SPES Sustainability performances, evidence & scenarios

D7.2 Understanding and assessing CBAM: vulnerability and impacts in the EU

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Authors

Jacopo Cammeo - Researcher of the SPES Project, European University Institute, Florence School of Regulation

Albert Ferrari - Researcher of the SPES Project, European University Institute, Florence School of Regulation

Simone Borghesi - Team leader of the SPES Project, European University Institute, Florence School of Regulation and University of Siena

Therese Dokken - Researcher of the SPES Project, Oslo Metropolitan University

Contributors and peer reviewers

Hélène Maisonnave, Partnership for Economic Policy and Le Havre Normandie University; Pierre Funalot, University of Bordeaux.

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Disclaimer

This Working paper 7.2 for the project SPES has been prepared by the European University Institute and Oslo Metropolitan University as part of Task 7.2 ” A new Carbon Border Adjustment Mechanism in Europe”/ Work Package 7. This task consists in the analysis and monitoring of how the EU Carbon Borders Adjustment Mechanism (CBAM) will work and impact EU Member States. The proposal for a CBAM on certain imported products aims to reduce the risk of carbon leakage, which is the risk of companies transferring production to countries that have more lenient emissions regulations.

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Abstract

The European Union (EU) has made significant progress in reducing CO_2 emissions in recent decades, partly due to the implementation of the EU Emissions Trading System (EU ETS). However, the decline in emissions has not been matched by an equally substantial reduction in the continent's carbon footprint. In addition, some European companies, in order not to be subject to EU climate regulation, could have relocated production abroad, thus confirming the risk of the so-called carbon leakage.

To remedy this problem, the EU has proposed a Carbon Border Adjustment Mechanism (CBAM), through which a carbon quasi-tariff, determined based on the embodied emissions of the good and priced according to EU ETS criteria, would be imposed on imports of non-EU products from specific sectors. The measure, scheduled to enter into force in 2026, is expected to be compatible with WTO regulation. It should limit carbon leakage effectively, indirectly support European competitiveness, and stimulate other jurisdictions to implement their own carbon markets. At the same time, it poses some critical issues regarding adherence to the Common But Differentiated Responsibilities and Respective Capabilities (CBDR-RC) principle.

Also, it has a possible negative socio-economic impact on vulnerable countries inside and outside the EU. At the European level, the 2021 European Commission's impact assessment and subsequent CBAM-covered goods trade data do not show a relevant CBAM negative effect on the European economy. However, the mechanism may hit the Mediterranean Member States and some in Eastern Europe the hardest. Considering this, the new Commission proposed to amend the CBAM with some revisions during the European Clean Industrial Deal presentation in February 2025. The revisions aim to support the European small, medium and large enterprises most exposed to CBAM, with the hope that this will not translate into a reduction in continental climate ambitions..

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1. Introduction

The European Union's Carbon Border Adjustment Mechanism (CBAM) aims to prevent carbon leakage by adjusting the costs of certain imports according to their carbon intensity. This approach ensures that the EU's climate policies, such as those outlined in the Green Deal, are not compromised by more carbon-intensive production outside of Europe.

This mechanism became operational on October 1, 2023, with a transitional phase lasting until January 31, 2024. In practice, CBAM levies a carbon tax on imports from six sectors (iron and steel, aluminium, cement, fertilisers, electricity and hydrogen) based on their embedded carbon emissions. It aims to avoid the risk of carbon leakage by ensuring that specific imported goods meet emissions standards similar to those produced within the EU. The decision to focus on these sectors was prompted by the observation that leakage is more common in energy-intensive (EITE) businesses due to their low innovation level, as well as their limited capacity to pass on environmental costs to customers.

Starting on January 1, 2026, the permanent system will require annual declarations of imported goods and their embedded emissions, with corresponding CBAM certificates priced based on EU ETS allowances. The CBAM will coincide with the gradual phasing-out of free allocation under the EU ETS from 2026 to 2034. A review during the transitional phase will precede the definitive system's entry into force, and the scope may expand to include additional sectors by 2030 (EC, 2025a).

The mechanism may be effective, but it has broader implications for EU climate policies and industrial sectors. CBAM, which has relevant international and geopolitical implications, also implies EU domestic impacts. On one hand, by imposing carbon costs on imports from countries with lax environmental regulations, CBAM might foster sustainable development and attract investments in low-carbon technologies in Europe, aligning with the EU's climate goals. On the other hand, the mechanism might increase import costs, affecting the competitiveness of carbon-intensive sectors, such as steel and cement. It may also strain trade relationships with non-EU countries, conflicting with the But Differentiated Responsibilities and Respective Capabilities (CBDR-RC) principle.

Furthermore, although compatible with international trade rules, the EU’s border mechanism could impact middle- and low-income countries for which the EU is an important export market (Beaufils et al., 2023).

This working paper analyses the functioning of CBAM, its pros and cons, and the current state in light of the proposed revisions, with particular attention to the potential impact of this mechanism on the economies of European countries.

Section 2 explores the issue of carbon leakage in Europe and evaluates the role of CBAM as a potential solution. Section 3 delves into the technical aspects, exploring CBAM design and implementation phases, while Section 4 presents its potential benefits and challenges. Section 5 assesses the anticipated impacts of CBAM in Europe, looking at its effects on the EU’s trade and its broader socio-economic consequences. Section 6 discusses the policy implications of CBAM, offering recommendations for potential revisions and future considerations in addressing carbon leakage and promoting climate ambitions. Section 7 is the conclusive part of the working paper.

2. Carbon leakage in Europe: trends and data

2.1 What is carbon leakage

Stringent unilateral climate policies such as regulated carbon markets may result in carbon leakage, a situation whereby reductions in emissions within a jurisdiction are counterbalanced by increases outside of it. Consequently, the leakage rate is the ratio between the increase of emissions by non-regulating countries and the decrease of emissions by regulating countries. For example, an average leakage rate of 0.25 implies that a reduction of 100 tons of carbon emissions domestically would be accompanied by an increase of 25 tons abroad (Wingender & Misch, 2021).

At a preliminary level, one important operation is to assess the risk of leakage at the country and sectoral levels (Fournier Gabela & Freund, 2023). The issue is particularly relevant for the so-called Emissions-intensive, trade-exposed industries (EITEs).

The European Union has started defining and measuring the risk of carbon leakage in its Directive 2003/87/EC relying on the notions of emission intensity and trade exposure. In the EU ETS phase III, the **Emission Intensity** was determined by:

[carbon price × (direct emissions × auctioning factor + electricity consumption × electricity emission factor)]/gross value added

while the **Trade Exposure** was the result of:

(imports + exports)/(imports + production).

In the same phase III, a sector or sub-sector was considered to be at significant risk of carbon leakage if: direct and indirect costs induced by the implementation of the directive would increase production cost, calculated as a proportion of the gross value added, by at least 5%; and the sector's trade intensity with non-EU countries (imports and exports) was above 10%. A sector or sub-sector is also deemed to be exposed if the sum of direct and indirect additional costs is at least 30%, or the non-EU trade intensity is above 30%.

In the EU ETS phase IV, the calculations slightly changed, due to the need for a more targeted assessment of sectors at risk. While the Trade Exposure is still calculated as:

(imports + exports)/(imports + production)

the Emission Intensity is now determined by

direct emissions + (electricity consumption × electricity emission factor)]/gross value added

When

Trade exposure * emissions intensity > 0.2

then the sector is deemed at risk of carbon leakage. When Trade exposure * emissions Intensity is between 0.15 and 0.2, the result should be qualitatively assessed and may be considered at risk of carbon leakage. Criteria include abatement potential, market characteristics, and profit margins.[1] The revised methodology led to a shorter carbon leakage list.

In this context, more stringent internal climate policies could tempt rich countries to outsource pollution increasingly. For example, EITE industries could relocate production to another jurisdiction

[1] For sectors and sub-sectors that are deemed to be at risk of carbon leakage in the EU, according to the European Commission, see the Appendix.

to avoid paying the same level of carbon prices. Theoretically, a stricter Emissions Trading Scheme may lead to greater reductions in emissions but could also result in increased delocalisation of polluting production activities (Antoci et al., 2021).

The literature needs to clarify how much the EU Emissions Trading System (ETS) increases the risk of leakage. Divergences exist between ex-ante and ex-post literature, i.e., between expected results and observed outcomes. On the one hand, theoretical studies found positive carbon leakage rates following the implementation of carbon markets: general economic equilibrium models showed a 10% to 33% increase in carbon leakage, and partial equilibrium models showed a 30% to 100% growth (Branger & Quirion, 2014; Böhringer et al., 2018). Sun et al. (2024) estimated that about 20.2% of the carbon leakage rate is caused by the carbon price ($90/t at the time of the study) in the EU ETS, measured by the ratio of increased emissions in non-EU regions to the reduced emissions in the EU.

According to OECD (2024), despite a USD 1/tCO_2e increase in carbon prices reducing cement and steel plants' emissions by 1.3%, carbon leakage through international trade offset around 13% of these domestic emission reductions.

On the other hand, empirical studies find little or no evidence that the EU Cap-and-Trade System has caused carbon emissions to shift from Europe to other regions of the world (Verde, 2020; Nordström, 2023), especially to countries with less stringent climate regulations or from EITE businesses (Naegele & Zaklan, 2019). Research on data from the regional emissions of 1,122 multinational firms, of which 261 were under the EU ETS, suggests that slight differences in carbon prices between countries do not induce carbon leakage (Dechezleprêtre et al., 2022). These findings should, however, be treated with caution as they are the result of analyses carried out during periods of low prices. Carbon leakage can be expected if carbon prices rise to achieve climate neutrality by 2050 (Cammeo et al., 2024).

Supporting climate policy with compensatory measures to reduce the risk of carbon leakage associated with declining competitiveness is one way to handle the problem. Four major strategies could be used in the case of the ETS to mitigate the risk of carbon leakage:

- free allocation of emission allowances
- directly encouraging low-carbon innovation
- linking ETSs
- creating a level playing field through border carbon adjustment.

Free allocation to EITE as a compensatory measure is controversial. It works by granting a certain number of emissions allowances under ETS at no cost. These allowances act as a form of compensation to offset the cost of complying with carbon pricing, reducing the risk of carbon leakage. It can reduce the incentive for companies to cut their emissions, potentially undermining the environmental goals of the ETS. It can also distort the carbon market, leading to windfall profits for companies, as they receive allowances without incurring direct costs, which can be seen as an unfair advantage (Martin et al., 2014). Determining the optimal level of free allocation is complex: if provisions are too low, firms delocalise; if they are too high, there is no incentive to abate emissions (Antoci et al., 2021); in addition, deciding who should receive free allowances is tricky, and it could raise concerns about fairness, potentially eroding trust in the ETS system. For these reasons, industry-specific free allowances will end in 2034, having been phased out since 2026.

Encouraging low-carbon innovation is a strategic approach to limiting carbon leakage (Fragkos et al., 2021). Indeed, firms' decisions on whether to reduce emissions or relocate abroad are more influenced by policies that lower the cost of green technologies than by specific aspects of the Emissions Trading System (ETS), such as the emissions cap, the floor price, or the number of permits allocated for free. (Antoci et al., 2021). By developing and adopting cleaner technologies, businesses can maintain competitiveness without shifting production to less regulated areas. This

reduces the risk of losing economic activity while ensuring that emissions are not simply displaced but reduced. However, its effectiveness depends on several factors. While innovation can strengthen domestic industries and create long-term advantages, the high costs and slow adoption of new technologies may delay impact. Additionally, if global disparities persist, businesses may still find relocation more cost-effective than investing in low-carbon alternatives.

Linking ETSs with different allocation systems is technically feasible, but differences can raise concerns regarding efficiency, competitiveness, equity, and environmental effectiveness (Tiche et al., 2014). In practice, linking ETSs involves mutual recognition of emissions allowances between different systems, allowing companies to buy and sell permits across jurisdictions. This requires policy alignment on cap-setting, monitoring, and compliance to ensure a level playing field, which helps stabilise carbon prices and reduce the risk of carbon leakage by ensuring industries in linked regions face comparable carbon costs. Transaction and compliance costs of such measures seem to be high, requiring trust, coordination, and mutual understanding between different jurisdictions (Doda et al., 2022).

Lastly, imposing border carbon adjustments is a much-discussed regulatory tool to minimise leakage and safeguard heavy industry competitiveness (Branger & Quirion, 2014). The EU is trying to level the playing field with its Carbon Border Adjustment Mechanism (CBAM). The following section will explain why implementing this measure was necessary.

2.2 Carbon leakage in Europe

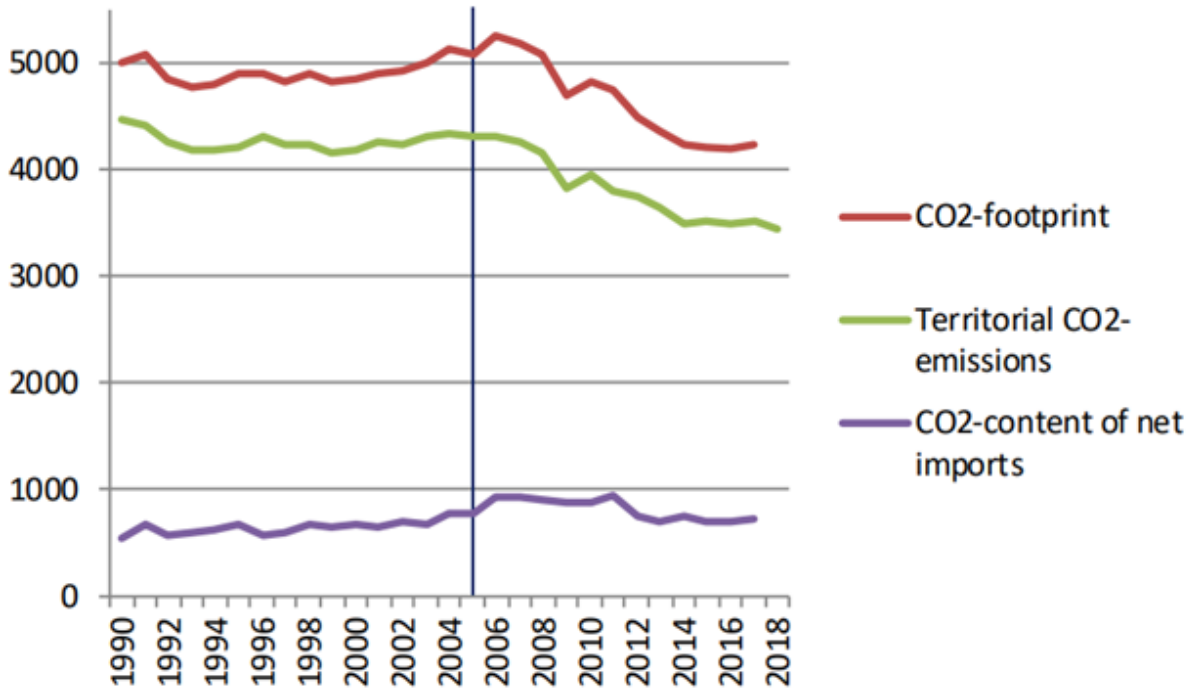
Even though some authors highlighted that the historical increase in aggregate emission transfers from Global North to Global South peaked around 2006 and declined since (Grubb et al.; 2022), the leakage rate is expected to be high for OECD countries due to their delocalisation of polluting production outside their respective countries; the EU makes no exception (EC, 2023).

Despite a 63% increase in worldwide emissions, EU territorial CO_2 emissions decreased by 29% between 1990 and 2020. Nevertheless, because emissions-intensive goods and services are imported to meet the EU demand, this reduction understates the EU's carbon footprint. With a 5.7% population share, the EU's consumption-based CO_2 emissions in 2021 were expected to be 3.5 billion metric tonnes, or roughly 9% of worldwide CO_2 emissions (37.9 billion tonnes) (Axelsson et al., 2024).

Figure 1 illustrates that, over the period 1990-2017, the CO_2 footprint of the EU exceeds its territorial emissions, indicating that the EU is a net importer of CO_2. This means that the imports into the EU were associated with higher CO_2 emissions produced abroad compared to the exports from the EU to other countries. This is particularly evident after the inception of the EU ETS in 2005.

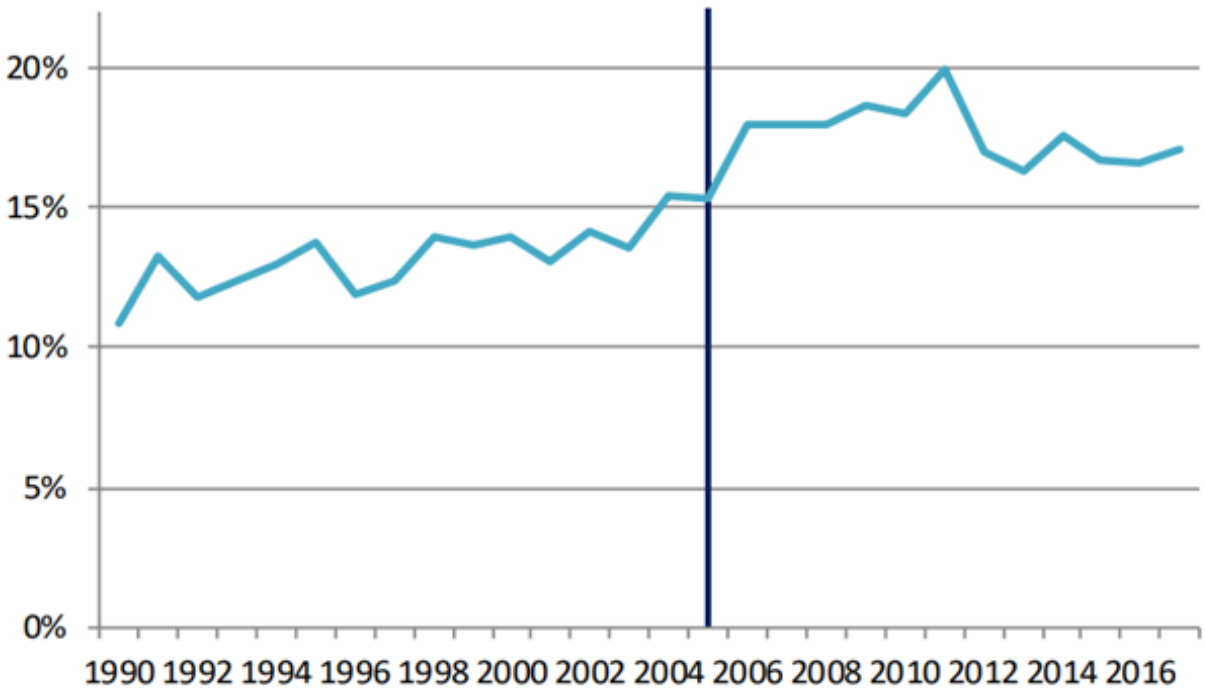
Additionally, the footprint has decreased by 15% from 1990 to 2017. However, this reduction in the carbon footprint is less notable, accounting for only a 6-%age point decline (EC, 2019). Figure 2 shows the EU's CO_2 emissions from net imports as a %age of the EU's overall CO_2 footprint, which has increased from 11% in 1990 to 17% in 2017 (EC, 2019).

***Figure 1**: Estimates of European Union CO_2-emissions, CO_2-footprint and CO_2-imports, in million tons of CO_2 per year*



Source: European Commission (2019)

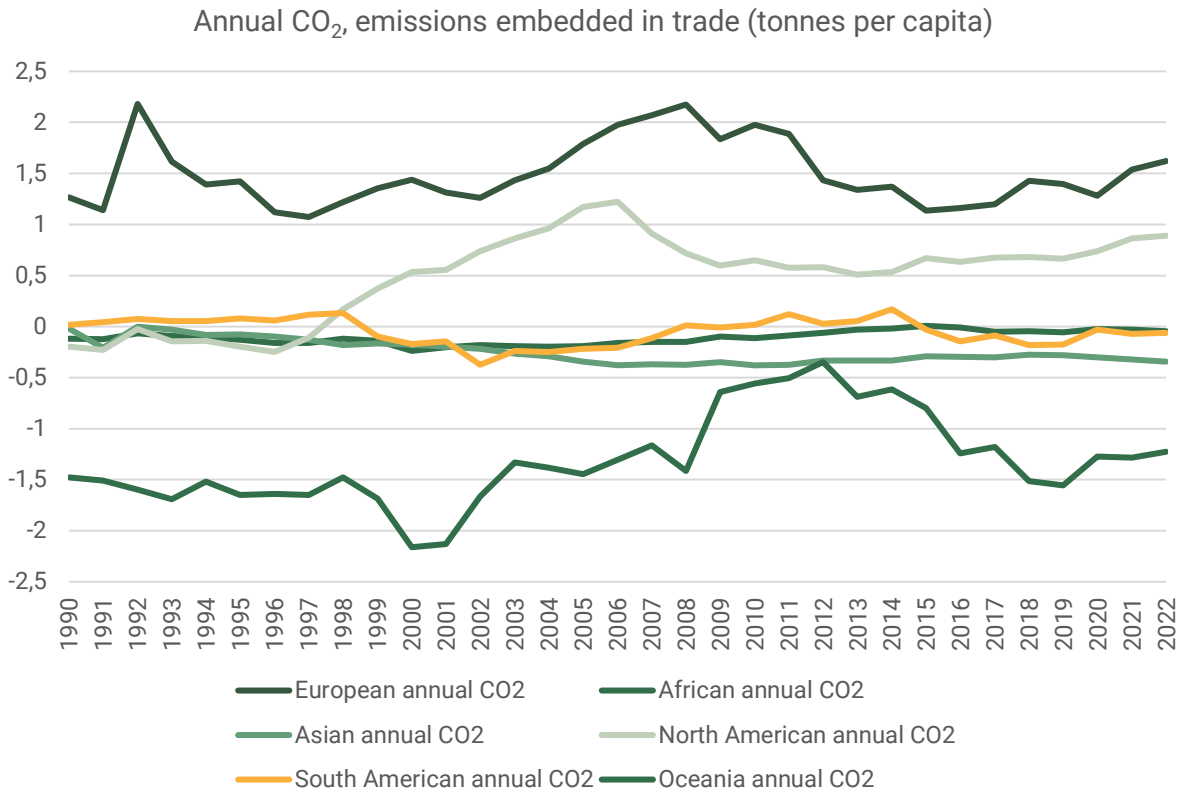
***Figure 2**: CO_2 embodied in net imports as a share of EU carbon footprint, %*



Source: European Commission (2019)

In 2020, the EU was the world's largest importer of virtual CO_2 emissions, with net imports containing over 700 million tons of CO_2, more than 20% of its territorial emissions (EC, 2020). Annual CO_2 emissions embedded in trade (tonnes per capita) refers to the amount of carbon dioxide emissions associated with the production of goods and services that are traded across borders, measured on a per-person basis within a given country or region. This metric accounts for the emissions generated during manufacturing in one country but consumed in another due to international trade. In Figure 3, the annual CO_2 emissions embedded in trade for Europe exceed 1.5 tonnes per capita in 2022. In contrast, other continents, Oceania, Asia, Africa, and South America, registered negative emissions in this regard.

***Figure 3**: Annual CO_2, emissions embedded in trade (tonnes per capita)*



Source: Authors based on data from Global Carbon Budget (2024)

Again, while ex-post evaluations of the EU ETS found limited direct leakage, broader studies suggested that unilateral climate policies led to a 5% rise in imports and an 8% increase in carbon intensity. Ex-ante simulations estimated that about 15% of domestic emission reductions are offset by foreign emissions, with some studies projecting rates as high as 130% (IMF, 2023). It is then plausible to state that part of these emissions embedded in trade are due to leakage.

To mitigate this, the EU proposed the CBAM in 2020. By imposing a carbon price on imports from selected sectors equivalent to domestic emissions costs, CBAM aimed to prevent industry relocation and extend the reach of EU climate policies. Assessment simulations suggested CBAM could eliminate direct leakage (where companies relocate production to avoid carbon costs), though it would have a limited impact on leakage through global energy markets (such as reduction in global energy prices leading to increased emissions elsewhere) (EC, 2020).

3. CBAM: technical aspects and different phases of implementation

3.1 Functioning of the Border Carbon Mechanisms

The debate around the Border Carbon Mechanism (BCM) started after the Kyoto Protocol's adoption in 1997. Initial ideas on border adjustments were theoretical and faced legal and political issues. Nevertheless, with the increase in carbon pricing initiatives such as the EU ETS created in 2005 and other national carbon tax policies, the idea became more attractive to avoid unfair competition from countries with less strict environmental standards.

BCM usually operates by placing a carbon cost on imported goods equal to the carbon cost incurred by domestic suppliers. The main features of such mechanisms are the range of products covered by carbon taxes and the most likely to experience carbon leakage. Importers must buy carbon certificates, which are the price difference between the carbon price in the exporting country and that of the regulating country. Companies must disclose the greenhouse gas emissions embedded in the imported products to avoid cheating on emission requirements. The BCM must be compatible with the WTO regulations, and the carbon price has to be neutral and equal for domestic and foreign manufacturers (Mehling et al., 2019). Adoption of a BCM has broad implications for the economy and politics. Although it encourages global decarbonisation, it was opposed by Global South countries worried about the trade barriers that may occur. Furthermore, technical issues concern accurately assessing carbon emissions embedded in goods traded across borders.

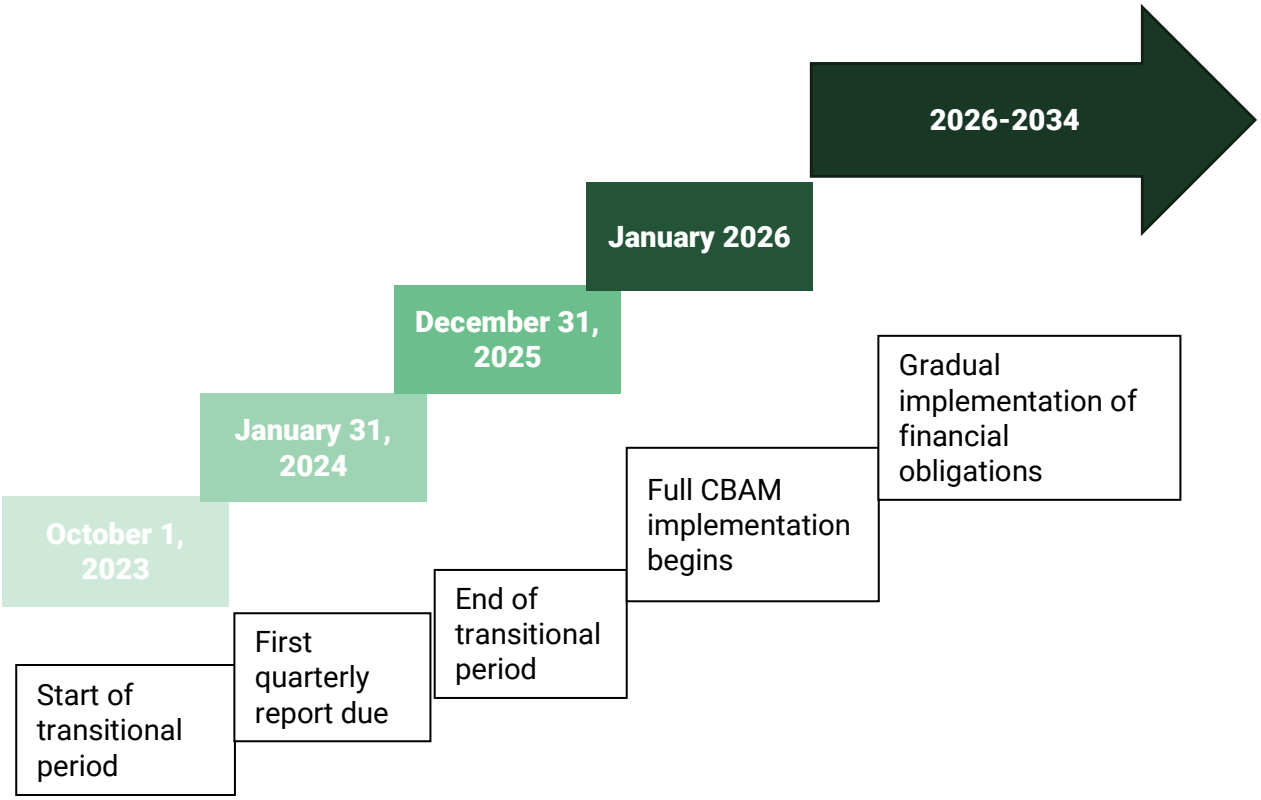
The CBAM is the most advanced attempt to implement such a measure on a large scale (European Commission, 2021a). The mechanism applies at first to heavy-emitting sectors such as iron and steel, cement, aluminium, fertilisers, electricity, and hydrogen, with plans for an extension to other sectors.

The EU is not the only region where the BCM discussions are ongoing. The previous administration of the United States has also put forward similar policies, including the Clean Competition Act, which provides for tariffs on carbon-intensive imports that exceed a certain amount (US Congress, 2023). The Government of Canada has also implemented a Border Carbon Adjustment (BCA) to align it with its domestic carbon pricing system (Government of Canada, 2021). On the other hand, China and other developing countries have highlighted certain concerns about BCM, claiming that such mechanisms can act as trade barriers that affect the Global South most.

3.2 Phases of implementation

The CBAM Regulation (EU) 2023/956 of 10 May 2023 by the European Parliament and the Council is the legal base that outlines the gradual implementation of the measure as currently applicable (see Figure 4). The current phases may be amended by the Omnibus Package proposed by the European Commission on 26 February 2025 (see section 6.1).

Figure 4: Gradual introduction of the CBAM



Source: Authors (2025)

The CBAM is phased in gradually for targeted sectors, while for the same sectors, the previous system for mitigating the risk of carbon leakage, free allocation, is phased out. According to the European Commission (2025a), this allows for a "careful, predictable and proportionate transition for EU and non-EU businesses, as well as for public authorities." The targeted sectors are those deemed the most at risk of carbon leakage: cement, iron and steel, aluminium, fertilisers, electricity and hydrogen.

CBAM transitional phase (2023 – 2025)

During this phase that started in October 2023, the EU importers of those sectors will only have to report emissions embedded in their imports (direct and indirect emissions) without the need to buy and surrender certificates.

The Implementing Regulation (EU) 2023/1773 of 17 August 2023 defines the reporting requirements and methodology that can be used. Until December 2024, companies could choose three among three options for reporting:

1. full reporting according to the new methodology;
2. reporting based on an equivalent methodology;
3. reporting based on default reference values (only until July 2024).

As of January 2025, non-EU installation operators can share their emissions data on a portal, allowing CBAM declarants (i.e. EU importers) to apply the actual emission data via the CBAM Registry created by the Implementing Regulation (EU) 2024/3210 of 18 December 2024 This option will become mandatory as of January 2026.

Building upon the experience of this transition phase, a review of the CBAM's functioning is foreseen before the entry into force of the definitive system to confirm the methodology and consider a scope extension and new timeline.

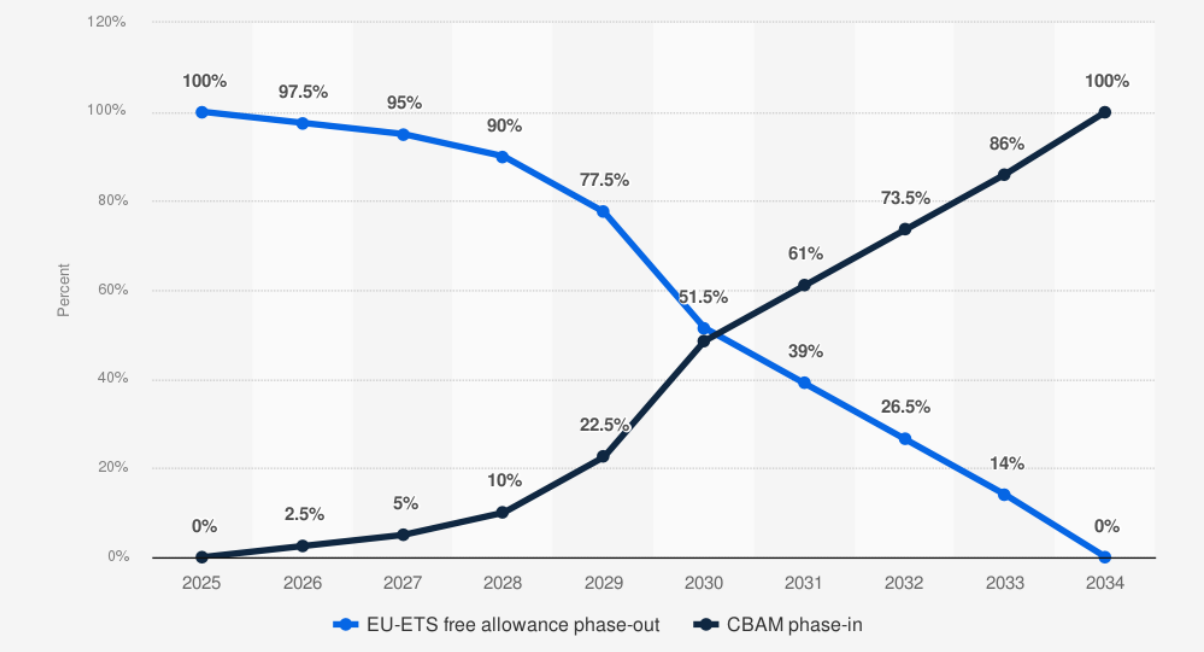
CBAM definitive regime (from 2026)

Considering the pilot phase presented above, the definitive regime will enter into force at the beginning of 2026. In this phase, EU importers of goods will be paying a carbon price equivalent to a given share of the emissions of the product they import.

EU importers will have to register with national authorities and surrender every year a number of CBAM certificates equivalent to the imported emissions for which they are responsible. The price of the certificates will correspond to the weekly average auction price of EU ETS allowances expressed in €/tonne of CO_2. If importers can prove that a carbon price has already been paid during the production process of the goods, the equivalent amount can be deducted.

Although this is considered the definitive regime, the importers from the covered sectors will not have to surrender certificates for all the imported emissions. The CBAM will gradually replace the EU ETS free allocation mechanism between 2026 and 2034 and a corresponding phasing-out of the free allowances (see Figure 5). During this period, free emissions allowances will be reduced initially at a slower rate, which will increase as the period ends. The reduction rate for free allowances, according to the EU ETS, is as follows: 2026: 2.5 %; 2027: 5 %; 2028: 10 %; 2029: 22.5 %; 2030: 48.5 %; 2031: 61 %; 2032: 73.5 %; 2033: 86 %; and 2034: 100 %.

***Figure 5**: Pathway of EU ETS free allowances phase-out and Carbon Border Adjustment Mechanism (CBAM) phase-in from 2025 to 2034*



Source: STATISTA (2023) based on data from ICAP and the European Commission

At the time of writing, and even prior to the assessment of the transitional phase, the newly in power European Commission has proposed amendments to the CBAM, which are still to be discussed by the European Parliament and the Council. These suggested amendments are detailed and discussed in section 6.

4. CBAM elements: pros and cons

4.1 Complying with WTO regulations

Measuring the exact WTO compatibility of the CBAM is quite complex. According to the WTO rules, a member is prohibited from discriminating between "like" products from various trading partners, awarding them "most favoured nation" (MFN), and between its products and "like" foreign products, awarding them "national treatment". On the MFN aspect, the EU has provided for the application of the CBAM to all trading partners. On the “national treatment” feature, it should be remembered that the CBAM is a mechanism that extends domestic regulation and does not contain stricter rules for the industrial sectors it covers. The strategy, furthermore, does not include quantitative restrictions that the WTO forbids. Besides, the exclusion of retaliation problems was the primary objective of the European legislator, who aimed to structure the CBAM as WTO-compatible, transparent, non-protectionist, and gradual (Delbeke & Vis, 2020).

Another important feature of the WTO compatibility is the ability to justify trade measures with reference to environmental exceptions provided for in Article XX of the General Agreement on Tariffs and Trade (GATT). Article XX permits countries to adopt such measures as may be necessary for the protection of human, animal or plant life or health, or for the conservation of exhaustible natural resources. The CBAM’s aim of cutting across international supply chains to decarbonise international trade is consistent with these exceptions, thus making its legality under the WTO more compelling. In addition, the EU has highlighted that the revenues raised through CBAM will be reinvested into climate action, making it a more environmental protection measure than a trade restriction (International Monetary Fund, 2023). This is because CBAM guarantees that importers pay the carbon cost incurred in the country of origin, thereby removing the possibility of carbon leakage. The transparency and flexibility of the mechanism also enhance the compatibility of CBAM with the WTO rules. The EU has reached out to its trading partners and international organisations to ensure that the mechanism does not discriminate against developing countries. The exemptions or flexibilities for countries with similar carbon price policies also make it more compatible with the WTO standards. For instance, if jurisdictions have put in place comparable carbon pricing mechanisms, CBAM may recognise them and avoid double carbon costs while trading (ICAP, 2024).

There are dissimilarities if CBAM is considered a measure replicating the EU ETS. ETS and CBAM are both carbon pricing tools, but CBAM applies to specific imported products, not production, as ETS does. Recent analysis reveals several discrepancies between CBAM and the EU ETS on the scope of emissions covered, free allocation of allowances, and verification requirements. Another critique is that CBAM levies duties based on the monetary price of the CO_2 emitted into the atmosphere, whereas the EU does it based on the actual CO_2 emitted in producing the goods. This could be more restrictive than necessary as the foreign producers may have already paid for the emissions in their domestic systems.

That said, given the countermeasures taken in the mechanism design, the EU may avoid legal challenges, allowing CBAM to proceed without immediate consequences.

4.2 Limiting carbon leakage

To what extent border mechanisms prevent carbon leakage is a crucial question. The literature provides mixed results. Some studies demonstrate the effectiveness of CBAM in lowering carbon leakage, while others highlight its limitations. Estimates of carbon leakage vary significantly. In the absence of policy, leakage rates range from 5% to 25% (mean 14%), whereas the presence of carbon border adjustment lowers this range to -5% to 15% (mean 6%) (Branger & Quirion, 2014). One of the most effective ways to reduce carbon leakage by 6% is through the addition of export refunds—though this remains controversial—and expanding carbon border adjustments to all sectors. Bellora & Fontagné (2023) confirm CBAM effectiveness, arguing that the mechanism significantly reduces carbon leakage by imposing carbon costs on imports, ensuring that emissions-intensive and trade-exposed (EITE) industries remain competitive and discouraging relocation to regions with weaker climate policies. Between 2015 and 2021, carbon leakage offset 13% of domestic emission reductions in key sectors such as aluminium, cement, and steel.

In terms of research, assessing carbon leakage remains a challenge. Most global emissions growth originates in developing countries due to production-based emissions accounting. Thus, it is difficult to measure the exact contribution of European energy-intensive companies that have relocated production.

Complementary measures such as export rebates are necessary to further enhance CBAM's effectiveness and potentially reverse carbon leakage. A combination of CBAM and export rebates has improved welfare across all carbon price levels while maintaining industrial competitiveness (Ambec et al., 2024). Model simulations applied to the cement and steel sectors predict that the CBAM, when paired with export rebates, could lead to reversed carbon leakage and significant welfare gains.

Despite its strengths, CBAM alone cannot fully address leakage caused by the EU ETS. In the benchmark scenario, emission reductions in non-EU countries amount to 22.5 Mt, covering only 18.9% of the emissions leaked due to the EU ETS (Sun et al., 2024). This suggests that CBAM, while effective, may require further policy support. Maximising its effectiveness in reducing carbon leakage will require ongoing refinements, expanding sectoral coverage, and strengthening international cooperation.

While the literature on carbon markets remains ambiguous, limited evidence should not be a pretext for less ambitious climate policies.

4.3 Supporting the EU competitiveness

Without CBAM, the EU industry will face significant competitive disadvantages compared to its competitors due to the unequal implementation of carbon pricing. The EU ETS levies steep carbon prices on domestic producers, but foreign competitors' products will still be imported into the EU and will not face the same constraints. If the mechanism had not been implemented, the competitiveness of sectors like basic metals and non-metallic minerals would be declining because of the rising cost of meeting the EU ETS requirements (Dechezleprêtre et al., 2025). Therefore, the EU producers may lose their market share to the non-EU suppliers because of the carbon costs.

One way of preserving the EU's competitive position in the global market while contributing to the green transition is to focus on innovation support (Jakob & Mehling, 2025). Innovation funding can enhance the competitiveness of EU production by reducing the costs of abatement and speeding up the adoption of clean technologies, thus making decarbonised products more price-competitive in the international market. This support could take the form of investment subsidies, tax credits, or

other instruments, such as Carbon Contracts for Difference (CCfDs), which serve to reduce the risk of green industrial investment. Unlike direct export rebates, which are likely to be illegal under the WTO and likely to provoke trade disputes, innovation support is less controversial and more in line with current global practices in green industrial policy.

The front-end costs of carbon-free production, such as green steel, which is currently 20-25% more expensive than conventional production, can be made viable by covering upfront capital costs. Cost degression trends, particularly in renewables, suggest that well-designed support measures can maintain long-term international competitiveness. The options for financing include redirecting revenues from auctioning of emissions allowances (which are expected to be €20 billion per year) and leveraging EU instruments such as the Innovation Fund and the Recovery and Resilience Facility (Jakob & Mehling, 2025). In order to enhance the impact and reduce the negative effects of innovation support, it must be guided by clear industrial policy principles. In other words, the mechanism is a partial shield against the competitiveness impacts of EU climate policies, as it does not eliminate the effect of higher carbon prices and the phasing out of free allowances. The effectiveness of CBAM in stabilising the internal market will depend on policy adjustments, which may include revenue recycling and other policy measures to support downstream industries (Dechezleprêtre et al., 2025).

In conclusion, CBAM is not enough to protect the competitiveness of EU exporters, but innovation support can be a way to reduce carbon leakage and promote industrial change at the same time. Through strategic investment in green technologies, the EU can maintain its industrial base in the transition to a low-carbon economy.

4.4 Incentivising other jurisdictions to increase climate ambition

Through the imposition of a carbon cost on imports that replicates the EU ETS, CBAM offers a compelling economic argument to countries exporting to the EU to either put in place or enhance their domestic carbon pricing policies. This leads to conformity of carbon pricing policies worldwide and enhances climate actions in various countries (World Bank, 2023; International Monetary Fund, 2023).

One of the main ways CBAM encourages higher climate action is by providing a clear economic signal to exporters to incorporate carbon costs into their production process. Countries that have identified their main export interests with the EU must ensure that compliance with CBAM includes measures that support the viability of their domestic industries aimed at exporting to the EU. This has especially been the case in countries such as Turkey and Brazil, where the debates on carbon pricing have been revived due to CBAM (ICAP, 2024).

In Turkey, the government has quickened the process of establishing a domestic emissions trading system due to the adoption of CBAM. Since Turkey has a close trade relationship with the EU, especially in the carbon-intensive industries such as steel, cement and aluminium, it is crucial to align with the EU's carbon pricing mechanism to avoid adverse competitive effects. The existence of CBAM charges on exports has made Turkey improve its cap-and-trade system to meet the EU standards (ICAP, 2024; World Bank, 2024). This development not only assists in meeting the requirement of CBAM but also enhances Turkey's overall decarbonisation plan and its Paris Agreement commitments.

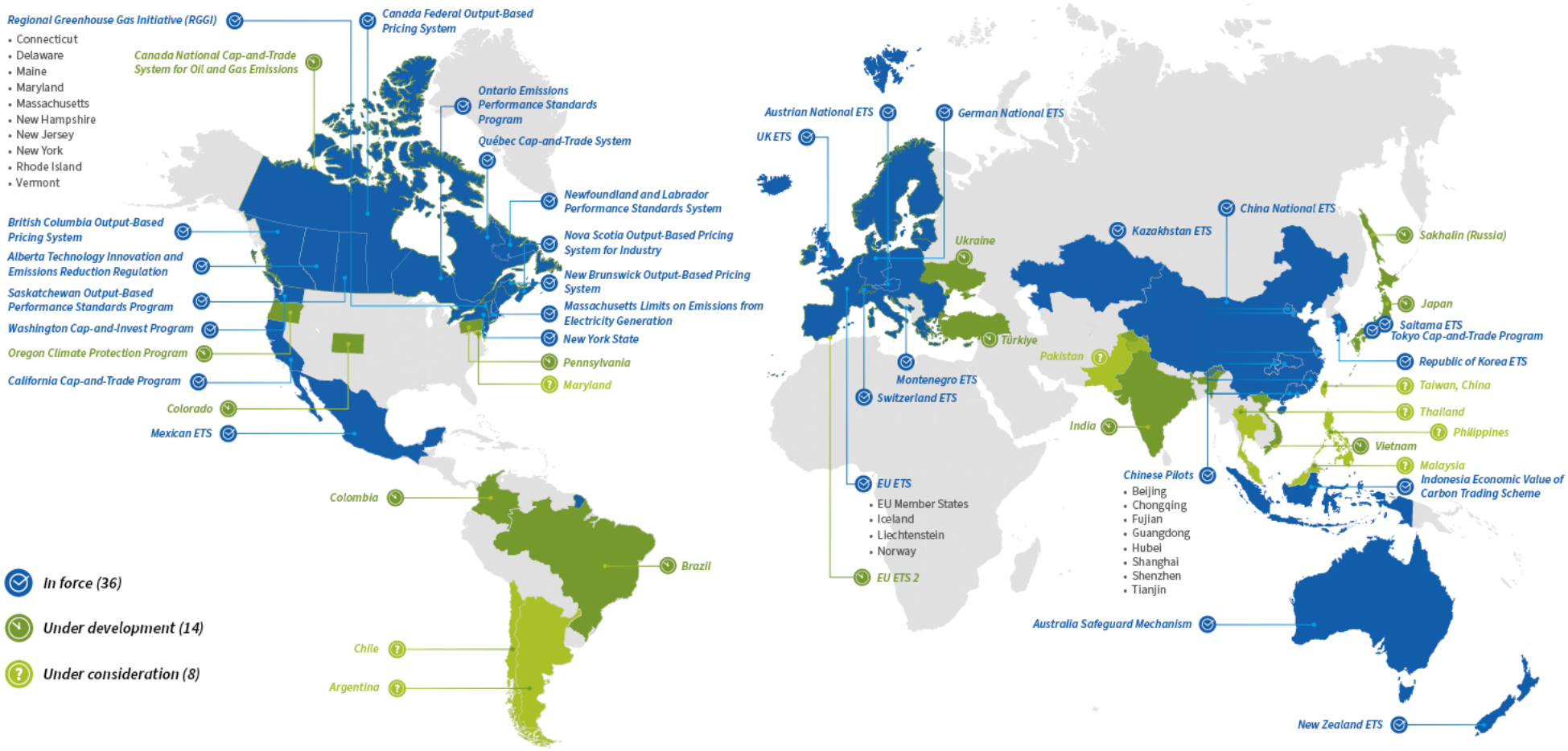
In the same way, in Brazil, CBAM has quickened the process of market carbon talks and policy making. The Brazilian government has moved forward with the process of implementing a domestic ETS because it realises that complying with international carbon pricing is beneficial for its export

industries. The Brazilian Greenhouse Gas Emissions Trading System (SBCE), which is now under legislative review, aims to include significant industrial sectors and to establish a cap-and-trade system that is connected to international carbon pricing systems. Therefore, Brazil endeavours to lessen the effects of CBAM on its exporters while enhancing its national climate policy (ICAP, 2024).

Aside from Turkey and Brazil, Malaysia has also implemented its domestic carbon market in response to CBAM. The Malaysian government has also carried out assessments on the implementation of carbon pricing, and a climate bill that contains provisions for emission trading is currently before parliament. These include the Malaysian engagement in these talks as an example of how CBAM can stimulate the formation of carbon pricing policies even in the areas where they were not well developed.

Countries including Indonesia, Vietnam and Thailand have started contemplating their carbon markets. The map in Figure 6 summarises the carbon markets that are in force, under development, or under consideration all over the word.

***Figure 6**: ICAP ETS Map*



Source: ICAP (2024)

In addition to particular national responses, CBAM also promotes the region's collective action and policy convergence. This means that the mechanism is sending a clear signal that carbon pricing is here to stay in international trade and induces countries to search for common strategies towards emissions reduction (World Trade Organisation, 2023).

Despite the challenges of equitable implementation and negotiation with partner countries, the effect of the European Carbon Border in encouraging climate policies outside the EU is becoming apparent. As more countries adopt its economic effects, the mechanism can trigger substantial change in emission reduction and climate policy convergence.

4.5 Violating the CBDR-RC principle

The CBAM compatibility with the principle of Common but Differentiated Responsibilities and Respective Capabilities (CBDR-RC) has been discussed. The CBDR-RC principle is central to international environmental law and recognises that countries have different responsibilities and capabilities in addressing climate change (Mehling et al., 2019).

Some critics are saying that applying the CBAM in a uniform way to all countries, regardless of their level of development, is inconsistent with the CBDR-RC principle. This approach could adversely affect developing nations by, in effect, assigning them carbon footprint similar to those of developed countries, which would be contrary to the concept of differentiated responsibilities under CBDR-RC (Krenek & Schratzenstaller, 2021). Other scholars also argue that CBAM is an extraterritorial policy that makes third countries adopt carbon regulation systems similar to that of the EU, which may be a violation of their sovereignty (Corvino, 2023). The extra-territorial effect of CBAM may influence these nations to conform to the EU carbon standards even if they are, in the process, disregarding their peculiar national circumstances and capacity, which may be seen as coercive and not consistent with the voluntary and nationally determined contributions (NDCs) spirit of the Paris Agreement (Corvino, 2023).

However, proponents of the argument hold that CBAM can be designed in a way consistent with the principles of differential treatment. Some policy recommendations are also suggested to include exemptions or lower rates for developing countries, which would align the mechanism with the principles of climate justice internationally (Krenek & Schratzenstaller, 2021). Also, the EU has indicated that it will table measures to support the scheme, including financial support, technology transfer, and capacity building to assist partner countries in shifting to low-carbon production processes. These accompanying actions may lessen the adverse effects of CBAM and align it with the principles of the CBDR-RC (European Commission, 2021a).

In conclusion, as things stand, CBAM poses questions regarding equity and power, but it is possible to improve its compatibility with principles of international climate governance through, for example, the introduction of differentiation and targeted support. Whether such revisions will be enough to secure global support is unknown.

Box: Social impacts of climate policies and CBAM

Climate change mitigation policies play a central role in the sustainability transition in Europe. Such policy instruments have socio-economic consequences and are often associated with both negative and positive side effects. The socio-economically disadvantaged groups are disproportionately affected by the adverse consequences of both climate change and the policies to mitigate climate change (Büchs et al., 2011; Markkanen & Anger-Kraavi, 2019). In a systematic review of the outcomes and trade-offs of ten types of decarbonisation policy instruments, Peñasco et al. (2021) find that while the instruments are often associated with positive impacts on outcomes related to innovation, environment and technology, they are often associated with negative impacts on distributional outcomes. Understanding the distributional impacts of the policies is crucial to facilitating a just transition.

Economy-wide computable general equilibrium (CGE) models are widely used to assess the social, economic and environmental impacts of different policy instruments at the macro level. CGE models have been applied to analyse the impacts of a wide range of transition policy instruments, but some instruments are more commonly assessed. According to a review by An et al. (2023), carbon pricing instruments, such as a carbon tax or cap-and-trade, are the most frequently assessed policies in CGE models. The second most frequently assessed policy is energy policies, followed by climate targets such as net-zero and the 2-degree pathway. The different studies and associated models are not necessarily comparable and sometimes produce conflicting results, particularly at the macro level. The models differ across studies, as well as the design of the policy instruments they assess.

Carbon pricing, such as the EU ETS, is recognised as an efficient instrument to change behaviour and reduce emissions (EC, 2024). The empirical evidence on the distributional effects of carbon pricing is mixed and depends on several factors, including technology, the structure of the consumption basket and policy design. Weitzel et al. (2023) use a CGE model to estimate the impact of different policy scenarios. One scenario assumes that the carbon price signal can be strengthened by extending the EU ETS to new sectors, finding that an increase in the carbon price has regressive effects and that poor households are disproportionally affected. This is anticipated because, in higher-income countries, the poor tend to spend a relatively larger share of their income on energy compared to the country average and will be charged a greater portion of their income (Dorband et al., 2019). However, some models yield opposite results. Landis et al. (2021) find that the impacts of harmonising carbon prices within the EU are non-regressive within most EU countries. Feindt et al. (2021) support this finding but also emphasise that carbon taxes are regressive at an aggregate EU level because some low-income countries are particularly affected by the increased carbon price.

Although carbon pricing imposes a cost on individual households, it also generates revenue. If the revenues are recycled and transferred to households through an income-targeted revenue recycling scheme, they may reduce the adverse effects on poor households (Vandyck et al., 2023). When recycling of revenues is considered in the carbon price scenario, Weitzel et al. (2023) find that transfers to households offset the negative results for poor households, and the overall effect of carbon pricing is progressive. Similar findings are estimated in the studies by Landis et al. (2021) whose estimates show strong progressive outcomes and gains for low-income households with revenue redistribution.

With respect to the impacts of energy policies, Mayer et al. (2024) find that net-zero configurations of the energy system in Europe may lead to welfare gains at the macro level, with positive employment effects leading to higher income and stronger capital accumulation over time. In the study by Weitzel et al. (2023) they also include a scenario based on regulatory measures that increase ambition on energy efficiency, land transport and renewables without changing the carbon

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price signals. Under their market-based scenarios with increased carbon prices, they estimate minor GDP losses at the macro level. When the assumption of a perfect labour market is relaxed, the regulation-based policies perform better than the market-based scenarios in terms of GDP losses. With respect to distributional effects, the regulatory scenario is less regressive than the carbon pricing scenario, but contrary to carbon pricing, no revenues that can potentially offset the negative impacts on poor households are generated.

CBAM will put a price on the carbon emitted during the production of goods imported to the EU from five sectors. Raising barriers to international trade by adding a carbon tax at the border raises the price of imported goods and increases the scarcity of these goods. These effects are disadvantageous for consumers and EU producers in terms of raising the price of intermediate goods used in their production. The total effect, however, depends on to what extent the reduced imports are replaced by domestically produced goods or less energy-intensive substitutes. Like other carbon-taxing instruments, CBAM also generates revenue. How this is recycled will also affect the socio-economic outcomes of the mechanism.

CBAM can disproportionately affect EU trading partners in products from sectors included in the mechanism, typically developing countries and emerging economies (Magacho et al., 2024; Bassi et al., 2025). The possible impacts of CBAM in the Global South is not the focus of this report and will be explored in the SPES report 7.3. In Europe, implementing CBAM is likely to cause significant price inequalities depending on technology (Zhong & Pei, 2022). While countries with high-emission production technology and high EU trade exposure are likely to suffer more from CBAM, non-EU countries with low emission production technologies may benefit from implementing CBAM. Within the EU, the vulnerability to adverse effects of the present climate policies depends on several factors, including the structure of the energy-intensive industry sector in the region and the adaptive capacity of the regional labour market. CBAM is likely to reduce the adverse effects on employment and improve competitiveness compared to not implementing a policy to counteract carbon leakage. However, the effect of CBAM is likely to vary across geographical regions (Perdana & Vielle, 2025). At the regional level, EU countries with energy-intensive industries in Southern and Central Europe are still vulnerable concerning adverse employment impacts after the implementation of CBAM (Perdana & Vielle, 2025). A study by Zhao & Lin (2025) indicates that the CBAM may reduce the inequality gap among EU countries and industries in the short term, while inequalities may increase in the long run. CBAM will increase the price of energy-intensive imports. Countries and industries that cannot find cheaper alternatives to these imports may face higher adjustment costs and reduce their competitiveness relative to better-prepared countries (Zhao & Lin, 2025). Few studies have modelled the distributional impacts of CBAM across households within EU countries, but adding a tax on imported products can potentially make the EU carbon pricing less regressive, given that richer households buy more imported goods (Feindt et al., 2021; Merkle & Dolphin, 2024). In a study using a CGE model to analyse the distributional impacts of carbon pricing on German income groups, Hübler et al. (2024) show that CBAM reduce the distributional effects of climate policies in terms of being more beneficial for low-income households in Germany. Results from survey experiments in four European countries indicate higher acceptance for CBAM than what is usually found in opinion studies of national carbon taxes (Bayer & Schaffer, 2024). However, information on the potential distributional consequences of CBAM shapes public support. Respondents who were informed about price increases of certain goods were less supportive, while respondents who were informed about job protection and positive employment effects for their country were more supportive (Bayer & Schaffer, 2024).

One important concern concerns the high costs European SMEs could face to comply with the regulation. Most of these SMEs do not have the instruments to submit all the complex documentation the mechanism requires. The main challenges are the high costs of adapting the production processes to meet the CBAM standards, the difficulty of carbon emissions tracing along

the supply chain, and the possibility of increased costs due to the necessity of carbon accounting and reporting. Many SMEs may not have the necessary skills or resources to spend on the technologies and methods needed to cut their carbon impact. As a result, smaller firms may face a competitive disadvantage compared to larger companies or those located in countries with stricter environmental standards. This could result in supply chain disruptions or higher costs of raw materials which, in turn, can affect the pricing and competitiveness of their products in the European market.

4.6 Impact on the EU internal market

The EU initially expected CBAM to generate €1.5 billion annually, just 1% of the EU budget, based on 2018 carbon prices (€16/ton). However, with carbon prices rising fivefold under the EU ETS, revenues are projected to reach €9 billion per year. Despite this increase, it remains modest compared to Member States' contributions of €120 billion annually (CCEEL, 2024).

The mechanism has implications for the EU internal market, affecting both CBAM-covered and non-covered sectors. The removal of free allowances and the CBAM implementation lead to increased costs for certain sectors, with the non-metal minerals sector experiencing value-added losses of up to 2.8% due to its limited coverage under the mechanism (Dechezleprêtre et al., 2025). CBAM also influences downstream industries, such as electrical equipment, machinery, and motor vehicles, which rely on CBAM-covered materials. These industries face rising input costs, resulting in a modest decline in value-added, with non-CBAM sectors accounting for 83% of the total loss in value-added within the EU (Dechezleprêtre et al., 2025). Trade tensions may also arise, particularly with developing countries that view CBAM as a protectionist measure (Ülgen, 2023). These economic and trade implications show the effects of CBAM extension beyond the initially covered sectors, creating a competitive environment within the EU and affecting trade relations with the rest of the world.

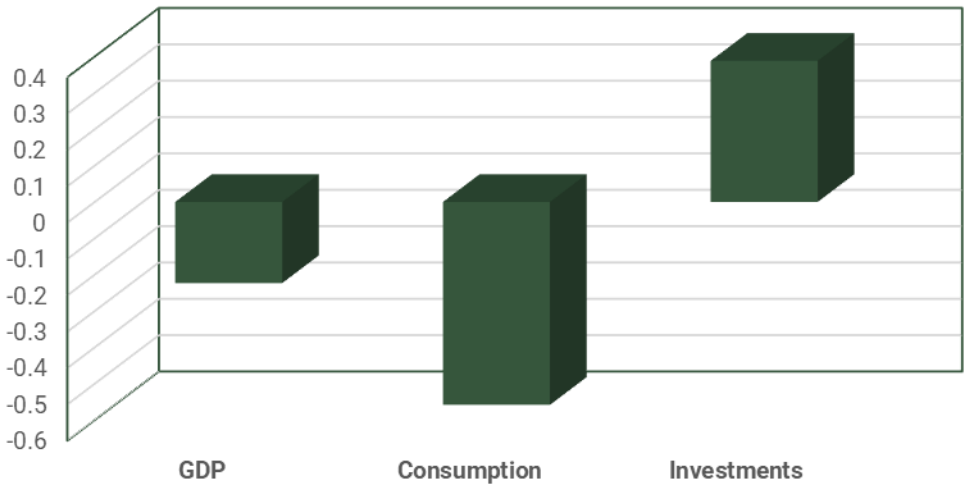
5. Impact in Europe

5.1 EC impact assessment

The European Commission's impact assessment of the CBAM provides valuable insights into its expected environmental, economic, and administrative effects.

From an environmental point of view, CBAM is expected to decrease emissions in the EU's covered sectors by about 1.0% by 2030. Although this reduction seems small, it should be emphasised that it is compatible with other EU climate policies to achieve net-zero emissions. Most importantly, CBAM is expected to decrease carbon leakage by 29% during the 2023–2030 period. This makes it a crucial measure in protecting EU climate efforts from being undermined by the relocation of emissions-intensive industries to countries with weaker regulations. (European Commission, 2021b).

***Figure 7**: Macroeconomic impact of CBAM in Europe*



Source: Authors based on data from European Commission (2021b)

The economic impacts of CBAM seem to be relatively mild, with only some adverse impacts on the main macroeconomic indicators (Figure 7). The impact assessment indicates that there will be a slight decrease in GDP (-0.223%) and consumption (-0.558%), while investments are set to grow slightly (0.388%). The CBAM, according to the assessment, will not have a severe economic impact on the EU economy but will channel investments towards cleaner technologies and more sustainable production processes. Furthermore, employment in the CBAM-covered sectors is expected to rise by 0.3%, which means that the mechanism is not a significant threat to job security in the covered industries (EC, 2021). This is also due to the simulated recycling of the CBAM revenues, which is redistributed through compensatory payments to those most affected by the mechanism.

However, the mechanism is expected to create substantial administrative and compliance burdens on businesses and regulatory authorities simultaneously (EC, 2021b). The European Commission, in its assessment of business impacts, expects them to incur annual costs between €9.8 million and

€14.3 million, which may include costs of reporting, verification and altering internal procedures to meet CBAM requirements. Furthermore, regulatory authorities are anticipated to incur about €15 million annually in costs that are associated with oversight, enforcement, and the creation of necessary infrastructure to guarantee compliance with the mechanism.

Thus, according to the EC assessment, the CBAM has different implications for Europe's economy. On the one hand, the mechanism guarantees a level of carbon cost for the EU industries without compromising the European macroeconomic dimensions. On the other hand, the administrative consequences of CBAM compliance, such as monitoring the embedded emissions in goods imported from elsewhere, are complex and onerous, especially for SMEs dependent on global supply chains. Furthermore, the effectiveness of CBAM depends on the sectors in which it is applied. Proposals under implementation limit their application to sectors with high emissions, but using this approach creates the risk of continuing to allow carbon-intensive intermediate products to be imported into the EU from countries outside the EU. It may be necessary to extend CBAM to downstream industries in order to shut these holes, but this would bring more complexity of administration and possible trade conflicts (ECB, 2023).

5.2 Data of the EU trade of CBAM sectors

To achieve its primary goal to reduce carbon leakage, CBAM acts as a trade measure. Because of that, a look at European trade trends with external partners is sought. Figure 8 illustrates the growth rate of European imports and exports from 2013-2023. The chart shows both a relatively stable trend and then an increase, especially in imports, in the years following the pandemic outbreak. After the Russian invasion of Ukraine, total EU imports dropped by 13% in 2023 following a strong 2022, which reflected both a COVID-19 recovery and price increases due to the energy crisis.

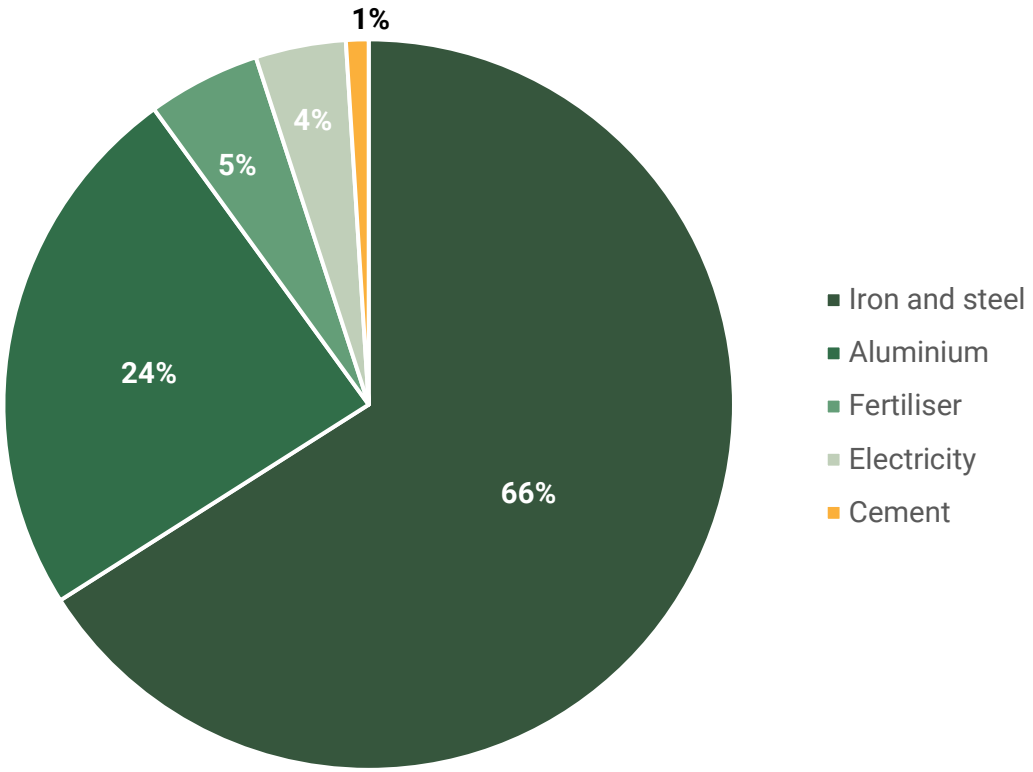
***Figure 8**: Extra-EU trade in goods, 2013-2023 (% year-on-year growth rate, based on trade value)*

Source: Eurostat (2024)

In addition, since February 2023, EU imports have fallen every month (Eurostat, 2024). However, we cannot establish any anticipatory effect of CBAM in influencing such a trend.

Regarding the CBAM-covered sectors, namely iron and steel, aluminium, fertilisers, cement, electricity and hydrogen, it is noteworthy that the first three sectors cover 95% of the EU imports of CBAM goods in relative value in 2023 (Figure 9). Overall, the iron and steel industry is the largest, most exposed sector to CBAM, accounting for 66% (€45 billion) of extra-EU imports in 2023 (Eurostat, 2024). More than half of the embedded emissions stem from CBAM goods in the iron and steel sector, with 134 Mt CO_2, whereas imported CBAM goods in 2023 emissions produced 258 Mt CO_2 (Narloch, 2024).

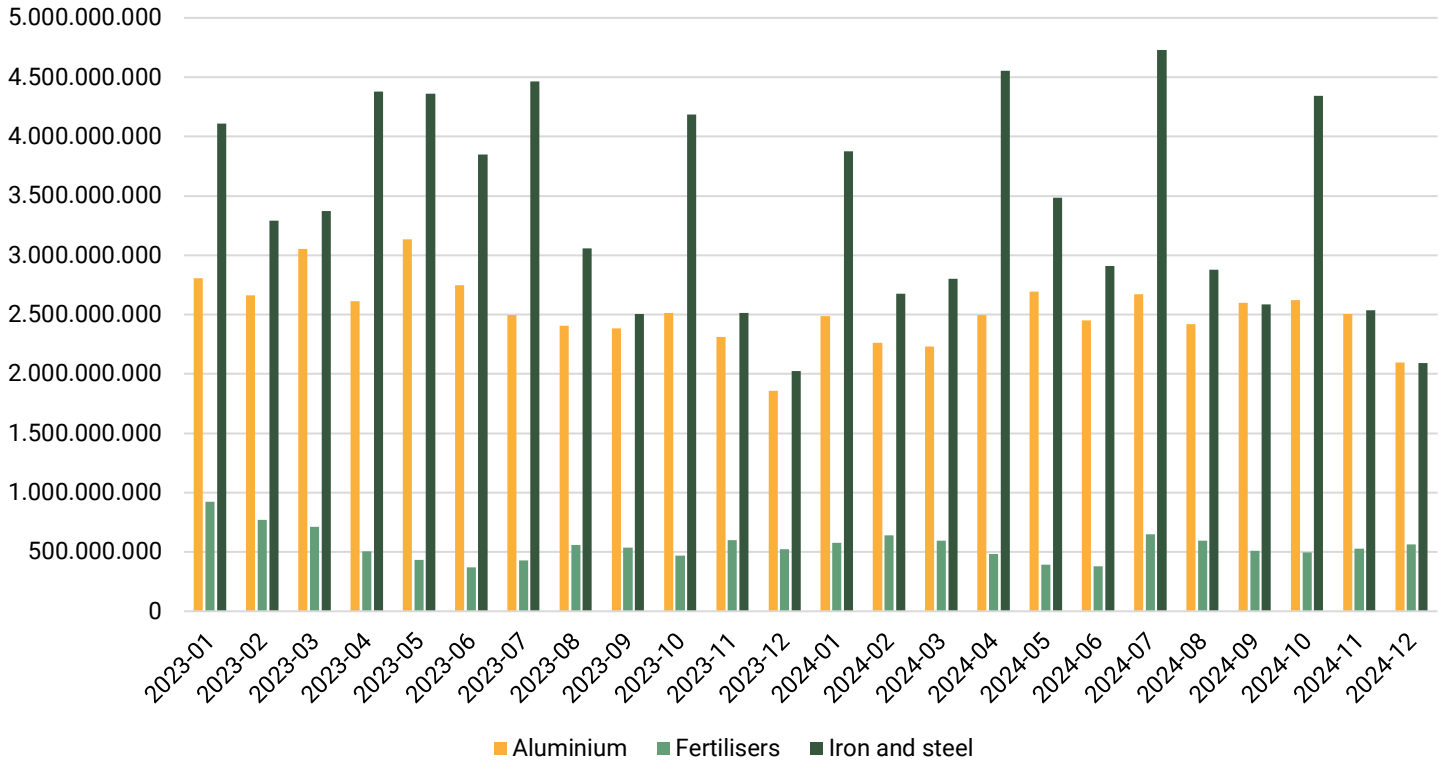
Figure 9: EU imports of CBAM goods in 2023, relative value (%)



Source: Authors based on data from Eurostat (2024)

Figure 10 shows the monthly import value in € of aluminium, fertilisers, and iron and steel into the EU for 2023 and 2024. Over both years, iron and steel always took the top place among the three sectors with noticeable fluctuations and peaks in the middle and at the end of the year. Some months have very high spikes, which might be due to seasonal or economic factors affecting trade volumes. Aluminium imports were the second biggest category, with fairly constant values over time. Iron and steel imports did not have severe fluctuations; they were within a normal range. Fertiliser imports were the smallest of the three categories and had fairly minor changes in values, which suggests more stable demand.

Figure 10: EU imports of CBAM products in € (2023-2024)



Source: Authors based on data from Eurostat (2024)

Also in this case, it is very difficult to identify if CBAM played a role in influencing the trends. Imports of CBAM goods (including cement and energy) indeed closed at a low of EUR 20bn in Q4 2023, when CBAM reporting started, compared to EUR 25bn in Q1 2023. Contextual factors like, again, the Russian invasion of Ukraine, could have impacted more since Ukraine was one of the major exporters of fertilisers to the EU. In addition, the fact that, in January 2024, the EU increased imports of iron and steel products from third countries by 19% compared to January 2023 could confirm a not relevant anticipatory CBAM effect on trade relationships.

Despite the EC impact assessment and current trade data not suggesting a significant impact of CBAM on the European economy, the exposure to the measure could be higher than expected, especially in importers of CBAM-covered sectors countries. The next section will then try to investigate this aspect.

5.3 Impact by countries

While CBAM is primarily designed to regulate imports outside the EU, some EU countries may face indirect impacts due to internal adjustments or cross-border supply chain effects. This is particularly true for those reliant on imports of non-EU countries of iron and steel, aluminium, and fertiliser.

Some examples based on Eurostat data (2024): in Poland, where 3.2 million tons of steel were imported in 2022 from non-EU countries, including Ukraine, the mechanism could make doing business more expensive for industries that depend on such steel. Germany, which imported 3.1 million tons of aluminium, 25% of which was from countries like China and Russia, may face higher costs, especially for its automotive industry accounting for about 5% of the country's GDP. CBAM could affect the Italian construction sector, which imported 4.3 million tons of steel, 20-25% from outside the EU, representing 5.3% of GDP. Spain, had to import 2.2 million tons of fertilisers from Morocco and Algeria in 2022.

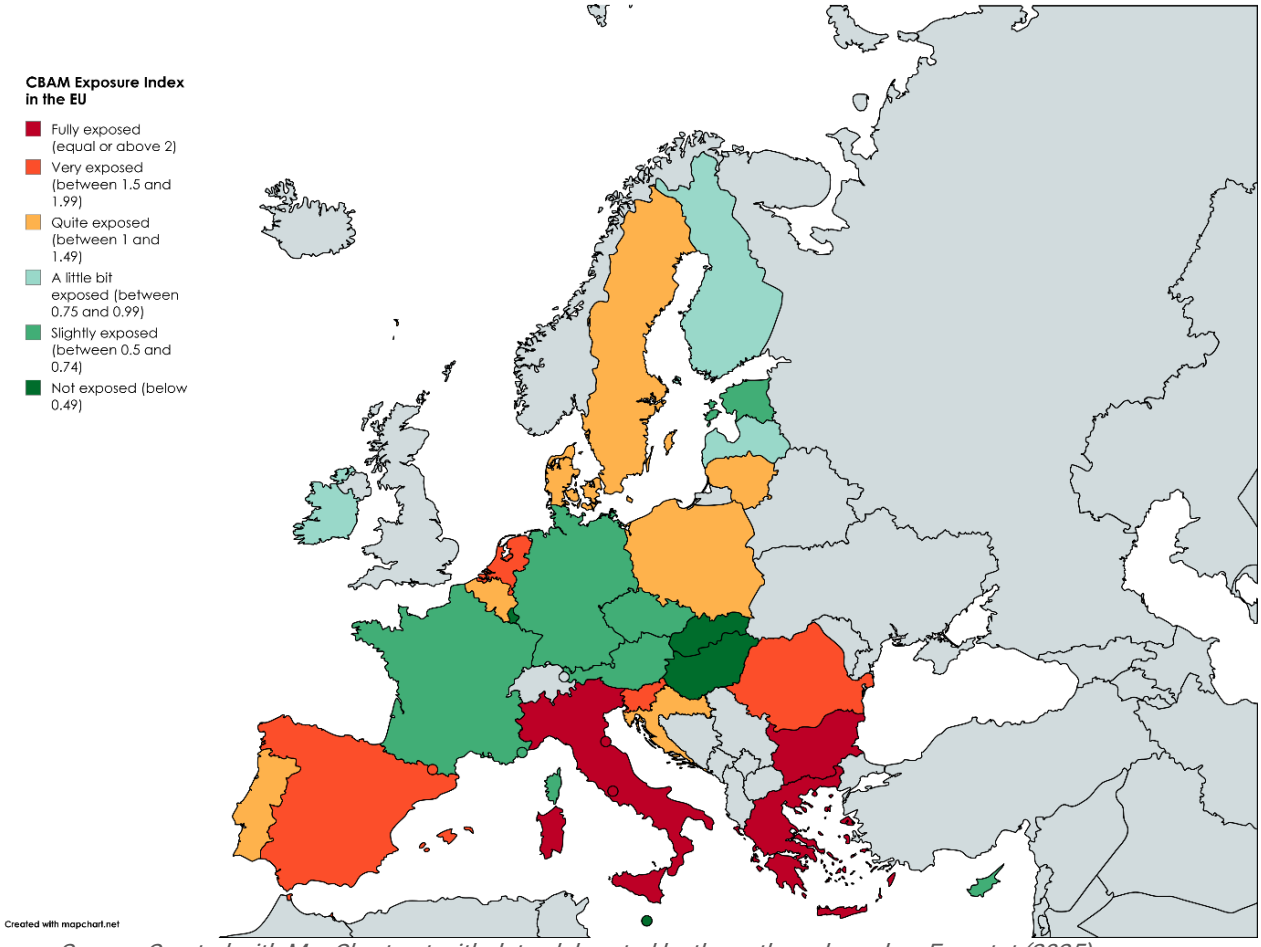
To quantitatively assess the CBAM exposure by country, the World Bank elaborated an Index for EU trading partners (World Bank, 2024). While the existing CBAM exposure index focuses on nations outside Europe, we propose to develop a simplified version of the index at the country level within the European Union (EU). Developing a **CBAM short-term Exposure Index** for European countries involves assessing how the EU's CBAM impacts each member state's economy. The variables considered are then the economy in terms of GDP (a controversial but useful metric when it comes to evaluating economic dimension at the country level) and the amount of imports, the reliance on CBAM goods from non-EU countries. We decided to neglect the pre-existence of carbon prices outside Europe as we assume that none of the major countries exporting to the EU today have carbon prices close to the EU ETS price.

The index will then be calculated in the following way:

CBAM short-term Exposure = CBAM Sector Imports (% of total imports) ×Total Imports (% of GDP) = CBAM Sector Imports (% of GDP)

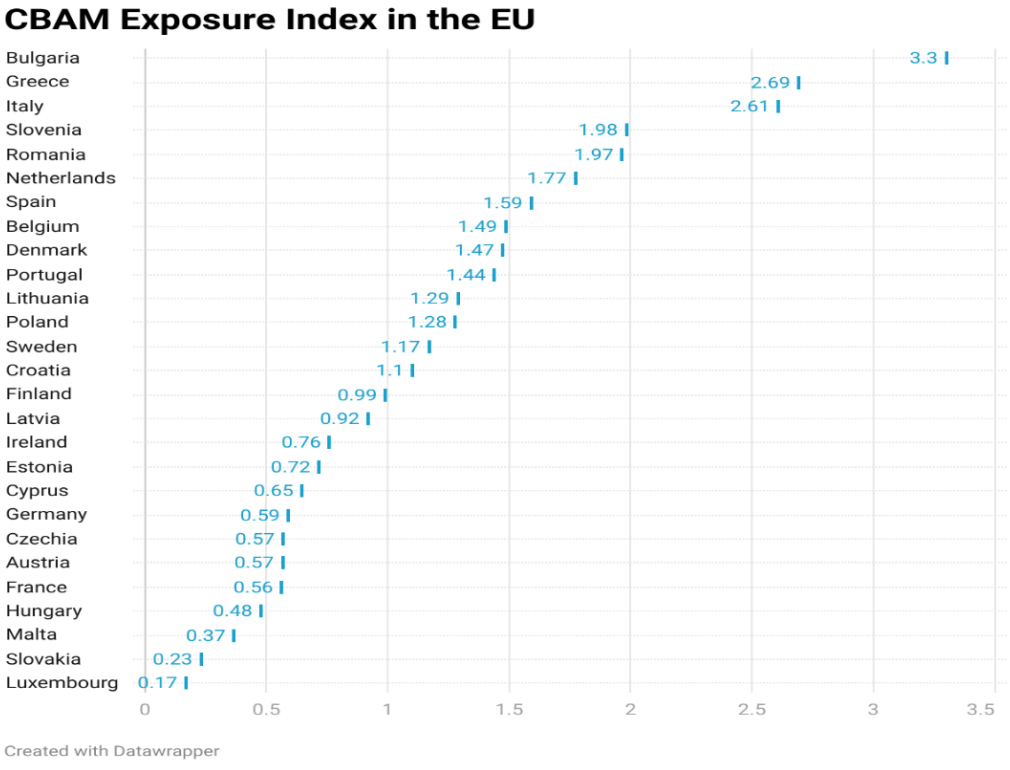
Figure 11 is the map of European countries coloured respectively. When red or orange, the Member State is likely to suffer more from implementing CBAM; when green or light green, the EU country is less exposed to the mechanism's direct effects. In the map, the Mediterranean and part of Eastern Europe are the ones most reliant on CBAM imports from outside EU countries. Not surprisingly, previous literature identified neighbourhood nations like Turkey, Ukraine, Serbia, Egypt, and Belarus as relevant actors in CBAM-covered exports to the EU (Erixon et al., 2023). Such countries, in turn, are most likely to interact more with their European Mediterranean and Eastern neighbours.

***Figure 11**: Short-term CBAM exposure index by European countries, map*



Source: Created with MapChart.net with data elaborated by the authors, based on Eurostat (2025)

***Figure 12**: Short-term CBAM exposure index by European countries, scores*



Source: Created with Datawrapper.de with data elaborated by the authors, based on Eurostat (2025)

Figure 12 makes explicit each country's score. The chart shows that Bulgaria has the highest CBAM exposure index, 3.3, followed by Greece, 2.69, and Italy, 2.61, which indicates a higher dependence on industries that will be impacted by CBAM, such as steel and aluminium. Countries such as Slovenia (1.98), Romania (1.97) and the Netherlands (1.77) are classified as countries with moderate exposure, which means that there are significant industrial sectors, but the countries may be well positioned to diversify or tap into cleaner energy sources. On the lower-exposure end of the spectrum are France (0.56), Hungary (0.48), and Malta (0.37), whose relatively low dependence on high-carbon industries or focus on renewables and low-emission manufacturing may explain their lower exposure. Luxembourg (0.17) is the least exposed country, whose economy may be more oriented towards services, finance, or low-emission industries rather than emissions-intensive industries.

Although the CBAM is not directly associated with the EU funding instruments such as the Just Transition Mechanism and Cohesion Funds, it is worth noting that there is a correlation between CBAM exposure and the list of countries standing to benefit from these funds. Three of the five countries most affected by CBAM are Bulgaria, Romania, and Greece, which also primarily benefit from Just Transition Mechanism (JTM) and Cohesion Funds due to their economic status and industrial dependence. These funds are mainly to support regions moving away from fossil fuels and reducing regional economic disparities, but in some cases, they may also be used to help alleviate some of the economic effects of CBAM.

However, some highly exposed countries like the Netherlands do not get a significant share of JTM or Cohesion Funds. This implies that although EU funding mechanisms may potentially help CBAM-affected areas, they are not designed for this specific purpose.

Therefore, policymakers may want to consider whether there is a need for other, more directed actions to support regions with high CBAM exposure and economic difficulties in the course of the transition to a low-carbon economy and to avoid a deepening of regional inequalities within the EU.

Overall, the impact of CBAM is anticipated to differ across various geographic regions (Perdana & Vielle, 2025). Nations and sectors unable to identify more affordable alternatives to imported goods may experience increased adjustment costs, thereby diminishing their competitiveness compared with countries that are more adequately prepared (Zhao & Lin, 2025).

6. Policy implications

6.1 Proposed revision of the measure

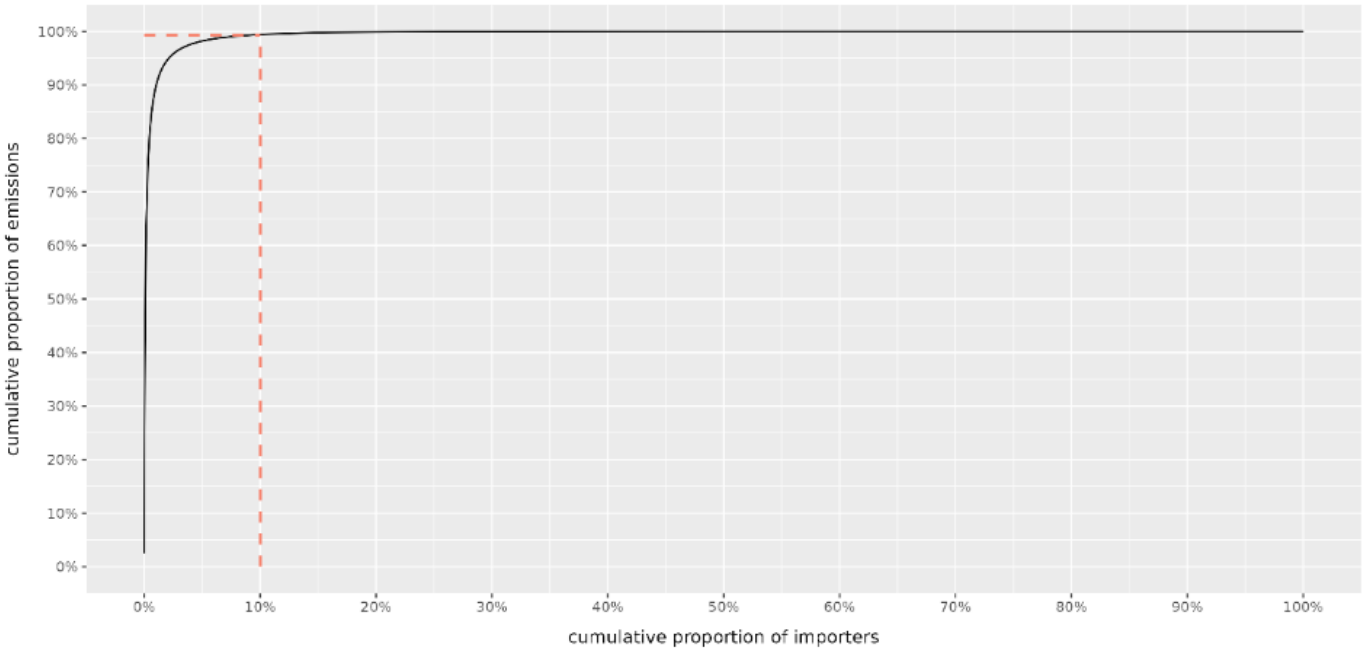
In January 2025, the European Commission outlined in its Competitiveness Compass a vision to make the EU's economy more prosperous and competitive, building on the recommendations of the Draghi report. In this prospect, the Clean Industrial Deal - A Joint Roadmap for Competitiveness and Decarbonisation (COM(2025) 85 final) was presented on 26 February 2025. The Clean Industrial Deal (CID) included, among others, a proposal to simplify and strengthen the CBAM as part of the first Omnibus packages of simplification measures.

This proposal for Regulation COM(2025) 87 on CBAM (European Commission, 2025b) would exempt small importers from obligations, simplify the obligations for those regulated by the policy and increase the anti-abuse mechanisms.

Exemptions for small importers and scope limitation

The revised CBAM framework introduces an exemption for small importers, mainly small importers and individuals, handling less than 50 tonnes of CBAM goods annually per importer. According to the European Commission, this would spare approximately 180,000 businesses from reporting obligations while still covering 99% of emissions (Figure 13).

***Figure 13**: Distribution of importers and distribution of emissions*



European Commission (2025c)

The emission scope will also be reduced in other ways. Emissions calculations for steel and aluminium would be adjusted to exclude production steps not covered by the EU ETS, limiting reporting to precursor materials. Non-calcined clay would be removed from CBAM's scope as it is linked to ceramics production, a sector not covered by the regulation. Similarly, the regulation will not cover indirect emissions from the electricity sector.

CBAM simplification for importers and national authorities

Furthermore, the EU proposes an extended usability of default values to simplify the mechanisms. European Commission will publish default carbon emissions based on the ten most carbon-intensive countries with reliable data. Furthermore, the EU will rely on default carbon prices for third parties, allowing importers to use these or submit verified actual data.

In addition, several procedural and reporting simplifications would be introduced to ease importers' and public authorities' compliance within CBAM's scope. The authorisation process for CBAM declarants should be streamlined by removing mandatory consultation from national authorities. Emissions verification would then apply only to actual values, without the need to verify default values. Declarants can also delegate the declaration to third parties established in EU Member States.

The timelines for declaration and compliance would also be delayed. The annual deadline for CBAM declarations should be extended from May to August, with a repurchase option available until 30 September. The deadline for handing over allowances should be shifted to October. CBAM certificate sales would start only in February 2027 (and not already in 2026), with 2026 certificates priced based on the quarterly average of EU ETS allowances at the time of import.

Anti-abuse and safeguard

The European Commission will strengthen CBAM oversight to prevent circumvention. Importers must be authorised before bringing CBAM-covered goods into the EU. A risk-based auditing system and random audits will be implemented to prevent misdeclaration, backed by financial penalties. A CBAM risk management network will coordinate efforts among national and EU authorities to identify and address circumvention practices. Information sharing between customs and competent authorities will also help track fraudulent activities, and non-reliable operators will be closely monitored.

This proposal is still to be discussed and approved by the co-legislators, namely the European Parliament and Council. In parallel, a full review of CBAM is still foreseen later in 2025 to assess its potential extension to other ETS sectors, downstream goods, and indirect emissions. In this context, the Commission will also examine how to help exporters of CBAM products at risk of carbon leakage. A legislative proposal will follow this review in early 2026.

6.2 Policy implications

The newly established Von der Leyen II Commission has made strengthening the continent's competitiveness one of its priorities for the coming five years. This new policy direction, detailed by the Clean Industrial Deal presented on 26 February 2025, is intended to complement the climate policies implemented in previous years within the framework of the European Green Deal (EC, 2025). Nevertheless, the complementarity of the two deals is not necessarily straightforward, in light of the difficulty of aligning the narratives of ambitious climate targets and European competitiveness. The CBAM, in this sense, is a paradigmatic example: the mechanism should make funds available to member countries from revenues, the use of which is much debated. As the CBAM is a climate policy measure to limit carbon leakage, the revenues from it should be used for the implementation of green measures, as well as for the mitigation of socio-economic costs of the transition.

The main concern is with the European Commission's proposal to use 75% of the revenues from the sale of CBAM certificates for the EU budget (Mair, 2025). The European Commission has calculated that annual CBAM revenues will be about €1.5 billion from 2028 onwards. Nevertheless, the use of these funds is not clear. Some experts think that reinvestment of CBAM revenue into European industries may be against the WTO rules, which prohibit trade measures that are protective in nature. Subsidising domestic industries in this manner may give EU companies an unfair competitive advantage. Therefore, CBAM revenues must be spent in a way that is consistent with the WTO, for example, on climate and sustainability objectives. One possible strategy is to direct CBAM revenues into European climate policies and strategies and make them available for green expenditures. This would guarantee that the funds will be used for environmental purposes while simultaneously satisfying the requirements of the international trade rules. The mechanism can also further support the EU's wider climate objectives by dedicating these revenues to renewable energy, carbon reduction, and climate resilience projects within the EU while avoiding protectionist concerns.

An alternative policy suggestion, which is backed by environmental organisations, trade experts, and some representatives of the EU[2] to meet the CBDR-RC principle, suggests that CBAM revenues should be used to finance climate change adaptation and mitigation in developing countries. These nations are likely to suffer from the economic consequences of CBAM because several of them depend heavily on carbon-intensive exports to the EU. A recycling scheme to redistribute CBAM revenues outside the EU to get more countries on board, conditional on clean investments, would be beneficial (Perdana & Vielle, 2022). Investment in green infrastructure, renewable energy, and technology transfer may not only help alleviate the economic impact of CBAM on these countries but also strengthen the EU's leadership in global climate action. This approach may also lower the opposition from the trading partners and increase the chances of an international consensus on carbon pricing.

Although this perspective ensures compliance with the WTO and CBDR-RC principles, as well as ambitious climate targets in limiting carbon leakage and incentivising other jurisdictions to adopt carbon markets, there remains the issue of the economic and social impacts of the measure at the European level. Both the European Commission's CBAM assessment and subsequent studies, and our analysis of trade and country exposure to the measure, seem to suggest that the mechanism is likely to have little impact on the economic and social EU dimensions, while the idea that it is likely to contribute to improving the environmental dimension remains valid. Of course, there are regional vulnerabilities to consider, with Mediterranean and some Eastern European countries more exposed to the negative consequences of the mechanism. Nevertheless, most exposed countries also

[2] https://ercst.org/declaration-calling-on-the-eu-to-direct-revenues-from-the-cbam-towards-international-climate-finance/

receive Just Transition Funds and Cohesion Funds. When this is not the case, it is possible to mitigate the impacts with further territorial measures.

The recently proposed revision presents some critical issues. The most important one is that the proposed amendment of the CBAM legislation in February 2025, i.e. shortly before the evaluation foreseen at the end of the transitional period in 2025 and the first review foreseen at the beginning of 2026. Indeed, frequent shifts in policy objectives may lead to legal uncertainties for businesses and investors that may jeopardise the effectiveness of the CBAM framework. To maintain the credibility of the policy reforms, major amendments should not be made before the next round of scheduled reforms unless they are widely consensual measures. The synchronisation of the two legislative processes would increase regulatory effectiveness and stability.

The 50-tonne threshold for CBAM obligations to simplify and lessen compliance costs for small importers is a reasonable compromise between administrative convenience and the mechanism's scope. However, it represents also a risk of strategic market behaviour, as importers may attempt to circumvent CBAM obligations by splitting their consignments between different companies or countries. This could create loopholes that undermine the system's efficiency. Consequently, it is essential to maintain strict oversight and enforcement measures. The EU institutions, customs authorities, and trade observers must ensure that adequate controls are in place to prevent any circumvention and to ensure that CBAM effectively reduces emissions in the global market.

The stability of the regulations is crucial to investors' confidence and avoiding negative effects on competition. Also, there will be a need to enhance the enforcement measures to close any ambiguities that may be available and to sustain the mechanism.

7. Conclusions

In conclusion, although the European Union has achieved much in its endeavour to curb CO_2 emissions, there are still some concerns regarding the current carbon footprint of the region and the issue of carbon leakage. Implementation of the EU ETS has been a significant step towards emission reduction within the EU, but this has not captured other emission sources outside the EU especially as companies shift their operations to other countries to avoid stringent emissions requirements. In response, the EU's proposed CBAM is an attempt to create a level field by imposing carbon taxes on imported products based on the carbon dioxide emissions incurred in production, in line with the EU ETS price.

The CBAM is expected to start in 2026 and seems to be a proper way to solve the carbon leakage problem, which would indirectly benefit the European competition and encourage non-EU countries to set up their own carbon pricing mechanisms. Moreover, the fact that it is compatible with the WTO rules makes it a significant step in combining trade policy with climate change objectives.

Although the idea is still rather optimistic, there are several issues that may become controversial, especially from the justice perspective and the effects that such measures may have on the vulnerable economies. The mechanism has been criticised for being likely to be inconsistent with the CBDR-RC, which holds that countries have different capabilities to address climate change. Developing nations that may not have the technology or infrastructure to switch to low-carbon technologies could be negatively affected by the carbon taxes and bring about social and economic consequences. Furthermore, applying the CBAM to imports from such countries may worsen global injustice, particularly in poor regions that are also experiencing economic and environmental challenges.

At the European level, the 2021 European Commission's impact assessment did not reveal any major problems, but there are possible negative effects for the Member States of the Mediterranean and Eastern Europe. These countries that depend more on carbon-intensive imports may be faced with higher trade barriers and more economic challenges with the implementation of the CBAM. This is because these regions will need targeted support measures to enable them to shift to green technologies and practices alongside the existing Just Transition Fund and Cohesion Fund.

The revisions proposed by the European Commission in February 2025 to the regulations addresses the concerns of European companies most affected by the CBAM show the challenges of climate and economic policies. These revisions can be viewed as a concession to industry pressure, and they spark questions about whether the EU is watering down its original climate targets. Also, the new world order that may emerge from the election of Donald Trump as the President of the United States and the possibility of his embracing protectionist policies threaten the sustainability of the CBAM. For this reason, the EU needs to strengthen the CBAM and make it clear that it is a climate policy and not a competitive or protectionist policy. The mechanism should be presented as an aspect of the member states' fight against climate change and not as a trade war or protectionism instrument. Therefore, the revenues that will be generated from the CBAM can greatly help in strengthening global climate actions.

The EU should be able to direct these funds towards climate policies both within the EU and in other countries to make the CBAM a positive force for the environment and climate justice. The funds could be used to support the development of clean technologies, build climate change adaptation, and promote low-carbon development to ensure that the effects of the mechanism are agreed upon and beneficial to all.

The CBAM and its implications for global environmental justice and equity will be analysed in the next SPES project working paper 7.3, with particular attention to how it may affect vulnerable countries outside Europe.

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Appendix

ANNEX

Sectors and subsectors which, pursuant to Article 10b of Directive 2003/87/EC, are deemed to be at risk of carbon leakage

1. **Based on the criteria set out in Article 10b(1) of Directive 2003/87/EC**

NACE Code	Description
0510	Mining of hard coal
0610	Extraction of crude petroleum
0710	Mining of iron ores
0729	Mining of other non-ferrous metal ores
0891	Mining of chemical and fertiliser minerals
0899	Other mining and quarrying n.e.c.
1041	Manufacture of oils and fats
1062	Manufacture of starches and starch products
1081	Manufacture of sugar
1106	Manufacture of malt
1310	Preparation and spinning of textile fibres
1395	Manufacture of non-wovens and articles made from non-wovens, except apparel
1411	Manufacture of leather clothes
1621	Manufacture of veneer sheets and wood-based panels
1711	Manufacture of pulp
1712	Manufacture of paper and paperboard
1910	Manufacture of coke oven products
1920	Manufacture of refined petroleum products
2011	Manufacture of industrial gases
2012	Manufacture of dyes and pigments
2013	Manufacture of other inorganic basic chemicals
2014	Manufacture of other organic basic chemicals
2015	Manufacture of fertilisers and nitrogen compounds
2016	Manufacture of plastics in primary forms
2017	Manufacture of synthetic rubber in primary forms
2060	Manufacture of man-made fibres
2311	Manufacture of flat glass
2313	Manufacture of hollow glass

NACE Code	Description
2314	Manufacture of glass fibres
2319	Manufacture and processing of other glass, including technical glassware
2320	Manufacture of refractory products
2331	Manufacture of ceramic tiles and flags
2351	Manufacture of cement
2352	Manufacture of lime and plaster
2399	Manufacture of other non-metallic mineral products n.e.c.
2410	Manufacture of basic iron and steel and of ferro-alloys
2420	Manufacture of tubes, pipes, hollow profiles and related fittings, of steel
2431	Cold drawing of bars
2442	Aluminium production
2443	Lead, zinc and tin production
2444	Copper production
2445	Other non-ferrous metal production
2446	Processing of nuclear fuel
2451	Casting of iron

2. **Based on the criteria set out in Article 10b(2) of Directive 2003/87/EC**

NACE Code	Description
0893	Extraction of salt
1330	Finishing of textiles
2110	Manufacture of basic pharmaceutical products
2341	Manufacture of ceramic household and ornamental articles
2342	Manufacture of ceramic sanitary fixtures

3. **Based on the criteria set out in Article 10b(3), first subparagraph of Directive 2003/87/EC**

NACE Code	Description
2332	Manufacture of bricks, tiles and construction products, in baked clay

4. **Based on the criteria set out in Article 10b(3), fifth subparagraph of Directive 2003/87/EC**

Prodcom Code	Description
081221	Kaolin and other kaolinic clays
10311130	Frozen potatoes, prepared or preserved (including potatoes cooked or partly cooked in oil and then frozen; excluding by vinegar or acetic acid)

Prodcom Code	Description
10311300	Dried potatoes in the form of flour, meal, flakes, granules and pellets
10391725	Concentrated tomato puree and paste
105121	Skimmed milk powder
105122	Whole milk powder
105153	Casein
105154	Lactose and lactose syrup
10515530	Whey and modified whey in powder, granules or other solid forms, whether or not concentrated or containing added sweetening matter
10891334	Bakers' yeast
20302150	Vitrifiable enamels and glazes, engobes (slips) and similar preparations for ceramics, enamelling or glass
20302170	Liquid lustres and similar preparations; glass frit and other glass in powder; granules or flakes
25501134	Open die forged ferrous parts for transmission shafts, camshafts, crankshafts and cranks etc.

1.

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