certified according to standards established by the International Civil Aviation Organization (ICAO) or recognized by the ANP;
 - viii. RENOVABIO guidelines (Efficient Biofuel Production Certificate containing the Energy-Environment Efficiency Score — NEEA);
 - ix. Programme for the Endorsement of Forest Certification (PEFC).
 - x. Brazilian Forest Certification Program (Cerflor)

Do no significant harm

The DNSH criteria for this activity complement the substantial contribution criteria to ensure that its implementation does not cause adverse impacts on the TSB's other climate, environmental and socio-economic objectives.

Do no significant harm (to any of the following objectives):	
Climate change adaptation	<ul style="list-style-type: none"> Establish and maintain a comprehensive climate risk assessment and management plan to identify possible vulnerabilities and adaptation opportunities throughout the supply chain. Implement strategies to ensure climate resilience, considering the specificities of the respective production environments, i.e., seek improvements in water resource management, infrastructure adaptation, and systematic approaches whenever possible. Prepare contingency plans to address risks associated with climate change.
Protection and restoration of biodiversity and ecosystems	<ul style="list-style-type: none"> Establish supply traceability through chain of custody management, ensuring that information on suppliers and contributors is made available in accordance with a robust methodology to be adopted. Conduct assessments to map any externalities resulting from the supply of biomass on local biodiversity, ecosystems, or endangered species. Implement strategies to mitigate any risks identified. Ensure that the supply of biomass does not result in environmental incompatibilities that cause significant damage to local biodiversity, ecosystems, or endangered species. Implement strategies to mitigate the risks identified.

¹⁷ https://www.iscc-system.org/wp-content/uploads/2025/01/ISCC_EU_material_list_250114-1.pdf or updates

Do no significant harm (to any of the following objectives):

Conservation and sustainable management and use of soil and forests	<ul style="list-style-type: none"> N/A
Sustainable use and protection of water and marine resources	<ul style="list-style-type: none"> Adopt efficient water use practices, such as the reuse of treated effluents, drip irrigation and optimization of industrial processes; implement strict standards for the quality of liquid effluents, reducing the load of pollutants such as Biochemical Oxygen Demand (BOD) and Chemical Oxygen Demand (COD).
Transition to a circular economy	<ul style="list-style-type: none"> If the raw material consists of industrial biowaste (including from the food sector) or municipal biowaste: Solid biological waste used in the production must come from waste streams separated at the source and collected separately from hazardous waste; in other words, it cannot be obtained via mixed waste separation. Biological waste must comply with the waste regulatory framework and national, regional, and local waste management plans. When municipal biowaste is used as a raw material, the project must complement and not compete with the existing municipal biowaste management infrastructure. <p>If the raw material consists of agricultural waste:</p> <ul style="list-style-type: none"> The production of the source raw material must not negatively affect food security. This can be demonstrated by adherence to guidelines such as the Food Security Assessment Guidelines of the Roundtable on Sustainable Biomaterials (RSB) (RSB, 2018) and the Bioenergy and Food Security Assessment of the Food and Agriculture Organization of the United Nations (FAO) (FAO, 2024).
Pollution prevention and control	<ul style="list-style-type: none"> Adhere to national and international standards for emissions and waste management, ensuring that production processes do not contribute to air, water, or soil pollution. Implement measures to minimize the waste generated during the production process, encouraging the recycling and reuse of materials whenever possible. Prepare and update Solid Waste Management Plans. Implement measures to reduce the risk of contamination of water resources. Control measures must reduce emissions of volatile gases, particulates, tars, sulfur dioxide, and nitrogen oxides during charcoal production.

Do no significant harm (to any of the following objectives):

Reduction of socio-economic inequalities, including racial and gender disparities

- Annex A1: Do No Significant Harm criteria for socio-economic Objective 9.

C5: Manufacture of organic chemical products — basic and intermediate petrochemicals, alcohols, organic solvents, carbon black, ketones, aldehydes, resins, and elastomers

CNAEs:

- 20.21-5: Production of basic petrochemical products
- 20.22-3: Production of intermediates for plasticizers, resins, and fibers
- 20.29-1: Production of organic chemical products not previously specified
- 20.31-2: Production of thermoplastic resins
- 20.32-1: Production of thermosetting resins
- 20.33-9: Production of elastomer
- 20.93-2: Production of additives for industrial use

Description:

The activity includes basic organic chemicals, such as ethylene, propylene, aromatics, and intermediates for plastics, plasticizers, resins and fibers, such as styrene and ethylbenzene, as well as other types of organic chemicals, such as alcohols for industrial use, carbon black, ketones, and aldehydes. The production of resins and elastomers is also included; examples of products are polyethylene, polypropylene, PVC, epoxy resin, and rubbers.

Examples of activities:

- Production of petrochemical products, such as ethylene, propene, benzene, toluene, xylenes, butadiene, butenes, methanol, and naphthalene
- Production of intermediate products for thermoplastic and thermosetting resins, such as vinyl chloride monomer, dichloroethane, styrene, ethylbenzene, maleic anhydride, bisphenol A, and other related compounds
- Production of intermediate products for plasticizers, such as phthalic anhydride, octanol, isobutanol, other related compounds
- Production of intermediate products for fibers, such as: adipic acid, caprolactam, terephthalic acid, acrylonitrile, hexamethylenediamine adipate, dimethyl terephthalate, monoethylene glycol, other related compounds
- Production of organic solvents
- Production of intermediates for detergents and surfactants
- Production of carbon black
- Production of plasticizers
- Production of fatty acids
- Production of other organic compounds
- Production of isopropyl alcohol (excluding fermentation alcohol)
- Production of polymers and copolymers
- Production of synthetic rubber, such as acrylic, chlorinated, silicone, and nitrile rubbers
- Production of blends of synthetic rubber and natural rubber or rubber-like gums
- Production of styrene-butadiene rubber (SBR)
- Production of neoprene
- Production of SBR latex
- Production of new products from recovered raw materials

- Production of essential oils
- Production of non-petroleum-based synthetic lubricants
- Production of chemical compounds for process aids or final product performance across several market segments

Out-of-scope activities:

- Production of ethane, propane, and butane derived from petroleum extraction and refining

Substantial contribution to Objective 1 — Climate change mitigation

To qualify as a substantial contribution, the production of chemicals covered by this activity must simultaneously meet criteria A and B, together with C or D, until the year 2040. From then on, all criteria must be met simultaneously:

A. Mandatory submission of annual reports:

- Including the quantification of the intensity of Scope 1 and 2 GHG emissions and following the criteria established in the NBR ISO 14064-1 standard.
- Including the quantification of the percentages of renewable energy use.
- Including the quantification of the percentages of use of renewable and circular raw materials.¹⁷

B. Applicable only after establishing the baseline for emissions intensity in chemical production,¹⁸ all of the following criteria must be met:

- The baseline must take into consideration Scope 1 and 2 GHG emissions.
- The production of the organic chemical must meet the maximum GHG emissions intensity limit set by the baseline and follow the same boundary conditions used in the baseline calculation.
- If CCS-CCU and BECCU technologies are used, the baseline for emissions intensity must be respected, and the criteria defined in the Cross-cutting Appendix: Carbon Capture and Utilization (CCU and BECCU) must be met.
- The use of natural gas for cogeneration of energy in the production of organic chemical products is qualified if it respects the baseline defined for the emissions intensity of the production of this same product.
- The production of chemical products using natural gas and liquid from natural gas extraction (such as ethane and propane) as the main raw material (use of methane for non-energy purposes) is qualified if it complies with the GHG emissions intensity limits (to be defined)¹⁹ established for the production of this same chemical product. This criterion is valid until 2035.

C. Applicable only after the baseline is established for the use of renewable energy in the production of the chemical product,²⁰ all of the following criteria must be met:

- The production of the organic chemical must meet the minimum renewable energy use limit set by the baseline and follow the same boundary conditions as the baseline calculation.
- If biomass or biofuels are used as a renewable energy source, they must meet the criteria defined by activity C4: Manufacture of biomass and biofuels in this technical chapter.
- If electricity, biogas, or biomethane are used as a sustainable energy source, they must meet the criteria set out in CNAE D — Electricity and Gas technical chapter.

¹⁷ For the application of these criteria, renewable raw materials refer to biomass (of plant, animal, or mineral origin), industrial biological waste, or municipal biological waste. Circular raw materials refer to plastic and rubber waste, which is reintegrated into the production cycle.

¹⁸ The baseline must be defined by January 1, 2028, and the methodology for establishing the baseline must be defined by an independent third party and approved by the TSB regulatory body.

¹⁹ The baseline must be defined by January 1, 2028, and the methodology for defining the baseline must be established by a third party and approved by the TSB regulatory body.

²⁰ The baseline must be defined by January 1, 2028, and the methodology for establishing the baseline must be defined by an independent third party and approved by the TSB regulatory body.

- D.** Applicable only after the baseline is established for the use of renewable and/or circular raw materials in the production of the chemical product,²¹ all of the following criteria must be met:
- i. The baseline for the production process must include scope 1 and 2 GHG emissions, following the criteria established in the NBR ISO 14064-1 standard.
 - ii. The production of the organic chemical must meet the minimum limit for the use of renewable and/or circular raw materials defined by the baseline and follow the same boundary conditions as the baseline calculation.
 - iii. If biomass, biofuels, biogas, or biomethane are used as a renewable raw material source, they must meet the criteria defined by activity C4: Manufacture of biomass and biofuels.

Investments in projects, facilities, and specific stages of the production of chemical products covered by this activity are qualified when they meet criterion E in conjunction with at least one of the other technical criteria F or G or H or I or J:

- E.** Mandatory submission of annual reports:
- i. Including the quantification of the intensity of Scope 1 and 2 GHG emissions and following the criteria established in the NBR ISO 14064-1 standard.
 - ii. Including the quantification of the percentages of renewable energy use.
 - iii. Including the quantification of the percentages of use of renewable and circular raw materials.²²
- F.** Adaptation or retrofit projects to replace fossil energy sources or reducing agents with renewable ones qualify directly if the following criteria are met:
- i. In the case of biomass, charcoal, and biofuels, the origin of the biological raw material must be proven, following the same criteria established for activity C4: Manufacture of biomass and biofuels.
 - ii. In the case of biogas or biomethane, the same criteria defined for the biogas and biomethane production activity in the CNAE D — Electricity and Gas technical chapter must be met.
 - iii. A minimum percentage of fossil fuels must be replaced by alternative fuels, as to be defined by the baseline established for renewable energy consumption for the organic chemical product.²³
- G.** Adaptation or retrofit projects aimed at replacing fossil raw material sources with renewable and/or circular sources²⁴ will be directly qualified, provided the following criteria are met:
- i. In the case of biomass, charcoal, and biofuels (including biogas and biomethane), the origin of the biological raw material must be proven, following the same criteria established for the activity C4: Manufacture of biomass and biofuels.
 - ii. A minimum percentage of fossil raw materials must be replaced by alternative raw materials, as to be defined by the baseline established for renewable and circular raw material consumption for the organic chemical product.²⁵
- H.** For electrification activities, see List of enabling activities in this technical chapter.
- I.** For CCU or BECCU facilities, see Cross-cutting Appendix: Carbon Capture and Utilization (CCU and BECCU).

²¹ The baseline must be defined by January 1, 2028, and the methodology for establishing the baseline must be defined by an independent third party and approved by the TSB regulatory body.

²² For the application of these criteria, renewable raw materials refer to biomass (of plant, animal, or mineral origin), industrial biological waste, or municipal biological waste. Circular raw materials refer to plastic and rubber waste, which is reintegrated into the production cycle.

²³ The baseline must be defined by January 1, 2028, and the methodology for establishing the baseline must be defined by an independent third party and approved by the TSB regulatory body.

²⁴ For the application of these criteria, renewable raw materials refer to biomass (of plant, animal, or mineral origin), industrial biological waste, or municipal biological waste. Circular raw materials refer to plastic and rubber waste that is reintegrated into the production cycle.

²⁵ The baseline must be defined by January 1, 2028, and the methodology for establishing the baseline must be defined by an independent third party and approved by the TSB regulatory body.

J. For the purchase of energy and industrial inputs, see List of enabling activities in this technical chapter.

Do no significant harm

The DNSH criteria for this activity complement the substantial contribution criteria to ensure that its implementation does not cause adverse impacts on the TSB's other climate, environmental and socio-economic objectives.

Do no significant harm (to any of the following objectives):	
Climate change adaptation	<ul style="list-style-type: none"> Establish and maintain a comprehensive climate risk assessment and management plan to identify possible vulnerabilities and adaptation opportunities throughout the supply chain. Implement strategies to ensure climate resilience, such as better water management, infrastructure adaptation, and ecosystem-based approaches. Prepare and update Solid Waste Management Plans and contingency plans to address risks associated with climate change.
Protection and restoration of biodiversity and ecosystems	<ul style="list-style-type: none"> The same criteria included in the activity C4: Manufacture of biomass and biofuels. If renewable electricity is used (in whole or in part), it must follow the same standards defined in CNAE D — Electricity and Gas technical chapter. If hydrogen is used, it must follow the same standards defined in the criterion for the activity of Low-carbon emission hydrogen production in the CNAE D — Electricity and Gas technical chapter.
Conservation and sustainable management and use of soil and forests	<ul style="list-style-type: none"> If the raw materials or energy sources consist of industrial biowaste (including from the food industry), municipal biowaste, or agricultural waste, they must follow the same standards included in the criteria mentioned in activity C4: Manufacture of biomass and biofuels, for the sustainable land use and the conservation, management and sustainable use of forests.
Sustainable use and protection of water and marine resources	<ul style="list-style-type: none"> Comply with environmental regulations related to the responsible use of water and marine resources. Ensure effluent treatment and proper disposal to prevent any environmental damage.
Transition to a circular economy	<ul style="list-style-type: none"> If the raw materials or energy sources consist of industrial biowaste (including from the food industry), municipal biowaste, or agricultural waste, they must follow the same standards included in the criteria mentioned in activity C4: Manufacture of biomass and biofuels. If the raw materials consist of plastic waste, it is important to evaluate the various recycling alternatives available. Factors such as the availability of technology, improvement of the quality of the recycled product, environmental impacts of the recycling process, and current waste regulations should be considered when defining the most suitable recycling option for waste. Activities should promote improvements in the collecting and sorting logistics of plastic waste for recycling processes. Activities should promote improvements in the monitoring practices of products derived from organic chemicals, so that end-of-life activities such as incineration and landfilling of plastic waste are minimized.

Do no significant harm (to any of the following objectives):

Pollution prevention and control	<ul style="list-style-type: none"> • Adhere to national and international standards for emissions and waste management, ensuring that production processes do not contribute to air, water, or soil pollution. • Implement measures to minimize the waste generated during the production process, encouraging the recycling and reuse of materials whenever possible. • Check for the addition of toxic components to the formulations of end products that may cause chronic effects (such as carcinogenic potential). • Avoid placing non-biodegradable products on the market. • Prepare and update Solid Waste Management Plans and contingency plans to address risks associated with climate change.
Reduction of socio-economic inequalities, including racial and gender disparities	<ul style="list-style-type: none"> • Annex A1: Do No Significant Harm criteria for socio-economic Objective 9.

C6: Manufacture of inorganic chemical products — chlorine, sodium carbonate, ammonia, nitric acid, industrial gases, sulphuric acid**CNAEs:**

- 20.11-8: Production of chlorine, alkalis, and derivatives
- 20.12-6: Production of fertilizer intermediates
- 20.14-2: Production of industrial gases
- 20.19-3/99: Production of other inorganic chemical products not previously specified

Description:

The activity includes the production of inorganic chemicals, such as chlorine, alkalis, industrial gases, and intermediates for fertilizers. The production processes for these chemicals are highly energy-intensive and therefore must be addressed. The production of inorganic chemicals with high levels of efficiency, or those that use renewable energy and/or renewable feedstock, contributes to the climate change mitigation objective.

Examples of activities:

- Production of chlorine and alkalis
- Production of intermediates for fertilizers and other chemical products for industrial use (nitric acid, sulphuric acid, ammonia, phosphoric acid, ammonium nitrate, and urea)
- Production of industrial gases that do not use fossil sources as raw material (e.g., cryogenic air separation, fractional air distillation, and membrane-based industrial gas recovery processes — non-exhaustive list)
- Production of alkaline earth metal hydroxides and oxides, such as magnesium hydroxide, magnesium oxide, beryllium oxide
- Production of lithium hydroxide
- Production of silica, including silica gel
- Production of inorganic dyes and pigments of mineral or synthetic origin in basic or concentrated form
- Production of ammonium nitrates

Out-of-scope activities:

- Production of fertilizer
- Production of methane, ethane, propane, and butane gases obtained from petroleum extraction and refining
- Production of independent hydrogen (which is included in the Low-carbon emission hydrogen production activity of CNAE D — Electricity and Gas technical chapter)

Substantial contribution to Objective 1 — Climate change mitigation

To qualify as a substantial contribution, the production of chemicals covered by this activity must simultaneously meet criteria A and B, together with C or D, until the year 2040. From 2040 onwards, all criteria must be met simultaneously:

A. Mandatory submission of annual reports:

- i. Including the quantification of the intensity of Scope 1 and 2 GHG emissions and following the criteria established in the NBR ISO 14064-1 standard.
- ii. Including the quantification of the percentages of renewable energy use.
- iii. Including the quantification of the percentages of use of renewable and circular raw materials.²⁶

B. Applicable only after establishing the baseline for emissions intensity in chemical production,²⁷ all of the following criteria must be met:

- i. The baseline must take into consideration Scope 1 and 2 GHG emissions.
- ii. The production of the inorganic chemical must meet the maximum GHG emissions intensity limit defined by the baseline and follow the same boundary conditions used in the baseline calculation.
- iii. If CCS-CCU and BECCU technologies are used, the baseline for emissions intensity must be respected, and the criteria defined in the Cross-cutting Appendix: Carbon Capture and Utilization (CCU and BECCU) must be met.
- iv. The use of natural gas for cogeneration of thermal and electrical energy in the production of the inorganic chemical product is qualified if it complies with the baseline defined for the emissions intensity of the production of that same product.
- v. The production of chemical products using natural gas (including liquid) as the main raw material (use of methane for non-energy purposes) is qualified if it complies with the GHG emissions intensity limits established²⁸ for the production of this same chemical product. This criterion is valid until 2035.

C. Applicable only after the baseline is established for the use of renewable energy in the production of the chemical product,²⁹ all of the following criteria must be met:

- i. The baseline for the production process must include scope 1 and 2 GHG emissions, following the criteria established in the NBR ISO 14064-1 standard.
- ii. The production of the organic chemical must meet the minimum renewable energy use limit set by the baseline and follow the same boundary conditions as the baseline calculation.
- iii. If biomass or biofuels are used as a renewable energy source, they must meet the criteria defined by activity C4: Manufacture of biomass and biofuels in this technical chapter.
- iv. If electricity, biogas, or biomethane are used as a renewable energy source, they must meet the criteria defined in the CNAE D — Electricity and Gas technical chapter.

D. Applicable only after the baseline is established for the use of renewable and/or circular raw materials in the production of the chemical product,³⁰ all of the following criteria must be met:

²⁶ For the application of these criteria, renewable raw materials refer to biomass (of plant, animal, or mineral origin), industrial biological waste, or municipal biological waste. Circular raw materials refer to plastic and rubber waste, which is reintegrated into the production cycle.

²⁷ The baseline must be defined by January 1, 2028, and the methodology for establishing the baseline must be defined by an independent third party and approved by the TSB regulatory body.

²⁸ The baseline must be defined by January 1, 2028, and the methodology for defining the baseline must be established by a third party and approved by the TSB regulatory body.

²⁹ The baseline must be defined by January 1, 2028, and the methodology for establishing the baseline must be defined by an independent third party and approved by the TSB regulatory body.

³⁰ The baseline must be defined by January 1, 2028, and the methodology for establishing the baseline must be defined by an independent third party and approved by the TSB regulatory body.

- i. The baseline for the production process must include scope 1 and 2 GHG emissions, following the criteria established in the NBR ISO 14064-1 standard.
- ii. The production of the organic chemical must meet the minimum limit for the use of renewable and/or circular raw materials defined by the baseline and follow the same boundary conditions as the baseline calculation.
- iii. If biomass, biofuels, biogas, or biomethane are used as a renewable raw material source, they must meet the criteria defined by activity C4: Manufacture of biomass and biofuels.

Investments in projects, facilities, and specific stages for the production of chemical products covered by this activity are qualified when they meet criterion E in conjunction with at least one of the other technical criteria F or G or H or I or J.

- E. Mandatory submission of annual reports:**
 - i. Including the quantification of the intensity of Scope 1 and 2 GHG emissions and following the criteria established in the NBR ISO 14064-1 standard.
 - ii. Including the quantification of the percentages of renewable energy use.
 - iii. Including the quantification of the percentages of use of renewable and circular raw materials.³¹
- F. Adaptation or retrofit projects to replace fossil energy sources or reducing agents with renewable ones qualify directly if the following criteria are met:**
 - i. In the case of biomass, charcoal, and biofuels, the origin of the biological raw material must be proven, following the same criteria established for activity C4: Manufacture of biomass and biofuels.
 - ii. In the case of biogas or biomethane, the same criteria defined for the biogas and biomethane production activity in the CNAE D — Electricity and Gas technical chapter must be met.
 - iii. A minimum percentage of fossil fuels must be replaced by alternative fuels, as to be defined by the baseline established for the inorganic chemical regarding renewable energy consumption.³²
- G. Adaptation or retrofit projects aimed at replacing fossil raw material sources with renewable and/or circular sources³³ will be directly qualified, provided the following criteria are met:**
 - i. In the case of biomass, charcoal, and biofuels (including biogas and biomethane), the origin of the biological raw material must be proven, following the same criteria established for the activity C4: Manufacture of biomass and biofuels.
 - ii. A minimum percentage of fossil raw materials must be replaced by alternative raw materials, as to be defined by the baseline established for renewable and circular raw material consumption for the inorganic chemical.³⁴
- H. For electrification activities, see List of enabling activities in this technical chapter.**
- I. For CCU or BECCU facilities, see Cross-cutting Appendix: Carbon Capture and Utilization (CCU and BECCU).**

³¹ For the application of these criteria, renewable raw materials refer to biomass, industrial biowaste or municipal biowaste. Circular raw materials refer to plastic waste that is reintegrated into the production cycle.

³² The baseline must be defined by January 1, 2028, and the methodology for establishing the baseline must be defined by an independent third party and approved by the TSB regulatory body.

³³ For the application of these criteria, renewable raw materials refer to biomass, industrial biowaste or municipal biowaste. Circular raw materials refer to plastic waste that is reintegrated into the production cycle.

³⁴ The baseline must be defined by January 1, 2028, and the methodology for establishing the baseline must be defined by an independent third party and approved by the TSB regulatory body.

- J. For the purchase of energy and industrial inputs, see List of enabling activities in this technical chapter.
- K. For the production of nitric acid:
- i. Technologies that reduce nitrous oxide (N₂O) emissions by more than 20% qualify directly. The baseline for comparison comprises the average value of nitrous oxide emissions in 2005. The percentage reduction in nitrous oxide emissions must be reassessed and updated in 2030.
 - ii. The use of sustainable ammonia, as defined by the TSB, as a raw material for nitric acid is directly qualified.
- L. For the production of ammonia and urea, technologies that enable the recovery of ammonia from wastewater are directly qualified.

Do no significant harm

The DNSH criteria for this activity complement the substantial contribution criteria to ensure that its implementation does not cause adverse impacts on the TSB's other climate, environmental and socio-economic objectives.

Do no significant harm (to any of the following objectives):	
Climate change adaptation	<ul style="list-style-type: none"> Establish and maintain a comprehensive climate risk assessment and management plan to identify possible vulnerabilities and adaptation opportunities throughout the supply chain. Implement strategies to ensure climate resilience, such as better water management, infrastructure adaptation, and ecosystem-based approaches. Prepare and update Solid Waste Management Plans and contingency plans to address risks associated with climate change.
Protection and restoration of biodiversity and ecosystems	<ul style="list-style-type: none"> The same standards included in the activity C4 criterion: Production of biomass and biofuels. If renewable electricity is used (in whole or in part), it must follow the same standards defined in CNAE D — Electricity and Gas technical chapter. Promote the use of biofertilizers and low-carbon emission fertilizers, in line with the standards established in the CNAE A — Agriculture technical chapter.
Conservation and sustainable management and use of soil and forests	<ul style="list-style-type: none"> If the raw materials or energy sources consist of industrial biowaste (including from the food industry), municipal biowaste, or agricultural waste, they must follow the same standards included in the activity C4 criteria: Biomass and biofuel production for sustainable land use and the conservation, management and sustainable use of forests.
Sustainable use and protection of water and marine resources	<ul style="list-style-type: none"> Comply with environmental regulations related to the responsible use of water and marine resources. Ensure effluent treatment and proper disposal to prevent any environmental damage.
Transition to a circular economy	<ul style="list-style-type: none"> The activities should promote improvements in practices for recovering materials through waste streams, including production processes in other industrial sectors.

Do no significant harm (to any of the following objectives):

Pollution prevention and control	<ul style="list-style-type: none"> • Check for the addition of toxic components to the formulations of end products that may cause chronic effects (such as carcinogenic potential). • Avoid placing non-biodegradable products on the market. • Prepare and update Solid Waste Management Plans and contingency plans to address risks associated with climate change.
Reduction of socio-economic inequalities, including racial and gender disparities	<ul style="list-style-type: none"> • Annex A1: Do No Significant Harm criteria for socio-economic Objective 9.

C7: Manufacture of cellulose and paper**CNAEs:**

- 17.10-9: Production of cellulose and other pulps for paper products
- 17.21-4: Production of paper
- 17.22-2: Production of cardboard and paperboard
- 17.31-1: Production of paper packaging
- 17.32-0: Production of cardboard and paperboard packaging
- 17.33-8: Production of corrugated cardboard sheets and packaging
- 17.41-9: Production of paper products, cardboard, paperboard, and corrugated cardboard for commercial and office use
- 17.42-7: Production of household and sanitary paper products
- 17.49-4: Production of cellulose pulp products, paper, cardboard, paperboard, and corrugated paper not previously specified

Description:

The production of pulp, paper, paperboard and cardboard, and products made from paper, paperboard or corrugated cardboard, including printed items.

Examples of activities:

- Production of cellulose and other pulps for paper manufacturing
- Production of cellulose-based products, including activities under the following active CNAEs: production of paper, cardboard and paperboard, paper packaging, cardboard and paperboard packaging, paper products, cardboard, paperboard and corrugated cardboard for commercial and office use, paper products for domestic and sanitary use, cellulose pulp products, paper, cardboard, paperboard and corrugated cardboard

Substantial contribution to Objective 1 — Climate change mitigation

To qualify as a substantial contribution, the activity must meet criteria A, B, C, and D (if applicable):

- A. Submission of annual reports quantifying Scope 1 and 2 GHG emissions in accordance with the criteria established in the NBR ISO 14064 standard.
 - i. The activity must meet the maximum intensity limits of Scope 1 and 2 defined for the different products included in this technical chapter. Within a maximum of two years after the publication of the TSB, or earlier if it is

possible to establish a baseline, this component of the criterion must be updated with the maximum limit for the intensity of Scope 1 and 2 GHG emissions for the activity to be considered qualified.³⁵

- B.** Raw materials for cellulose and paper production must meet the following criteria, where applicable:
- i. If virgin raw material is used, it must meet the substantial contribution criteria for the corresponding activities at the farm level in the Agriculture, Livestock, Forestry, Fisheries and Aquaculture sectors; or it must be certified by recognized sustainability standards:
 - o Forest Stewardship Council (FSC)
 - o Programme for the Endorsement of Forest Certification (PEFC)
 - ii. If recyclable raw materials are used, the activity qualifies directly;
 - iii. If there is a mixture of both types of raw materials (virgin and recycled), the certifications relating to the use of virgin raw materials, mentioned in the first point of this criterion B, must be obtained.
- C.** The production of cellulose and paper products included in this technical chapter must increase renewable energy consumption, considering the total consumption of electricity, heating, cooling, and steam, in accordance with the guidelines of GRI 302 (2016), for both the paper and cellulose industries.
- i. Within a maximum of two years after the publication of the TSB, or earlier, the minimum limits for renewable energy consumption will be defined.
- D.** In forestry assets, maintain stock levels or a verified increase in forest removals, if applicable.

Do no significant harm

The DNSH criteria for this activity complement the substantial contribution criteria to ensure that its implementation does not cause adverse impacts on the TSB's other climate, environmental and socio-economic objectives.

Do no significant harm (to any of the following objectives):	
Climate change adaptation	<ul style="list-style-type: none"> • Establish and maintain a comprehensive climate risk assessment and management plan to identify possible vulnerabilities and adaptation opportunities throughout the supply chain. Implement strategies to ensure climate resilience, such as better water management, infrastructure adaptation, and ecosystem-based approaches. • Prepare and update Solid Waste and Effluent Management Plans, as well as contingency plans to address risks associated with climate change.
Protection and restoration of biodiversity and ecosystems	<ul style="list-style-type: none"> • Establish full traceability of supply through the appropriate chain-of-custody management system and demonstrate compliance with the general compliance criteria through appropriate verification systems. • Conduct assessments to ensure that the biomass supply does not have a negative impact on local biodiversity, ecosystems, or endangered species. • Implement strategies to mitigate identified risks • Follow the recommendations and guidelines of the PEFC and FSC certifications.

³⁵ The methodology for defining maximum emission limits should be determined by an independent third party and approved by the TSB regulatory body.

Do no significant harm (to any of the following objectives):	
Conservation and sustainable management and use of soil and forests	<ul style="list-style-type: none"> The supply of virgin raw materials must follow the same standards as those mentioned in CNAE A — Agriculture technical chapter for sustainable land use and the conservation, management and sustainable use of forests.
Sustainable use and protection of water and marine resources	<ul style="list-style-type: none"> Reduce water use and/or consumption and treat effluents; prevent contamination of water bodies.
Transition to a circular economy	<ul style="list-style-type: none"> Encourage paper and cardboard recycling processes and ensure that these do not cause environmental impacts.
Pollution prevention and control	<ul style="list-style-type: none"> Adhere to national and international standards for emissions and waste management, ensuring that production processes do not contribute to air, water, or soil pollution. Implement measures to minimize the waste generated during the production process, encouraging the recycling and reuse of materials whenever possible. Prepare and update Solid Waste and Effluent Management Plans, as well as contingency plans to address risks associated with climate change.
Reduction of socio-economic inequalities, including racial and gender disparities	<ul style="list-style-type: none"> Annex A1: Do No Significant Harm criteria for socio-economic Objective 9.

C8: Manufacture of glass

CNAEs:

- 23.11-7: Production of flat glass
- 23.12-5: Production of glass packaging
- 23.19-2: Production of glassware

Description:

Production of glass products (flat glass, hollow glass, mirrors) for applications in construction, food and beverage, automotive, furniture, appliances, and equipment.

Examples of activities:

- Production of hollow glass — bottles, jars, containers, and similar items
- Production of flat glass used in construction, furniture industry, solar panels, or household appliances
- Lamps

Substantial contribution to Objective 1 — Climate change mitigation

To qualify as a substantial contribution, the production activity must meet criterion A in conjunction with at least one of the technical criteria between B and C.

- A.** Mandatory submission of annual reports:
 - i. Including the quantification of Scope 1 and 2 GHG emissions, following the criteria established in the NBR ISO 14064-1 standard.
 - ii. Including the quantification of the percentages of renewable energy use.
 - iii. Including the quantification of the percentages of use of renewable and circular raw materials.³⁶
- B.** The limit for the intensity of specific direct emissions associated with flat and hollow glass production by 2030 is:³⁷
 - i. 0.60 tCO₂/t for flat glass and textured flat glass without processing;
 - ii. 0.46 tCO₂/t of hollow glass.
- C.** Glass production using recycled content equal to or greater than those described for the different types of glass below, calculated on the total volume produced, are qualified by measuring recycled content.
 - i. 20% for flat glass and textured flat glass without processing;
 - ii. 40% for hollow glass.

Investments in projects, facilities, and specific stages for the production of products covered by this activity are qualified when they meet criterion D in conjunction with at least one of the other technical criteria E, F, G, or H.

- D.** Mandatory submission of annual reports:
 - i. Including the quantification of Scope 1 and 2 GHG emissions, following the criteria established in the NBR ISO 14064-1 standard.
 - ii. Including the quantification of the percentages of renewable energy use.
 - iii. Including the quantification of the percentages of use of renewable and circular raw materials³⁸.
- E.** Adaptation or retrofit projects aimed at replacing fossil energy sources or reducing agents with alternative sources will be qualified, provided that the following criteria are met:
 - i. In the case of biomass, charcoal, and biofuels, the origin of the biological raw material must be proven, following the same criteria established for activity C4: Manufacture of biomass and biofuels.
 - ii. In the case of hydrogen, the same criteria defined by the Low-carbon emission hydrogen production activity in the CNAE D — Electricity and Gas technical chapter must be met.
 - iii. In the case of biogas or biomethane, the same criteria defined for the biogas and biomethane production activity in the CNAE D — Electricity and Gas technical chapter must be met.
 - iv. A minimum percentage of fossil fuels must be replaced by alternative fuels, as to be defined by the baseline established regarding renewable energy consumption for the product.³⁹
- F.** For electrification activities, see List of enabling activities in this technical chapter.
- G.** For CCU or BECCU facilities, see Cross-cutting Appendix: Carbon Capture and Utilization (CCU and BECCU).
- H.** For the purchase of energy and industrial inputs, see List of enabling activities in this technical chapter.

³⁶ For the application of these criteria, renewable raw materials refer to biomass, industrial biowaste or municipal biowaste. Circular raw materials refer to recycled glass (cullet) from post-consumer or industrial waste reintegrated into the production process to partially replace virgin raw materials such as sand, limestone and soda ash.

³⁷ Based on the carbon footprint of the national industry (Abvidros, 2023).

³⁸ For the application of these criteria, renewable raw materials refer to biomass, industrial biowaste or municipal biowaste. Circular raw materials refer to recycled glass (cullet) from post-consumer or industrial waste reintegrated into the production process to partially replace virgin raw materials such as sand, limestone and soda ash.

³⁹ The baseline must be defined by January 1, 2028, and the methodology for establishing the baseline must be defined by an independent third party and approved by the TSB regulatory body.

Do no significant harm

The DNSH criteria for this activity complement the substantial contribution criteria to ensure that its implementation does not cause adverse impacts on the TSB's other climate, environmental and socio-economic objectives.

Do no significant harm (to any of the following objectives):	
Climate change adaptation	<ul style="list-style-type: none"> • Conduct assessments to identify vulnerabilities in supply chains and diversify raw material sources to avoid areas susceptible to extreme weather events. • Design and build facilities with engineering solutions to withstand climatic events, such as effective cooling systems to operate in high temperatures. • Use construction materials and equipment designed to perform efficiently under variable climatic conditions. • Prioritize the diversification of suppliers and glass raw materials from various regions to reduce vulnerability to climate impacts. • Prepare and update Solid Waste and Effluent Management Plans, as well as contingency plans to address risks associated with climate change.
Protection and restoration of biodiversity and ecosystems	<ul style="list-style-type: none"> • Use recycled materials whenever possible to reduce the extraction of natural resources and minimize the environmental footprint.
Conservation and sustainable management and use of soil and forests	<ul style="list-style-type: none"> • Implement sustainable management practices in areas where sand and other materials are extracted to protect local ecosystems and biodiversity.
Sustainable use and protection of water and marine resources	<ul style="list-style-type: none"> • Implement water reuse and treatment systems in the production process to avoid contamination of water sources and promote efficient water use.
Transition to a circular economy	<ul style="list-style-type: none"> • Promote the recycling of glass and co-products to encourage the closure of the production cycle and reduce the demand for new raw materials.
Pollution prevention and control	<ul style="list-style-type: none"> • Adhere to national and international standards for emissions and waste management, ensuring that production processes do not contribute to air, water, or soil pollution. • Implement measures to minimize the waste generated during the production process, encouraging the recycling and reuse of materials whenever possible. • Prepare and update Solid Waste and Effluent Management Plans, as well as contingency plans to address risks associated with climate change.

Do no significant harm (to any of the following objectives):

Reduction of socio-economic inequalities, including racial and gender disparities

- Annex A1: Do No Significant Harm criteria for socio-economic Objective 9.

C9: Energy efficiency improvement activities, demand response, use of renewable energy, and other demand-side flexibility activities**CNAEs:**

- 43.21-5: Electrical installation and maintenance
- 35.30-1: Production and distribution of steam, hot water, and air conditioning
- 33.21-0: Installation of industrial machinery and equipment

Description:

This activity covers measures to increase energy efficiency that can be applied to various production processes within CNAE C technical chapter and other CNAEs, related to manufacturing activities. These measures and their criteria are defined below.

Out-of-scope activities:

- Production sites or activities involving the primary use of fossil fuels.

Substantial contribution to Objective 1 — Climate change mitigation

The following measures are directly qualified:

- Installation, maintenance, and operation of ISO 50001-certified energy management systems, including for micro, small, and medium-sized enterprises;
- Installation, maintenance, and operation of efficient electrical technologies (e.g., heat pumps and electric boilers) meeting the latest PROCEL label or Level A of the National Energy Conservation Label (ENCE) from the Institute of Metrology, Standardization and Industrial Quality (Instituto Nacional de Metrologia, Qualidade e Tecnologia – INMETRO);
- Implementation of advanced data collection and analysis, including measurement, monitoring systems, and smart controls for managing and improving energy consumption;
- Installation, maintenance, and operation of electric motors — the efficiency of the motor must meet the most recent PROCEL label or be authorized to bear the INMETRO ENCE, level A;
- Installation, maintenance, and operation of motors with variable speed drives to improve the energy efficiency of pumps, fans, conveyors, and compressor systems;
- Installation, maintenance and operation of industrial thermal battery systems, such as water-based thermal batteries;
- Installation, maintenance, and operation of technologies for the recovery and use of waste heat and waste heat upgrade;

- H. Adaptation or replacement of fossil fuel heat generation systems with biofuel heat generation systems, including installation, maintenance, and operation;
- I. Installation, maintenance, and operation of cogeneration technologies (CHP — Combined Heat and Power and CCHP — Combined Cold, Heat, and Power) that do not use fossil fuels;
- J. Improvement or redesign of air compression systems in order to convert pneumatic actuators to smart electric actuators, and replacement of vacuum compressed air with electric vacuum pumps;
- K. Electrification of conveyor belts;
- L. Installation, maintenance, and operation of electric furnaces;
- M. Implementation of demand management programs;
- N. Development of energy efficiency projects and diagnostics for micro, small, and medium-sized enterprises;
- O. Installation, maintenance, and operation of load control technologies, smart lighting, and automation technologies in general;
- P. Installation, maintenance, and operation of high-efficiency industrial refrigeration and freezing systems, using the National Program for the Conservation of Electric Energy (Programa Nacional de Conservação de Energia Elétrica – PROCEL) labeled equipment (or equivalent) and refrigerants with low Global Warming Potential (GWP) and low Ozone Depletion Potential (ODP), consistent with Brazil's commitments to the Montreal Protocol and the Kigali Amendment;
- Q. Installation, maintenance, and operation of high-efficiency industrial air conditioning systems, using PROCEL-labeled equipment (or equivalent) and low GWP and ODP refrigerants;
- R. If the electrification of any equipment mentioned above results in a surplus residual fossil gas in the system, it must be proven that its reuse contributes to the net reduction of GHG emissions, either on-site or at third-party sites. The use of these gases must replace additional fossil sources and not result in an absolute increase in emissions in the production chain, thus avoiding carbon leakage;
- S. The electricity used must come from plants that use energy generation sources and technologies included in CNAE D — Electricity and Gas technical chapter, either through self-generation, Power Purchase Agreements in the Free Contracting Environment (ACL), the short-term market of the National Interconnected System (Sistema Interligado Nacional - SIN), or through the purchase of energy in the regulated market, directly from distributors.⁴⁰

Do no significant harm

The DNSH criteria for this activity complement the substantial contribution criteria to ensure that its implementation does not cause adverse impacts on the TSB's other climate, environmental and socio-economic objectives.

Do no significant harm (to any of the following objectives):

Climate change adaptation	<ul style="list-style-type: none"> • The installation of energy management systems must include climate resilience analyses to ensure that the technologies remain effective under adverse weather conditions. • Energy cogeneration technologies must be designed to operate efficiently in scenarios where resources such as water or electricity are scarce.
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⁴⁰ Brazil's electricity matrix has a high level of renewability, with more than 90% of its electricity coming from renewable sources. See General Overview of the Sector in the CNAE D - Electricity and Gas technical chapter.

Do no significant harm (to any of the following objectives):

Protection and restoration of biodiversity and ecosystems	<ul style="list-style-type: none"> The installation of efficient electrical technologies must avoid negative impacts on local ecosystems, especially in sensitive areas. Smart monitoring and control systems must include metrics that consider the preservation of biodiversity in the areas of operation.
Conservation and sustainable management and use of soil and forests	<ul style="list-style-type: none"> The installation of energy efficiency technologies must ensure that they do not result in soil degradation or inappropriate exploitation of natural resources. Projects involving the redesign of air compression systems must consider impacts on land use and forest conservation.
Sustainable use and protection of water and marine resources	<ul style="list-style-type: none"> Waste heat recovery technologies must be implemented in such a way that prevents contamination of local water sources. Heating systems that use hot water must include strategies to minimize excessive water consumption and guarantee its protection.
Transition to a circular economy	<ul style="list-style-type: none"> The installation of energy management systems must include circular economy practices to promote the recovery and reuse of materials throughout the entire product's life cycle. The development of energy efficiency projects must consider the reuse of waste generated during production
Pollution prevention and control	<ul style="list-style-type: none"> The installation of electric furnaces and cogeneration technologies must include monitoring systems to prevent excessive emissions of pollutants. The flaring of waste gas in other processes must be avoided to prevent increases in greenhouse gas emissions anywhere along the production chain.
Reduction of socio-economic inequalities, including racial and gender disparities	<ul style="list-style-type: none"> Annex A1: Do No Significant Harm criteria for socio-economic Objective 9.

C10: Research, development, and innovation activities for the sector**CNAEs:**

- 71.0: Architecture and engineering services; technical tests and analyses
- 72.10-0: Research and experimental development in physical and natural sciences

Description:

R&D activities to develop technologies or products with a Technology Readiness Level (TRL) of 7 or below, which have the potential to reduce greenhouse gas emissions. It also covers individual measures and professional services to ensure compliance with TSB objectives. The solutions developed must demonstrate their ability to contribute significantly to the climate change mitigation objective of the sector's activities.

Out-of-scope activities:

- Activities linked to the improvement of technologies and processes for the use of fossil fuels

Substantial contribution to Objective 1 — Climate change mitigation

Creation of intangible assets and conducting research, development and innovation activities explicitly aimed at facilitating compliance with TSB substantial contribution criteria and achieving the limits established for the CNAE C sector.

Do no significant harm

The DNSH criteria for this activity complement the substantial contribution criteria to ensure that its implementation does not cause adverse impacts on the TSB's other climate, environmental and socio-economic objectives.

Do no significant harm (to any of the following objectives):	
Climate change adaptation	<ul style="list-style-type: none"> • Research and development activities must include assessments of the resilience of technologies to climate change. • Renewable energy generation equipment must be designed to operate effectively under extreme weather conditions. • Prepare and update Solid Waste Management Plans and Contingency plans to address risks associated with climate change.
Protection and restoration of biodiversity and ecosystems	<ul style="list-style-type: none"> • The production of equipment must avoid negative impacts on natural habitats and ecosystems. • R&D projects must consider the preservation of biodiversity in the deployment and use of materials.
Conservation and sustainable management and use of soil and forests	<ul style="list-style-type: none"> • Technologies developed must prevent soil degradation and loss of native vegetation.
Sustainable use and protection of water and marine resources	<ul style="list-style-type: none"> • Low-carbon emission hydrogen and renewable energy technologies must ensure the protection of water resources, avoiding pollution and promoting effective use of water resources. • R&D projects should include water efficiency strategies.
Transition to a circular economy	<ul style="list-style-type: none"> • Technologies must be designed to minimize waste and promote life-cycle efficiency.
Pollution prevention and control	<ul style="list-style-type: none"> • Equipment must be developed to prevent the release of harmful pollutants. • Production must include monitoring systems to control emissions during processes. • Prepare and update Solid Waste Management Plans and contingency plans to address risks associated with climate change.
Reduction of socio-economic inequalities, including racial and gender disparities	<ul style="list-style-type: none"> • Annex A1: Do No Significant Harm criteria for socio-economic Objective 9.

List of enabling activities

Description:

Enabling activities are those that promote sustainability and reduce emissions in various sectors. Although they do not necessarily reduce emissions on their own, these activities are essential for enabling and allowing other initiatives to achieve reductions. The list prioritizes only directly qualified activities that support the transition to a low-carbon emission economy, encouraging technological innovation and responsible resource management.

The directly qualified enabling activities are:

- A.** Production and implementation of key component products and machinery essential for the deployment, maintenance, and operation of renewable energy generation activities defined in the CNAE D — Electricity and Gas technical chapter;
- B.** Production of equipment for the production of low-carbon emission hydrogen (as per activity Production of low-carbon hydrogen of the CNAE D — Electricity and Gas technical chapter) via electrolysis or biogas reforming, and not linked to the use of fossil fuels;
- C.** Production of cells, batteries, and electric accumulators for energy storage and vehicle traction that comply, where applicable, with the most recent PROCEL seal or are authorized to bear INMETRO's ENCE, level A;
- D.** Production of generators, transformers, and electric motors not linked to the use of fossil fuels;
- E.** Production of equipment for electricity distribution and quality control, such as capacitors, reactors, and harmonic filters;
- F.** Production of LED lamps and other lighting equipment of equal or greater efficiency according to the most recent PROCEL seal or INMETRO's ENCE, level A;
- G.** Production and implementation of energy-efficient equipment for qualified buildings, as established in the CNAE F — Construction technical chapter, that meets the most recent PROCEL seal or are authorized to bear the INMETRO ENCE, level A;
- H.** Development of projects, implementation of processes and technologies and production of equipment for recycling: collecting, separating and processing recyclable materials such as paper, plastic, glass, and metals, as well as making better use of materials to be recycled in the manufacturing process;
- I.** Production of equipment for capturing, collecting and storing carbon, both from stationary sources and direct capture from the air;
- J.** Implementation of digital systems for environmental monitoring: use of IoT (Internet of Things) sensors and digital monitoring platforms for continuous, real-time control of atmospheric emissions (GHG and non-GHG), enabling greater transparency, regulatory compliance, early identification of deviations, optimization of operational efficiency, and traceability of the environmental performance of industrial units;
- K.** Purchase of renewable electricity in accordance with the criteria defined in CNAE D — Electricity and Gas technical chapter;
- L.** Purchase of biomass and biofuels respecting the criteria defined by activity C4: Manufacture of biomass and biofuels in this technical chapter;
- M.** Purchase of low-carbon emission hydrogen as defined by the activity of Production of low-carbon emission hydrogen in the CNAE D — Electricity and Gas technical chapter;
- N.** Purchase of biogas and biomethane as defined by the activity Production of biogas and biomethane in the CNAE D — Electricity and Gas technical chapter;
- O.** Purchase of any organic chemical as defined by the criteria set out in activity C5: Production of organic chemical products — basic and intermediate petrochemicals, alcohols, organic solvents, carbon black, ketones, aldehydes, resins, and elastomers;

- P. Purchase of any inorganic chemical as defined by the criteria of activity C6: Production of inorganic chemical products — chlorine, sodium carbonate, ammonia, nitric acid, industrial gases, sulphuric acid.

Do no significant harm

The DNSH criteria for this activity complement the substantial contribution criteria to ensure that its implementation does not cause adverse impacts on the TSB's other climate, environmental and socio-economic objectives.

Do no significant harm (to any of the following objectives):	
Climate change adaptation	<ul style="list-style-type: none"> • Research and development activities must include assessments of the resilience of technologies to climate change. • Renewable energy generation equipment must be designed to operate effectively under extreme weather conditions. • Prepare and update Solid Waste Management Plans and contingency plans to address risks associated with climate change.
Protection and restoration of biodiversity and ecosystems	<ul style="list-style-type: none"> • The production of equipment must avoid negative impacts on natural habitats and ecosystems. • R&D projects must consider the preservation of biodiversity in the deployment and use of materials.
Conservation and sustainable management and use of soil and forests	<ul style="list-style-type: none"> • Technologies developed must prevent soil degradation and loss of native vegetation.
Sustainable use and protection of water and marine resources	<ul style="list-style-type: none"> • Low-carbon emission hydrogen and renewable energy technologies must ensure the protection of water resources, avoiding pollution and promoting effective use of water resources. • R&D projects should include water efficiency strategies.
Transition to a circular economy	<ul style="list-style-type: none"> • Technologies must be designed to minimize waste and promote life-cycle efficiency.
Pollution prevention and control	<ul style="list-style-type: none"> • Equipment must be developed to prevent the release of harmful pollutants. • Production must include monitoring systems to control emissions during processes. • Prepare and update Solid Waste Management Plans and contingency plans to address risks associated with climate change.
Reduction of socio-economic inequalities, including racial and gender disparities	<ul style="list-style-type: none"> • Annex A1: Do No Significant Harm criteria for socio-economic Objective 9.

Cross-cutting Appendix: Carbon Capture and Utilization (CCU and BECCU)

Description:

All activities using CCS/CCUS in compliance with the applicable criteria must also meet the specific criteria established for CCS technology. This Appendix is not a standalone document and must be applied only when CCS is mentioned as a requirement within another activity.

It is included the implementation, operation, modernization, or expansion of systems to capture CO₂ from stationary sources and use this carbon in the manufacture of products. The activity includes both fossil carbon (CCU) and biogenic carbon (BECCU).

Examples of activities:

- Capture of CO₂ from industrial processes
- Capture of CO₂ in biomass cogeneration plants and ethanol distilleries
- Use of CO₂ in the production of recyclable plastics, such as PET, polyurethanes, and other thermoplastic resins

Out-of-scope activities:

- Applications of fossil-derived CO₂ in short-lived products that result in its rapid release into the atmosphere (e.g., carbonated drinks, urea, and fuels);
- Carbon capture in economic activities that are not eligible under the TSB;
- Use of CO₂ for enhanced oil recovery (EOR) or any purposes associated with the exploitation of fossil fuels.

Substantial contribution to Objective 1 — Climate change mitigation

The activity will be considered qualified if it meets the following criteria:

- A.** The source of CO₂ must come from an economic activity already qualified by the TSB or explicitly referenced in the activities with decarbonization potential.
- B.** The use of captured fossil CO₂ must result in its fixation in long-lasting products⁴¹ or recyclable materials, with technical evidence of the permanence of the carbon through life cycle assessments (LCA) or equivalent recognized methodologies.
- C.** In the case of fossil carbon capture, it must be demonstrated that the implementation of the technology does not imply an increase in Scope 1 and 2 GHG emissions, according to the following parameters:
 - i. For applications in the industrial sector: emissions (Scope 1 and 2) per unit produced must remain equal to or lower than the levels prior to the installation of the technology.
 - ii. For applications in the energy sector: emissions (Scope 1 and 2) per unit of energy generated (e.g., tCO₂e/MWh) must remain equal to or lower than the levels prior to the installation of the technology.
- D.** Appropriate systems for monitoring, verification, and reporting of avoided or removed emissions must be implemented, with verification by an independent third party.

⁴¹ Long-term use is considered to be that for which a life cycle assessment demonstrates that more than 90% of the captured CO₂ remains stored for at least ten years after production (<https://globalgoals.goldstandard.org/standards/>). This criterion is limited to CO₂ of fossil origin.

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