

Neuhoff, Karsten et al.

## Research Report

# Industrial decarbonisation in a fragmented world: an effective carbon price with a "climate contribution"

Policy insight

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# Industrial decarbonisation in a fragmented world: an effective carbon price with a 'climate contribution'

Policy insight

January 2025



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# Summary

## Context and problem

- The European Union's Carbon Border Adjustment Mechanism (CBAM) was introduced to prevent carbon leakage, and to incentivise global carbon pricing. The UK is set to introduce a CBAM in 2027 for the same reasons. However, this policy measure will face limitations in a fragmented geopolitical environment if progress on global carbon pricing remains slow.
- The reliance on international progress in carbon pricing exposes European climate and industrial policies to external risks, threatening investment certainty and decarbonisation goals.
- The current transition period for the EU's CBAM, in which free allocation of emissions allowances is in place until 2034, creates funding and incentive gaps for green industrial investments.

## Proposal for a climate contribution

- A straightforward charge in the form of a 'climate contribution' would complement emissions trading and the CBAMs. It would be non-discriminatory, as it would be levied on domestically produced and imported carbon-intensive basic materials like steel, cement and plastic, and be based on standardised values equal to the value of free allowance allocation to conventional production.
- Unlike a CBAM, the climate contribution would be product-based, thus a relief for exports would be possible, in line with World Trade Organization (WTO) rules. The standardised value avoids resource shuffling and allows consistent application along the value chain.
- The climate contribution could help fill the funding gap left by free allocation, ensuring stable revenues to finance, for example, Carbon Contracts for Difference (CCfDs), which are critical for green industrial investments.
- It offers the flexibility to extend free allocation if progress in advancing global carbon pricing proves slow, without compromising climate and industrial objectives.
- We recommend introducing the climate contribution as a bridging instrument to complement emissions trading and ensure investment stability and incentives for green industry during the CBAM transition period.
- In summary, the climate contribution provides a practical, WTO-compliant solution to address carbon leakage risk, ensure investment stability, and support industrial decarbonisation in the face of global policy fragmentation.

# 1. Introduction

Global efforts to combat climate change are entering a critical phase, yet the international landscape is becoming increasingly fragmented. The election of Donald Trump to United States president and the rise of protectionist policies signal a shift away from multilateral cooperation towards a more divided global order. This fragmentation poses significant challenges for Europe, due to its focus on carbon pricing as a central pillar for the investment strategy moving industry towards climate neutrality (or 'net zero'). In particular, the European Union's Carbon Border Adjustment Mechanism (CBAM) may not suffice to provide a level playing field if other countries do not pursue comparable carbon pricing strategies.

Europe's climate policymakers must prepare options to ensure the resilience of its industrial strategy in this changing global context. This short report proposes and details the 'climate contribution' approach, which has been attracting interest among stakeholders in industry, non-governmental organisations, government and political parties. The report has been authored by a group of academics from institutions across Europe that have been working on these issues over the last few years.

## 2. CBAMs in an increasingly fragmented world

### How does global fragmentation change the role of the EU's CBAM?

The European Green Deal defined a pathway for the EU to achieve climate neutrality by 2050. A key element of this strategy is the phased transition from free allocation of EU Emissions Trading System (ETS) allowances for industry to full auctioning by 2034. This shift is intended to strengthen the effectiveness of the carbon price in driving green investments while generating revenue to support climate action.

The EU's CBAM was introduced as a safeguard to prevent carbon leakage during this transition, and the UK is set to launch its own CBAM in 2027. The underlying assumption was that other major economies would follow Europe's lead by adopting comparable carbon pricing mechanisms, thereby reducing global carbon price disparities. However, few anticipated a scenario where protectionism would take precedence over collective climate action. The new US administration's aversion to multilateralism underscores this risk and raises urgent questions about whether CBAMs as a policy will be adequate in a world of persistently divergent carbon prices.

### Addressing carbon leakage: can the EU CBAM provide adequate protection?

When ETS carbon prices are higher than those in other regions, it can cause the risk of carbon leakage. Carbon leakage occurs when production and emissions shift to countries with laxer climate policies, undermining both EU climate targets and global emissions reductions (Grubb et al., 2022). Leakage also impedes the 'carbon cost pass-through' process, in which carbon costs are reflected in product prices throughout the value chain. Effective carbon pass-through is crucial for funding the incremental costs of climate-neutral production, and for incentivising circularity, material efficiency and substitution with greener products.

Carbon border adjustments seek to address the risk of carbon leakage by levelling the playing field between domestic producers subject to an ETS and foreign producers from countries with lower or no carbon pricing. For that purpose, imported goods are charged for differences in carbon costs incurred due to carbon price differences (or requiring the surrendering of ETS allowances), according to the specific emissions in their production. Carbon border adjustments build on the experience with border tax adjustments for indirect taxes like VAT, which have long been established in international trade. As well as charging imported products with a tax equivalent to that charged on domestic products in the importing country, such tax mechanisms may also relieve exported products of the domestic tax charged (OECD, 1968; WTO, 1970). Therefore, in principle, carbon border adjustments could also involve rebates for exports on carbon costs incurred during production, to address carbon price differences in international markets.

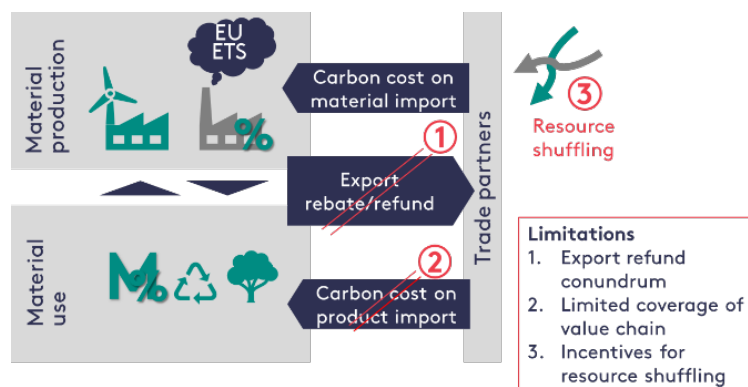
However, there are severe doubts about the compatibility of such export rebates with World Trade Organization (WTO) rules. Unlike adjustments for VAT or other indirect taxes for product-related charges, carbon border adjustments target the carbon costs embedded in production processes, making the policy inherently production process-specific (Espa et al., 2022). Expanding the scope to account for input-related carbon costs could set a precedent for adjustments on a wide range of other input taxes, raising concerns about the broader implications for international trade rules.

### 3. CBAMs: objectives, coverage and limitations

In 2023, the EU formally adopted legislation introducing a CBAM to strengthen its climate policy framework. The CBAM was introduced to encourage third countries to implement carbon pricing and to bridge the remaining international carbon price disparities to reduce the risk of carbon leakage. However, due to concerns over WTO compliance, the EU CBAM does not provide refunds for carbon costs on exports. The UK CBAM will be similar to the EU CBAM but with differences in terms of timescale and scope.

In its initial phase, the EU CBAM covers a limited range of emissions-intensive products: iron and steel, cement, aluminium, fertilizers, electricity and hydrogen. Future expansions including plastics and other basic materials are under consideration. The focus on basic materials reflects their disproportionate role in industrial emissions, accounting for over 70% of industrial emissions globally and around 25% of total global emissions (IEA, 2017). However, basic material production contributes only 1–2% to the EU's overall GDP, which means these producers cannot shoulder the cost of carbon pricing or decarbonisation without passing those costs along the value chain to the wider economy.

Figure 3.1. The CBAM's coverage across emissions in production and usage, and in imports and exports, plus its limitations



#### Limitations

The debate surrounding the CBAM's implementation has revealed three significant limitations that may undermine its effectiveness in preventing carbon leakage across material production and use.

##### 1. The export refund conundrum

One of the most contentious issues is the lack of export rebates for carbon costs. If other regions will not implement comparable carbon pricing, European exports will be exposed to international competition from these regions (Marcu et al., 2024). A quantitative analysis by Stede et al. (2021) suggests that at a carbon price of around €75 per tonne of CO<sub>2</sub>, nearly 23% of European manufacturing exports could be classified as being at risk of carbon leakage. However, offering rebates presents a legal and practical dilemma:

- Refunds could violate WTO rules, raising doubts about their compatibility with international trade law.
- Refunds may weaken the incentive to decarbonise production for export markets, reducing the overall effectiveness of emissions trading.
- Refunds fail to address the incremental costs associated with operating cleaner production facilities, thereby limiting the long-term decarbonisation potential of industries reliant on export markets.

This conundrum leaves policymakers with few viable options for safeguarding export competitiveness without compromising the climate goals of the ETS.



## 2. Limited coverage of value chain

The combination of a rising ETS carbon price and the CBAM increases production costs for downstream manufacturing industries within Europe. Since the CBAM currently applies only to imports of basic material products – and not to semi-finished or finished goods – European manufacturers face higher input costs if other countries will not implement comparable carbon pricing. This imbalance poses two risks:

- European manufacturers may lose market share both in domestic markets and in export markets, due to their higher production costs (Bellora and Fontagné, 2023).
- The lack of coverage for downstream products reduces carbon cost pass-through along the value chain, weakening incentives for material efficiency and substitution in manufacturing and construction.

This incomplete coverage creates a structural disadvantage for European manufacturers, potentially slowing down the transition to low-carbon industrial production.

## 3. Incentives for resource shuffling

CBAMs can also create perverse incentives for resource shuffling – a practice where foreign companies reallocate their production in response to carbon pricing mechanisms. In this scenario, foreign producers may choose to send their least carbon-intensive products to Europe while using more CO<sub>2</sub>-intensive processes to supply their domestic markets or other export destinations (CRU Consulting, 2021).

Resource shuffling can cause:

- An increase in the competitiveness of imports relative to domestic production.
- Carbon leakage if, as a result, third countries increase their net exports and to do so, increase overall production. They would use spare capacity, which is typically available within the less efficient and thus most carbon-intensive plants. While this additional carbon-intensive production would not be directly dedicated to European exports, it would still be caused by these exports.
- Higher overall emissions if third countries increase production from their most carbon-intensive plants to meet growing demand in other markets.

This unintended consequence not only undermines the goal of reducing global emissions but also distorts the competitiveness of European producers relative to foreign suppliers.

## Challenges in addressing CBAM limitations

These three obstacles to effective industrial decarbonisation will thus remain if other countries do not implement comparable carbon prices (Böhringer et al., 2022), even with the CBAM in place. Recognising these shortcomings, European policymakers have explored throughout the legislative process various options to improve the CBAM's design. However, each proposed solution comes with significant trade-offs:

- **Extending the CBAM to downstream products:** while this could improve carbon cost pass-through along the value chain, it would significantly increase administrative complexity and invite stronger international resistance, particularly from trading partners who may view it as a non-tariff barrier.
- **Reintroducing free allocation for exports:** this approach aims to avoid cost disadvantages in export markets but risks undermining the very purpose of emissions trading by diluting carbon price signals (Marcu et al., 2022). It comes with administrative and legal complexity that would further increase if an extended value chain were to be covered.

- **Using standardised carbon values to limit resource shuffling:** setting default values for carbon intensity could reduce incentives for resource shuffling, but it would raise further concerns about WTO compliance and the accuracy of emissions reporting.<sup>1</sup>

Despite extensive discussion, no clear solution has emerged that offers adequate protection against carbon leakage in the event that large carbon price differences persist.

### **A difficult choice for policymakers**

In this context, European policymakers may soon face an uncomfortable dilemma:

- **Accept incomplete carbon leakage protection with the current CBAM design,** risking loss of competitiveness and production shifting outside the region; or
- **Delay the transition from free allocation to auctioning and the CBAM,** which would weaken the carbon price signal, reduce ETS revenues,<sup>2</sup> and hinder the investment framework necessary for modernising EU industry.<sup>3</sup>

This policy challenge is not unique to the EU. Other jurisdictions that are considering the implementation of effective carbon pricing mechanisms for industry, including the UK and Australia, are likely to encounter similar trade-offs (DCCEEW, 2024). Balancing climate ambition with competitiveness concerns will require innovative policy solutions that go beyond traditional carbon pricing tools.

Ultimately, the EU must ensure that its carbon leakage measures are resilient to a fragmented global climate policy landscape while preserving the economic foundations needed to modernise industry with new technologies and practices that achieve climate neutrality. If large carbon price differences persist globally, the EU's success in leading the industrial transition to carbon neutrality will depend on its ability to navigate these complex trade-offs effectively.

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<sup>1</sup> A CBAM at standardised value imposed on imports would discriminate against an importer from a carbon-efficient technology in a third country if the standardised value exceeded the emission intensity of this producer. The importer would be liable for higher carbon costs than a domestic low-carbon producer.

<sup>2</sup> In principle, investments in clean processes are also possible if they obtain the same level of free allocation as conventional producers and can then sell these (Venmans, 2016). In practice, the declining emissions cap will limit the availability of free allowances or other resources governments might use to fund incremental costs.

<sup>3</sup> The Draghi report (European Commission, 2024) recommends postponing free allocation phase-out if the system turns out to be ineffective (see p. 103-104 and 110-111).

## 4. Policy recommendations for a climate contribution

### **Complementing the CBAM with a climate contribution: a pragmatic approach for a fragmented world**

As the limitations of the current CBAM become more apparent, it is time to reconsider an alternative instrument previously explored during the EU CBAM impact assessment: the 'climate contribution'.

The climate contribution would be a straightforward charge on carbon-intensive basic materials, such as steel, cement and plastic (Neuhoff et al., 2022). Unlike the CBAM, which uses production-specific emissions values to calculate carbon costs for imports, the climate contribution would apply a standardised carbon charge on both domestically produced and imported materials. This design would simplify administration (Ismer et al., 2016) for both public authorities and businesses, while allowing the charge to be applied further along the value chain. Importantly, by using standardised values, the climate contribution would avoid the risk of resource shuffling.

Because the climate contribution would be levied on the product itself based on a standardised value, rather than differentiated by the location of the emissions specific to a given production process, it would be classified as an excise charge. As a result, both coverage of imports and relief for exports would be in line with WTO rules (Ismer et al., 2020).

### **Why has a climate contribution not yet been pursued and why is it appropriate now?**

The climate contribution underwent a comprehensive assessment as part of a support study for the Directorate-General for Taxation and Customs Union (DG TAXUD). It was positively evaluated on almost all dimensions including leakage prevention and emission reductions.<sup>4</sup> In comparison, the CBAM performs well with respect to encouraging international climate action. The climate contribution was ultimately set aside because the use of standardised values would not create direct incentives for carbon pricing and climate-neutral production in third countries.

However, recent developments, including the fragmentation of global climate policy and growing protectionism, have exposed the shortcomings of the CBAM as a standalone solution. In this context, the climate contribution deserves renewed consideration, at least for its possibility as a bridging instrument to strengthen Europe's climate policy and avoid competitive disadvantages in a fragmented global market. Introducing a climate contribution would not create strong international climate action incentives like the CBAM, but the combined package could contribute to global momentum on the transition to climate-neutral industrial production and create resources to support investments in climate-neutral production in developing countries.

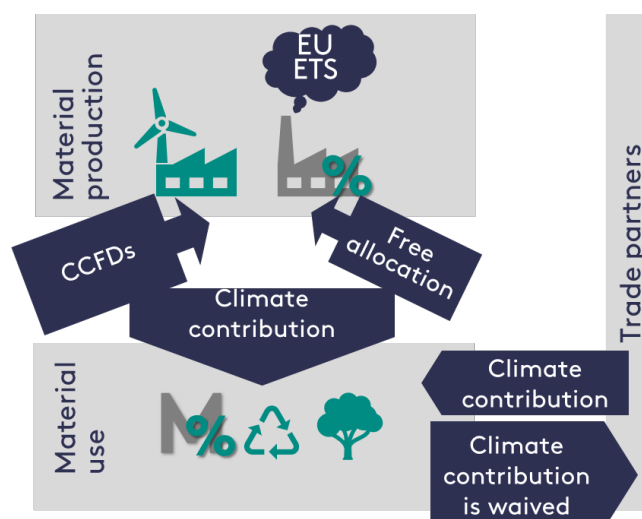
### **How would the climate contribution interact with existing instruments?**

The climate contribution would complement, rather than replace, the existing European climate policy framework, particularly the EU and UK Emissions Trading Systems (ETS), free allocation of allowances, and Carbon Contracts for Difference (CCfDs) (see Figure 4.1).

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<sup>4</sup> According to the CBAM Support Study for DG TAXUD (EU Commission, 2021), a package including climate contribution performs best in supporting greenhouse gas reductions in EU (Table 3.2), avoiding carbon leakage risks (Table 3.4), and moderately well with respect to international climate action (Table 3.5) and is only outperformed with respect to practical feasibility by a CBAM on imports at standardised value (Table 3.6; option was however not pursued also due to WTO concerns) and delivers the highest revenue (Table 3.7). For the subsequent impact assessment, the EU Commission assumed that free allocation and a climate contribution would not be retained at the level of best available conventional technology but would decline with increasing shares of recycling and clean production. The model results with this specification show carbon leakage and insufficient incentives for mitigation.

Figure 4.1. Combining a climate contribution with free allocation and Carbon Contracts for Difference



### 1. Interaction with ETS and free allocation

Emissions trading remains the primary instrument for incentivising carbon efficiency in material production. It also ensures compliance with the overall emissions cap by driving carbon prices. Currently, free allocation of allowances is used as a transitional measure to prevent carbon leakage for industries at risk of experiencing this phenomenon. However, as the CBAM is phased in, free allocation will gradually decline, provided that global carbon price disparities narrow and the CBAM effectively mitigates carbon leakage risks.

One improvement from recent ETS reforms is the requirement for companies receiving free allocation to develop and implement credible climate neutrality transition plans. Companies that fail to deliver such plans will see their free allocation reduced (European Union, 2023). Strengthening this link between free allocation and decarbonisation commitments is essential to ensuring that producers of basic materials transition to climate-neutral technologies (Algers and Åhman, 2024).

### 2. Interaction with Carbon Contracts for Difference

Several EU Member States and the UK are introducing CCfDs to support investments in climate-neutral production processes (Richstein and Neuhoﬀ, 2022). These contracts provide financial stability for investors by covering the additional costs associated with low-carbon technologies.

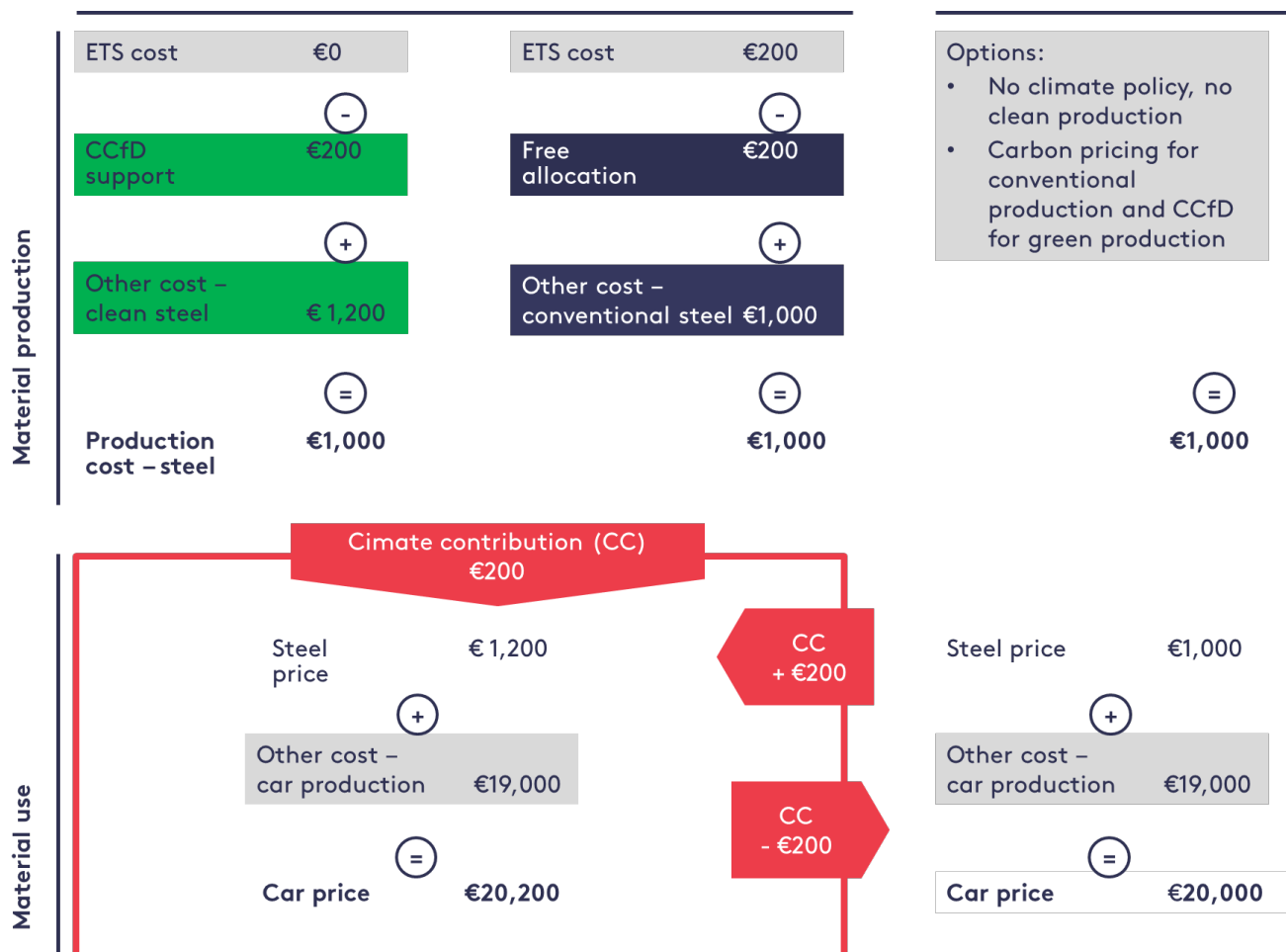
CCfDs are tendered through competitive processes, and the clearing price compensates companies for the incremental costs of clean production methods compared with conventional processes. Payments under CCfDs are adjusted to reflect the carbon costs already incurred under the ETS, avoiding overcompensation. One key challenge is how to ensure sufficient and harmonised financing for CCfDs across Europe.

The combination of a climate contribution, emissions trading with free allocation, and CCfDs delivers a single carbon price,<sup>5</sup> thus incentivising efficient material use, recycling and substitution

<sup>5</sup> Sector-specific assessments of requirements of the sector and the potential of different instruments including a climate contribution to address these include Neuhoﬀ, Acworth et al. (2014), Neuhoﬀ, Vanderborght et al. (2014), and Roth et al. (2016). Studies that conduct a comprehensive modelling of the mechanism include Böhringer et al. (2017) and Böhringer et al. (2021). While earlier work envisaged free allocation of allowances to cover incremental costs of near-climate-neutral processes, the proposal now addresses their incremental costs with CCfDs for three reasons. First, the value of free allocation might exceed the incremental costs, risking challenges under the WTO Agreement on Subsidies and Countervailing Measures (ASCM). The competitive tender for granting the CCfD limits payments to incremental costs. For WTO-ASCM assessment see Ismer et al. (2023). Second, the volume and value of free allowances granted are subject to regulatory uncertainty and hence discounted by investors. CCfDs reduce financing costs and risks and thus public resources. Third, there will be insufficient allowances under the EU ETS cap if future clean production also obtains allowances at benchmark rate of conventional plant.

(see Figure 4.2) (Neuhoff et al., 2022). As the climate contribution would complement the EU ETS to deliver the environmental objectives, it could be implemented in the EU with a qualified majority (Ismer and Haussner, 2016). The combination of CCfDs with the climate contribution ensures compatibility with the WTO Agreement on Subsidies and Countervailing Measures (Ismer et al., 2023). It raises revenue that could be dedicated to climate action, including funding CCfDs for clean production, which are viewed as essential for industrial modernisation. This funding is crucial not only for European industry but also for advancing global climate action (Cornago and Berg, 2024).

Figure 4.2. Illustration of how combined policy instruments deliver a single carbon price for domestic material production and use (example for the situation prior to CBAM implementation)



Notes: As the CBAM is being introduced, the free allocation, CCfD payments and climate contribution will decline in parallel. Depicted prices are per ton of steel and per car respectively; in practice, a conventional plant may have slightly higher emissions than the benchmark; and a clean plant has residual carbon emissions.

### How would the climate contribution relate to the CBAM?

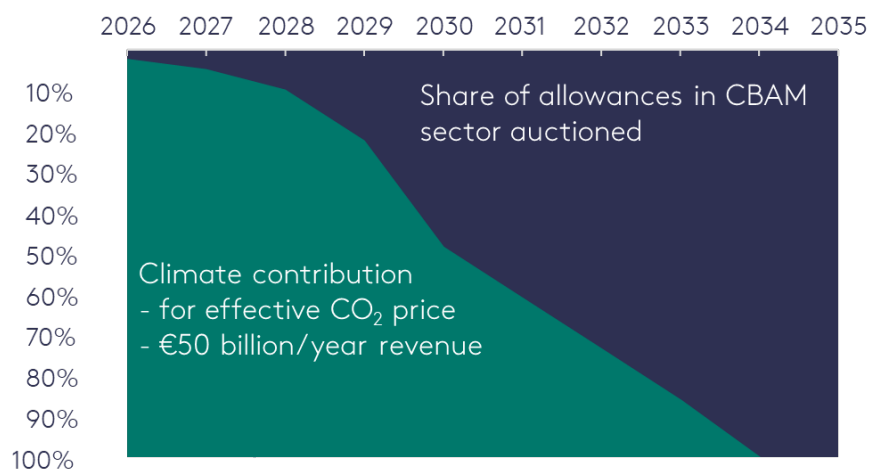
The EU ETS Directive envisions a gradual phase-out of free allocation for selected producers of basic materials by 2034. Simultaneously, the CBAM is expected to be phased in to cover these sectors. However, during this transition period, continued free allocation leaves a funding and incentive gap for green industry investments. The climate contribution could fill this gap by imposing a charge on each ton of basic material produced, equivalent to the value of free allocation granted to conventional producers.

If a climate contribution were implemented, it could be evaluated as part of the ETS, monitoring whether global carbon pricing progress is sufficient to justify the continued phase-out of free allocation; see Figure 4.3. If this progress were lacking, the climate contribution would give Europe

the option to delay the phase-out of free allocation without undermining its industrial modernisation and climate goals.

This dual mechanism would provide greater investment certainty for industries transitioning to low-carbon production.

Figure 4.3. Illustration of how the climate contribution would decline as a share of auctioning increases over time (2026–2035)



## 5. Looking ahead

A climate contribution offers a practical, WTO-compliant solution to support green industrial transformation and reduce carbon leakage risk, while providing flexibility to adapt Europe's climate policy to global developments.

### Why implement a climate contribution now?

An effective carbon price is critical for achieving core European policy objectives. The climate contribution would support these goals by providing three key benefits:

1. **Promoting a circular and material-efficient economy.** By reducing the demand for primary material production, the climate contribution would enhance value chain resilience, improve biodiversity and reduce the energy consumption associated with raw material extraction and primary material production.
2. **Supporting industrial decarbonisation and modernisation.** The climate contribution would generate revenues and incentives for clean industrial investments, to ensure the long-term competitiveness of European industries by facilitating their participation in the global transition to climate-neutral technologies and practices.
3. **Strengthening Europe's negotiating position in global climate policy.** Introducing the CBAM has revitalised global carbon pricing debates, but further progress now requires a European strategy that is seen to be effective domestically.

### What are the strategic benefits of a climate contribution?

Currently, the success of the EU's ETS and CBAM is contingent on global progress in carbon pricing. This reliance on external policy shifts exposes Europe's climate and industrial strategy to international uncertainties.

The climate contribution offers a way to reduce this vulnerability by providing an autonomous instrument that enhances the resilience of Europe's industrial and climate strategy against uncertainties about third-country policies.

By implementing a climate contribution, European countries would:

- **Provide greater policy stability for European industry**, reducing the risk of investment delays.
- **Maintain incentives for clean production**, recycling and efficient material use and choice while avoiding competitive disadvantages for European industry.

### Decoupling climate action from trade negotiations

The climate contribution would give Europe the flexibility to adjust its CBAM strategy based on global political dynamics.

If trade negotiations with key partners became challenging, the climate contribution would allow Europe to postpone the CBAM without compromising its climate and industrial goals. This decoupling of climate policy from trade disputes would ensure that European climate action remains credible and consistent, even in a volatile geopolitical environment.

**In summary, the climate contribution provides a practical, WTO-compliant solution to address carbon leakage risk, ensure investment stability, and support industrial decarbonisation in the face of global policy fragmentation.**



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