MULTINATIONAL
DEVELOPMENT
POLICY DIALOGUE
KAS BRUSSELS

THE EU CARBON BORDER ADJUSTMENT MECHANISM: OPPORTUNITIES, CHALLENGES AND RISKS AHEAD

Dr. Jaroslaw Pietras

April 2026

THE EU CARBON BORDER ADJUSTMENT MECHANISM: OPPORTUNITIES, CHALLENGES AND RISKS AHEAD

Dr. Jaroslaw Pietras

Abstract

The EU Carbon Border Adjustment Mechanism (CBAM) is the first large-scale attempt to align the carbon costs of imports with an internal emissions trading system. Entering its definitive phase on 1 January 2026, CBAM aims primarily to prevent the risk of carbon leakage and to level competitive conditions for energy-intensive and trade-exposed (EITE) sectors subject to the EU Emissions Trading System (EU ETS). The text evaluates CBAM's stated objectives and expected outcomes (before, during and after adoption) and assesses whether the instrument can plausibly achieve its core aims. Across chapters, the paper identifies opportunities, implementation challenges and systemic risks - including WTO contestability, downstream and export-side competitiveness gaps, distributional impacts for least and middle-developed countries, administrative burdens, and uncertainty in the EU ETS 'endgame' as the cap tightens toward very low levels.

Keywords: CBAM; EU ETS; carbon leakage; border carbon adjustment; carbon diversion; WTO; MRV.

Content

Biography

Dr. Jaroslaw Pietras was the former (between 2008-2020) Director General in the Council of the European Union, overseeing Climate Change, Environment, Transport, Telecom, Energy, Education, Culture, Audio-visual, Youth, and Sport. Also, former (between 1990 and 2006) Polish Government high ranking official - including positions of Undersecretary and Secretary of State for Europe and Head of the Office of the Committee for European Integration, and Secretary of State in the Ministry of Finance of the Polish Government. He also served as the deputy chief negotiator for Poland's accession to the EU. Currently he is a Visiting Professor at the College of Europe in Bruges and a Senior Research Associate at the Wilfried Martens Centre for European Studies in Brussels, as well as Senior expert at the Centre for International Relations in Warsaw. He holds his PhD in Economics from the Faculty of Economics at the University of Warsaw and has authored numerous publications on EU and trade issues.

Executive Summary

This report examines the EU Carbon Border Adjustment Mechanism (CBAM) as a climate instrument applied at the border. CBAM operates on the basis of import declarations submitted to authorities at the border, emissions reporting, and certificate surrender, and therefore it is simultaneously a climate measure, an economic policy instrument, and a trade intervention. As the report shows, CBAM will affect import prices, competitive conditions in the EU internal market, and the economic prospects of trading partners. CBAM should therefore be understood as a governance innovation at the climate-trade interface rather than a standalone policy tool.

The report emphasises that CBAM is the first global attempt to implement a border carbon adjustment at scale, and that it has been designed to reconcile multiple objectives: preventing leakage risk, levelling the playing field, preserving ETS integrity, enabling the phase-out of free allocations, incentivising third-country decarbonisation, generating revenue, and improving transparency of embedded emissions. The report argues that such a multi-purpose mechanism inevitably involves trade-offs. For this reason, it structures the analysis around distinct dimensions: trade, development, administrative governance, revenue, and long-term "end-game" dynamics, and in each area identifies the main **opportunities, challenges and risks** associated with CBAM's evolving design.

CBAM entered its definitive phase on 1 January 2026, following the transitional reporting period that began in October 2023. The report therefore highlights that CBAM's operation, while conceptually simple in design, is administratively demanding in practice. Importers must manage extensive monitoring, reporting, and verification (MRV) obligations, registry processes, and data collection from third-country producers (including for certain precursors), supported by accredited verification. The report stresses that these features are essential for environmental integrity but generate fixed compliance costs that may fall disproportionately on the EU's small companies and on exporters from countries with limited institutional capacity. This administrative dimension is therefore not secondary: it is central to CBAM's credibility, enforceability, and legitimacy.

From a trade perspective, the report shows that CBAM will influence prices and sourcing decisions. It can shift EU imports toward lower-emission production and raise the cost of carbon-intensive basic materials, with downstream effects for manufacturing, construction, and agriculture. At the same time, the report discusses risks of downstream leakage, where EU producers face higher input costs while imported finished goods remain outside CBAM scope. It also explores how trade diversion, resource shuffling, and circumvention pressures can change the emissions profile of EU imports without necessarily reducing global emissions. The report further recognises that CBAM remains defendable but vulnerable under WTO rules, despite careful design choices intended to maximise legal admissibility, and that political controversy often turns on perceived unilateralism and standard-setting as much as on technical legal arguments.

An important contribution of the report is its analysis of the developmental implications of CBAM. Because the mechanism does not systematically differentiate by income level, it does not follow the EU's established trade-and-development approach with equity principles reflected in climate diplomacy. The report explains that for many least developed countries and lower middle income countries, CBAM may operate less as a decarbonisation incentive and more as a market-access constraint, especially in basic materials that are often associated with early industrialisation. Where capital, technology, clean electricity and MRV capacity are constrained, adjustment may take the form of lower export prices, reduced volumes, or export diversion to markets without comparable border carbon costs, producing carbon diversion rather than global mitigation.

The report also provides a cautious assessment of CBAM as a source of revenue. While CBAM may generate substantial receipts through certificates acquisition and surrender, revenues are structurally uncertain because they depend on ETS prices, trade volumes, emissions intensity, and behavioural responses by exporters and governments. The report underlines that CBAM revenues are ultimately borne by EU consumers through price pass-through, and it discusses the political sensitivity around revenue use. While proposals were made to recycle revenues toward climate transition support in developing countries, the report notes that the adopted framework channels receipts largely into the EU budget, raising questions of the perception of CBAM in external relations.

Looking ahead, the report stresses that the EU is a first mover, but likely not the only actor. Several jurisdictions, including the United Kingdom, Canada and others, are considering their own border carbon measures. A future of multiple CBAM-type instruments would increase the importance of cooperation on emissions accounting, mutual recognition, origin rules, and anti-circumvention frameworks. As the report argues, this could create opportunities for convergence, but also challenges of duplication and fragmentation, and risks of intensified trade tensions and regulatory conflict.

Overall, the report concludes that CBAM is a high-stakes experiment in aligning trade with deep decarbonisation. Its primary role is to preserve the integrity and credibility of EU climate ambition, particularly as free allocations are phased out, by limiting the trade channel through which decarbonisation could be displaced. At the same time, the report underlines that CBAM remains an evolving instrument, and that further refinement should remain guided by a clear principle: **maximising climate effectiveness in the EU and globally, while minimising avoidable economic harm and disproportionate burdens**, especially for small and medium sized enterprises and less developed partners. Readers are encouraged to engage with the full report, which provides a dimension-by-dimension assessment of CBAM's opportunities, challenges and risks, and proposes areas where design improvements and complementary measures remain possible.

Introduction

The Carbon Border Adjustment Mechanism (CBAM) represents the European Union's most novel and unique response to trade in a world of asymmetric efforts to reduce carbon emissions[1]. It remains a work in progress and is not yet fully shaped in its final form. The development and launching of CBAM is a highly convoluted process, as it seeks to address climate externalities that have not traditionally been brought under the WTO rules of international trade[2]. The complex design is a result of compromise between various options proposed. During the first transitional reporting phase, which began on **October 1, 2023,** many of CBAM features have been tested. The preparation of the necessary implementing rules has taken longer than initially expected: some key measures were adopted only shortly before the definitive phase began on 1 January 2026, while others are still under development[3]. The work is in progress and CBAM will likely continue to evolve through revisions, adjustments, and refinements. This makes it all the more important to assess comprehensively the many dimensions and implications of this unprecedented instrument.

CBAM is a climate measure, but since its applied at the border it affects imports to the EU, competitive position of the EU producers of CBAM covered goods and EU trade partners. The mechanism of CBAM can be described in a relatively straightforward way. CBAM requires EU importers of selected carbon-intensive goods to purchase and surrender CBAM certificates priced by reference to the EU ETS allowance cost, adjusted for verified embedded emissions and for any eligible carbon price paid abroad. But the functioning of this mechanism imposes new and quite complex requirements that have not been practiced in international trade.

CBAM is motivated by a need to respond to the evident asymmetry in policies to cope with climate change. Debates on establishing a broadly shared, globally meaningful carbon price have stalled, and there is little evidence of a return to coordinated carbon-pricing convergence. While carbon pricing instruments have expanded in numbers, their coverage, stringency, and design remain highly heterogeneous, with large differences in effective carbon costs across jurisdictions and sectors. In this context, the risk is not only the displacement of emissions through trade and investment but also competitive distortion. As long as climate ambition remains uneven and the

1 European Parliament and Council, Regulation (EU) 2023/956 establishing a carbon border adjustment mechanism (2023), OJ L 130, 16.5.2023; European Commission, 'Carbon Border Adjustment Mechanism' CBAM) overview and implementation materials (accessed 2025).

2 Dong, Yan, and John Whalley. "Carbon, Trade Policy and Carbon Free Trade Areas." *The World Economy*, vol. 33, no. 9, 2010, pp. 1073-1094. "Remedying location-varying externalities through geographically discriminatory measures thus might seem logical to environmental economists, but the idea also strikes at the heart of the post-war GATT/WTO-based trading system which is so close to the heart of trade economists." p. 1085

3 At the definitive stage of implementing CBAM there are still some implementing or delegated acts to be prepared by the Commission. Notably delegated regulation concerning purchase of CBAM Certificates, and implementing regulation on deduction of Carbon Price paid at origin and implementing regulation on CBAM declarations. And further assessment of CBAM implementation may lead to additional refinements.

global economy operates through integrated supply chains, the absence of a common carbon price creates structural asymmetries that domestic climate policies cannot fully address on their own[4]. Without a border interface, internal carbon pricing can create incentives for import substitution and, in certain circumstances, relocation of production and associated emissions. The EU therefore frames CBAM as an instrument necessary to prevent the risk of carbon leakage and to 'level the playing field' for European energy-intensive and trade-exposed (EITE) sectors, thereby safeguarding the integrity of the ETS and preserving societal and political support for deepening climate ambition[5]. The CBAM is an important part of the EU's climate policy, but it is not a silver bullet for achieving the multiple objectives associated with it[6].

The CBAM is designed to align the carbon cost of certain imported goods with the carbon cost borne by producers inside the European Union under the EU Emissions Trading System. The ETS is a cap-and-trade system in which a **diminishing quantity of emission allowances** is issued each year. These allowances are tradable, and their price is determined by market supply and demand, reflecting increasing scarcity as the EU tightens its climate targets. CBAM mirrors the ETS logic but applies it at the border. Importers of covered goods must purchase "**CBAM certificates"** corresponding to the embedded greenhouse gas emissions of their imports. The price of CBAM certificates is linked to the current ETS allowance price. Unlike ETS allowances, however, **CBAM certificates are not limited in quantity and they are not tradable**: they can only be purchased from authorities and must be surrendered annually. CBAM also allows for the **deduction of a carbon price paid in the country of production**, provided that such a price is verifiable and comparable. This feature is intended to avoid double carbon pricing and to incentivize adoption of ambitious climate policies by other countries. Importantly, CBAM **does not provide exemptions** based on development status or firm size. Least developed countries and small companies are subject to the same rules, reflecting the EU's emphasis on uniform application. However, the implications of CBAM goes far beyond this mechanism and some of its aspects are not yet fully apprehended. Because CBAM has no global precedents at comparable scale, it is best analysed as an experiment in governance at the climate-trade interface.

4 Selicato, G. (2022). The EU proposal for a Carbon Border Adjustment Mechanism: an advanced tool to combat 'carbon leakage' , a new EU own resource of 'moral suasion' for third Countries?. *Review of European and Comparative Law*, *50*(3), 25–37. https://doi.org/10.31743/recl.13920

5 See CBAM Regulation, recitals and Article 1 (core purpose); for the 'risk' framing and linkage to leakage prevention and ETS integrity, see also European Commission impact assessment accompanying the CBAM proposal (SWD(2021) 643 final).

6 Pirlot A. (2022) Carbon Border Adjustment Measures: A Straightforward Multi-Purpose Climate Change Instrument? *Journal of Environmental Law*, Volume 34, Issue 1, March 2022, Pages 25–52, https://doi.org/10.1093/jel/eqab028

CBAM as a Tool to Prevent the Risk of Carbon Leakage

The CBAM Regulation states explicitly that the mechanism's central purpose is to prevent the risk of carbon leakage[7]. This choice of wording is consequential. 'Carbon leakage' is often defined as the increase in greenhouse gas emissions outside a regulating jurisdiction that is causally attributable to that jurisdiction's climate policy (through relocation of production, import substitution, or changes in global fossil-fuel prices). Preventing carbon leakage is an important concept potentially affecting the effectiveness of the EU's climate policies. Several studies and policy contributions argue that observed leakage under carbon pricing has historically been limited or was hard to detect, especially in Europe[8]. The Bruegel's paper[9] assessment stresses that the magnitude of leakage is uncertain and often small in empirical work, while modelling results depend strongly on assumptions about trade elasticities, market structure and policy coverage. The difficulty to separate clear carbon leakage from other factors influencing carbon intensive sectors has been the reason that even the initiated by the European Commission's "Carbon Leakage Evidence Project", which focused on the two ETS periods, did not find any significant prove of carbon leakage[10].

However, there is a risk that leakage will increase over time and due to possible further increases in already high carbon prices, which would seriously affect production decisions. Firms may not physically relocate whole plants (the most visible channel), instead, they may shift the *margin* of activity, adjusting product mix, sourcing more intermediates, or reallocating investment toward expansion abroad rather than closure at home. Carbon leakage parallels the long-standing debate on the claim that stricter environmental regulation in one jurisdiction pushes dirty industries and investment toward jurisdictions with laxer rules even if there is little evidence to confirm it[11].

Therefore, the EU Carbon Border Adjustment Mechanism is deliberately framed as a tool to prevent the **"risk" of carbon leakage**, rather than to address

7 Regulation (EU) 2023/956 of the European Parliament and of the Council of 10 May 2023 establishing a carbon border adjustment mechanism. Article 1 Subject matter 1. "This Regulation establishes a carbon border adjustment mechanism (the 'CBAM') to address greenhouse gas emissions embedded in the goods listed in Annex I on their importation into the customs territory of the Union in order **to prevent the risk of carbon leakage**, thereby reducing global carbon emissions and supporting the goals of the Paris Agreement, also by creating incentives for the reduction of emissions by operators in third countries"; https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32023R0956

8 Dechezleprêtre, Antoine, et al. "Searching for carbon leaks in multinational companies." *Journal of Environmental Economics and Management*, vol. 112, 2022, p. 102601. *ScienceDirect*, https://doi.org/10.1016/j.jeem.2021.102601

9 Zachmann, G. and McWilliams, B., '*A European carbon border tax: much pain, little gain*' (Bruegel Policy Contribution, 2020);

10 Carbon Leakage Evidence Project, Factsheets for selected sectors; Rotterdam, 23 September 2013; https://climate.ec.europa.eu/system/files/2016-11/cl_evidence_factsheets_en.pdf . The general conclusions of the study are that there is no evidence detected for the occurrence of carbon leakage as defined by the ETS Directive in the period of application of the EU ETS, 2005-2012. In some, but not all, assessed sectors increasing imports and/or decreasing exports were observed, driven mainly by global demand developments, and input price differences

11 Javorcik, B. S., & Wei, S.-J. "*Pollution Havens and Foreign Direct Investment.*" (2004);

carbon leakage as an empirically established phenomenon[12]. This choice is well grounded in the academic analysis and policy requirements[13]. First,**ex post empirical evidence of carbon leakage is weak and inconclusive**[14]. Second, CBAM is explicitly **forward-looking**. The literature emphasises that the absence of observed leakage in the past does not preclude significant leakage risks in the future, especially as EU climate ambition increases, the ETS cap tightens, and free allocation of allowances is going to be phased out[15]. Ex ante modelling exercises often predict higher leakage under such scenarios, but these results depend heavily on assumptions. Third, the **"risk" framing aligns with EU climate governance and legal prudence**. EU ETS rules have long relied on a risk-based concept of leakage, and a precautionary approach strengthens the proportionality and defensibility of CBAM under WTO law, avoiding claims about proven causality[16]. Sector-specific analyses (including for steel and cement) have also suggested that competitiveness impacts may be modest in some circumstances, particularly when free allocation and other protections are in place.

The findings so far concerning leakage do not imply that leakage risk is absent. They suggest that policy design must be attentive to uncertainty and avoid overstating the evidence base[17]. The shift from 'leakage' to 'risk of leakage' also reflects a forward-looking investment logic. When carbon prices are expected to rise over time - as the ETS cap tightens and free allocations are phased out - firms may change investment and sourcing decisions before relocation is observable in aggregate statistics. In this sense, CBAM is intended to address an incentive problem: it seeks to reduce the expected benefit of supplying the EU market from high-emission installations not subject to comparable carbon costs. The framing in terms of "risk" is also politically strategic: it allows the EU to justify preventive action without claiming to have definitively proven the counterfactual that would prevail absent CBAM.[18]

At the same time, the leakage narrative should be separated from broader structural trends in deindustrialisation. Over recent decades, many G7 economies have experienced declining shares of manufacturing in GDP and employment, driven by productivity, global value chains, and the rise of emerging industrial centres[19]. Such deindustrialisation is not necessarily

12 Naegele, H. & Zaklan, A. (2019). *Does the EU ETS cause carbon leakage in European manufacturing?*Journal of Environmental Economics and Management.

13 World Bank. (2015) *Carbon Leakage: Theory, Evidence and Policy Design.* Technical Note 11 (Partnership for Market Readiness series).

14 Ferguson, S. & Sanctuary, M. (2019). *Why is carbon leakage for energy-intensive industry hard to find?*Environmental Economics and Policy Studies; and Dechezleprêtre, A. & Gennaioli, C. & Martin, R.& Muûls, M.& Stoerk, T., 2022. "*Searching for carbon leaks in multinational companies*," Journal of Environmental Economics and Management, Elsevier, vol. 112(C).

15 European Commission (2021). *Impact Assessment accompanying the CBAM proposal* (SWD(2021) 643).

16 Mehling, M. et al. (2019). *Designing border carbon adjustments for enhanced climate action*. American Journal of International Law

17 Fournier Gabela, J.G., Freund, F. Potential carbon leakage risk: a cross-sector cross-country assessment in the OECD area. *Climatic Change* 176, 65 (2023). https://doi.org/10.1007/s10584-023-03544-x

18 CBAM Regulation, recital framing of leakage risk; European Commission, Impact Assessment (SWD(2021) 643 final) on leakage risk under higher ETS ambition.

19 Baldwin, R., 'How G7 deindustrialised: seven charts showing lost manufacturing' (LinkedIn article, accessed 2025), describing long-run deindustrialisation trends in G7 economies.

explained by climate policy[20]. CBAM can address only a specific channel - carbon-cost asymmetry in the EU market - not the full set of forces shaping Europe's industrial structure. Treating CBAM as an instrument to 'stop de-industrialisation' risks misdiagnosing both the problem and the appropriate policy response. CBAM is the most effective instrument to address potential undesirable incentives to relocate carbon intensive production from countries implementing ambitious climate measures to jurisdictions with lenient climate policies. Relocation decisions are never based on just one cost factor, there are many more aspects to be taken into account. Companies will continue to consider various options for the place of production and imports, but the contribution of CBAM is clear, it neutralises the impact of asymmetric carbon prices.

* * *

Preventing carbon leakage is an important climate policy concept. CBAM matches expectations in this respect. In principle, CBAM will reduce import-related leakage by aligning the carbon cost of imported and domestically produced covered goods[21]. Even at this early stage, the Commission's initial assessments suggest that CBAM can be an effective tool for mitigating the risk of carbon leakage[22]. However, its effectiveness depends on several conditions. First, embedded-emissions measurements must be credible and comparable across producers; otherwise high-emission imports can be 'laundered' as low-emission through weak reporting. Second, the mechanism must be robust against circumvention (including product reclassification and complex routing). Third, CBAM must be aligned with the phase-out of free allocation to avoid a period of 'double protection' that could affect legal defensibility, but also weaken abatement incentives or create trade friction.[23]

Opportunities arise because CBAM contributes to the preservation of a stronger ETS carbon price signal by replacing free allocation with border equalisation. It therefore can affect investment decisions favouring more carbon efficient production in Europe which will face long-term protection from competition of imported carbon intensive products. The main implementation challenge is integrity, credible application and consistent

20 It is interesting to note that in the Explanatory Memorandum of the Proposal for Regulation of the European Parliament and of the Council addressing the negative trade-related effects of global overcapacity on the Union steel market the carbon leakage is not even mention. The Regulation introduces far going limitations of imports of steel and some steel products citing global overcapacity as a problem of shrinking European production and employment in the steel sector, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:52025PC0726

21 Burniaux, J. M., Chateau, J., & Duval, R. (2013). Is there a case for carbon-based border tax adjustment? An applied general equilibrium analysis. *Applied Economics*, *45*(16), 2231–2240. https://doi.org/10.1080/00036846.2012.659346

22 " … there are already many signs that in the period since the introduction of CBAM, firms with cleaner production have sustained or improved their market positions even before its entry into application, while more carbon-intensive producers are facing pressure to adapt …" p.6; Report on the application of the Regulation on the Carbon Border Adjustment Mechanism; COM(2025) 783 final; https://eur-lex.europa.eu/resource.html?uri=cellar:05f0b7f5-da86-11f0-8da2-01aa75ed71a1.0001.02/DOC_1&format=PDF

23 *Commission Implementing Regulation (EU) 2023/1773 of 17 August 2023 laying down the rules for the application of Regulation (EU) 2023/956 as regards reporting obligations for the purposes of the Carbon Border Adjustment Mechanism during the transitional period* (OJ L 228, 15.9.2023, pp. 94–195.

enforcement on all EU borders. The principal risks include incomplete leakage coverage (notably the export channel), downstream displacement (emissions re-entering in processed goods), and potential trade distortions or legal challenges if the mechanism is perceived as discriminatory or protectionist rather than as a good-faith environmental measure.

Level the Playing Field

The second major justification for CBAM is the levelling of competitive conditions between EU and non-EU producers supplying the EU market. Under the ETS, EU large firms in covered sectors face an explicit carbon cost. When imports originate in jurisdictions with weaker regulation or no carbon price, they may enjoy a cost advantage unrelated to productivity or product quality. CBAM seeks to neutralise this asymmetry by imposing a border charge that mirrors the carbon cost that would have been incurred had the goods been produced under the EU ETS. In political debate, this 'level playing field' argument has been particularly influential for EITE sectors whose products are globally traded and price-competitive.[24]

The 'level playing field' concept also appears in policy debates outside the EU. In the United States, for example, border adjustment ideas have been discussed as part of climate policy design to reduce competitiveness concerns and address leakage risk. The PIIE/WRI volume 'Leveling the Carbon Playing Field' analyses design options for border measures and their interactions with domestic climate policy. Such work underscores the appeal of border adjustments as an alternative to heavy reliance on free allocation or exemptions, which can dilute domestic carbon pricing incentives[25].

Asymmetric carbon policies create a structural risk that firms in ambitious jurisdictions, like the EU, will be disadvantaged relative to competitors in countries with weaker or non-existent carbon constraints. Within the EU, energy-intensive and trade-exposed sectors - such as steel, cement, aluminium and fertilisers - must surrender allowances for their emissions under the ETS. Even though these sectors historically received free allocations, the effective carbon cost for them is real, especially as free allocations are phased down and auctioning grows in importance. With EUA prices fluctuating in the range of €70-€100 per tonne in recent years, the carbon component of production costs can be significant for primary materials. Paying a carbon price under the ETS while facing competition from imported goods that bear no equivalent cost clearly tilts the playing field.

By contrast, many countries exporting to the EU have no economy-wide carbon price, or maintain modest carbon taxes or emissions-trading schemes that

24 European Commission, CBAM proposal and impact assessment; CBAM Regulation recitals on ensuring that the carbon price of imports is equivalent to that of domestic production under the EU ETS.

25 Houser, T. et al., Levelling the Carbon Playing Field: International Competition and US Climate Policy Design (PIIE/WRI, 2008).

apply to narrower sectors or at lower price levels. This asymmetry manifests itself in two ways. Firstly, European producers selling on the European market have to bear a carbon cost on their production, while foreign producers selling on the same market do not. Second, EU producers selling into third-country markets compete against firms that do not face comparable carbon costs. In both cases, the concern is that EU firms may be undercut by cheaper, high-carbon products, as they are obliged to invest in decarbonisation. From the perspective of a European steel or cement producer, the result is a structural disadvantage: they must factor a domestic carbon price into their cost base, while imports may embed high emissions but face neither carbon charge in the country of origin nor at the border. Industry groups have repeatedly characterised this as a "lack of a level playing field" on both internal and external markets.

The situation is even more complex for **products with a high content of CBAM-covered goods,** such as cars, machinery, household appliances or fabricated metal products. These downstream goods are currently not comprehensively covered by CBAM, which means that when EU downstream producers buy inputs (e.g. steel, aluminium) that bear ETS or CBAM costs, this raises their production costs. At the same time foreign downstream producers can export finished goods into the EU without paying a CBAM charge on the embedded emissions of their inputs, unless and until CBAM coverage is extended. This creates a risk that the playing field is levelled for **basic materials imports** but remains uneven for **downstream products,** potentially pushing leakage further along the value chain.

While CBAM addresses asymmetries in carbon pricing, it does not directly correct differences in the scale and structure of climate and environment related public support policies across jurisdictions[26]. On the one hand, subsidies to low-carbon production (for example, support for renewable electricity, hydrogen, low-carbon steel, or industrial efficiency) can be economically and environmentally justified because they accelerate learning curves, overcome market failures, and correct underinvestment in clean technologies. On the other hand, uneven subsidy regimes can tilt competitive conditions in ways that resemble and sometimes exceed the effects of carbon price differentials. The United States' Inflation Reduction Act (IRA) is a prominent example of how large-scale, targeted industrial incentives can reshape comparative advantage in clean manufacturing. In parallel, the EU operates a complex landscape of national and EU-level support instruments, state aid frameworks, innovation funding and sectoral transition support that also affect industrial competitiveness and trade flows.

Moreover, in reality many countries continue to provide even more substantial fiscal or direct support to fossil fuels, lowering domestic energy

26 "If a level playing field for companies should count as a demand of fairness at all, one might argue that we should focus on a level playing field in terms of the overall regulatory environment, or possibly even a level playing field in terms of the overall business environment, including non-political factors." pp 241 and 242; Roser, Dominic, and Luke Tomlinson. "Trade Policies and Climate Change: Border Carbon Adjustments as a Tool for a Just Global Climate Regime." Ancilla Iuris, 2014, pp. 223–233. https://www.anci.ch/articles/ancilla2014_223_roser-tomlinson.pdf

costs and directly and indirectly subsidising carbon-intensive exports. Such fossil fuel subsidies can undermine the environmental effectiveness of CBAM by sustaining carbon-intensive production structures abroad and enabling exporters to remain cost-competitive despite the border charge. In response, policy debates increasingly recognise that "greening" trade requires a broader set of governance tools beyond border adjustments, including stronger disciplines and transparency on environmentally harmful subsidies, as well as permissible frameworks for environmentally supportive subsidies. The OECD has shown that regional trade agreements (RTAs) offer practical avenues to integrate environmental objectives into subsidy-related provisions, for example by strengthening notification requirements, enhancing transparency, or distinguishing between harmful and supportive subsidies in trade[27]. In this wider perspective, CBAM should be seen as one element of an emerging toolkit, potentially complemented by WTO reform, greening of RTAs, and targeted bilateral agreements that reduce subsidy-induced distortions[28].

From a levelling perspective, CBAM is intended to achieve two things. First, within the EU market, it aims to neutralise the cost difference between ETS-regulated EU producers and foreign producers that have not paid for their emissions. Second, by crediting foreign carbon prices, it aims to avoid penalising exporters from countries that are themselves implementing robust carbon policies, thereby encouraging convergence. International organisations echo this framing. An OECD analysis notes that CBAM "aims to level the playing field, ensuring that imports into the EU face similar carbon prices as goods produced in the EU," while reinforcing the ETS by enabling the phase-out of free allocation[29]. An IMF paper similarly concludes that CBAM can improve competitiveness of EU industries by ensuring that imports bear equal carbon costs, even if its impact on global emissions reductions is limited[30].

A range of instruments can be used to correct this asymmetry, including free allocation, indirect cost compensation, innovation funding, and result-oriented mechanisms such as standards or climate clubs. Among these, CBAM is the most far-reaching attempt to equalise carbon costs between EU and non-EU producers in the EU market. By pegging CBAM charges to the ETS price, recognising foreign carbon prices, and phasing out free allocation, CBAM is broadly capable of levelling the playing field for imports in covered sectors and reducing the risk that EU industry is undercut by cheaper, high-carbon products. CBAM currently applies only to a limited set of basic materials listed in Annex I of the Regulation. As a result, although

27 Shunta Yamaguchi, *Greening Regional Trade Agreements: Subsidies Related to Energy and Environmental Goods*, OECD Trade and Environment Working Papers No. 2020/01 (Paris: OECD Publishing, 2020), https://doi.org/10.1787/7e1fe8ed-en

28 Horlick, Gary & Clarke, Peggy. (2017). Rethinking Subsidy Disciplines for the Future: Policy Options for Reform. Journal of International Economic Law. 20. 673-703. 10.1093/jiel/jgx022.

29 OECD (2025), "*What to expect from the EU Carbon Border Adjustment Mechanism?*", *OECD Policy Briefs*, No. 15, OECD Publishing, Paris, https://doi.org/10.1787/719d2ff9-en.

30 Dolphin G. & Ferrucci G..; (2025) *The EU's CBAM: Implications for Member States and Trading Partners*; IMF Working Paper; WP/25/125;

CBAM directly targets only a small number of sectors, its economic effects may extend much further through input-output linkages across European industry.

The European Commission has warned that this structure may create a "dual cost pressure" for EU producers of downstream goods. Firms affected by CBAM face not only the direct costs of compliance with EU climate rules (including carbon costs passed through from their own production processes), but also higher input prices as their suppliers of CBAM-covered materials adjust to carbon pricing and border costs. As emphasised in the Steel and Metals Action Plan[31] published in 2025, such cost pressures could reduce the competitiveness of EU downstream manufacturers relative to imported finished products, particularly where foreign competitors can source cheaper carbon-intensive materials without comparable carbon constraints. Over time, this imbalance may increase the risk of relocation of downstream production outside the EU, shifting emissions abroad and undermining the environmental objectives of EU climate policy.

To address these concerns, the Commission has proposed at the end of 2025 extending CBAM coverage to approximately 180 downstream products. Under the draft regulation[32], this expansion would enter into force on 1 January 2028. The proposed list focuses mainly on downstream goods that are particularly steel and aluminium intensive. Illustrative examples include certain household appliances such as washing machines and refrigerator-freezers, various machinery and industrial equipment (including steam or sandblasting machines), construction equipment, selected hardware products, and vehicle parts such as gearboxes and chassis. While the current proposal is limited to selected downstream sectors, the Commission has indicated that further extensions, potentially covering downstream products linked to cement, fertilisers, and hydrogen, may be assessed in future legislative initiatives.

However, levelling the playing field should not be equated with 'keeping production at home' regardless of other comparative advantages. Even when carbon costs are equalised, foreign producers may retain advantages based on land, energy and other inputs prices, scale economies, logistics, state support, or labour costs. CBAM can therefore be understood as levelling one dimension of competition, carbon-cost exposure in the EU market, rather than as a comprehensive industrial protection mechanism. Overstating CBAM's industrial protective power risks creating political disappointment and policy pressure for additional protective tools.

* * *

31 Communication from the Commission, European Steel and Metals Action Plan ; Brussels, 19.3.2025 COM(2025) 125 final; https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52025DC0125

32 Proposal for a Regulation of the European Parliament and of the Council amending Regulation (EU) 2023/956 as regards the extension of its scope to downstream goods and anti-circumvention measures,COM(2025) 989 final, Brussels, 17.12.2025, https://eur-lex.europa.eu/resource.html?uri=cellar:a837cf93-db4d-11f0-8da2-01aa75ed71a1.0001.02/DOC_1&format=PDF

The assessment of the efficiency of CBAM in this respect done by the European Commission[33] is encouraging. CBAM already now affects the way how economic operators consider the playing field. Whether the EU ultimately achieves a fully level global playing field will depend on two things. First, how CBAM evolves - particularly regarding exports and downstream coverage - and whether complementary instruments are deployed to support affected sectors. Second, whether other countries move closer to EU-level carbon pricing, thereby reducing asymmetries at their source. CBAM alone cannot guarantee global carbon cost symmetry, but within the EU market it represents a substantial step towards ensuring that firms compete on low-carbon performance rather than on their ability to avoid climate policy. However, effectiveness of CBAM and its impact on European industries and their competitiveness depend also on the reactions and adjustments done outside the EU[34].

Opportunities from the 'level playing field' function include improved competitive neutrality for covered basic materials and enhanced credibility for the ETS as a long-term decarbonisation instrument. The key **challenge** is designing and administering the measure without loopholes - especially in complex supply chains - while maintaining legal defensibility. **Risks** include downstream competitiveness harm, strategic trade diversion, other forms of reactions by trading partners and the political reframing of CBAM as 'green protectionism' if levelling is perceived as a cover for industrial shielding.

Preserving Policy Integrity and Europe's Climate Leadership

CBAM should be understood as part of a broader EU climate governance architecture, rather than as a standalone climate or trade measure. The European Green Deal, Climate Law, and the Fit for 55 packages tighten the EU's decarbonisation trajectory and expand climate policy across sectors, including strengthening the EU ETS and extending carbon pricing and regulation to additional activities. One of the central challenges in ambitious climate policy is ensuring that domestic emission reductions are not offset by increases elsewhere: the EU's legally binding targets operate in a global economy in which carbon-intensive production and consumption are linked through trade. Without leakage protection, increasingly stringent internal constraints risk turning the EU transition into a territorial accounting achievement rather than a net contribution to global mitigation, as EU consumption could remain satisfied through imports produced under weaker climate regimes. CBAM is intended to preserve the integrity and credibility of the EU's internal climate

33 Report on the application of the Regulation on the Carbon Border Adjustment Mechanism; COM(2025) 783 final; https://eur-lex.europa.eu/resource.html?uri=cellar:05f0b7f5-da86-11f0-8da2-01aa75ed71a1.0001.02/DOC_1&format=PDF

34 Fuest, C. (2025, October 1). Climate policy, carbon border adjustment, and the competitiveness of European industry. *ifo Institut*. https://www.ifo.de/en/econpol/opinion/2025-10-01/climate-policy-carbon-border-adjustment-and-competitiveness-european-industry

policy by mitigating the trade channel through which ambitions could be "exported" rather than realised as global emissions reductions.

This integrity rationale is closely tied to the gradual phase-out of free allocation. The ETS historically combined a carbon price with extensive free allocation for sectors deemed at risk of carbon leakage, a design that served as a transitional compromise to secure political acceptance of carbon pricing in heavy industry[35]. CBAM is designed to enable a coherent pathway in which free allocations are phased out while maintaining leakage protection through the border, thereby preserving the marginal carbon price signal domestically and strengthening the credibility of the ETS as the EU's flagship decarbonisation instrument[11]. In this sense, CBAM functions as an external shield for internal ambition: it reduces the need to soften domestic constraints to protect competitiveness, and it helps avoid a policy contradiction in which higher internal ambition would indirectly incentivise higher emissions abroad.

CBAM also supports the broader consistency of the EU climate acquis beyond the ETS alone. Fit for 55 and related instruments, such as the Renewable Energy Directive, the Energy Efficiency Directive, and the Effort Sharing Regulation, collectively increase compliance costs for carbon-intensive production and accelerate structural transformation. Yet these measures share a common vulnerability: without border adjustment, emissions-intensive imports can displace domestic production. CBAM therefore contributes to policy integrity by ensuring alignment between the internal and external dimensions of EU climate governance: it reduces the probability that stronger domestic climate rules simply reallocate emissions geographically rather than eliminating them. Protecting environmentally regulated businesses may, for instance, involve a total exemption on their exports. Such a measure, however, could encourage carbon intensive plants to produce for export markets, while lesser emitting plants would concentrate on domestic regulated markets[36]. This coherence is especially important for investment-heavy decarbonisation strategies, such as hydrogen-based steelmaking or low-carbon fertiliser production, which require predictable carbon-price signals. Without CBAM, the risk of stranded assets and delayed industrial transformation could increase, weakening both climate ambition and economic credibility.

At the same time, CBAM is linked to the EU's claim of climate leadership globally and its attempt to demonstrate that ambitious mitigation can coexist with openness to trade. By operationalising a border mechanism based on embedded emissions, the EU attempts to show that it can raise internal carbon constraints without resorting to protectionist closure or

35 Christian Böhringer, Jared C. Carbone & Thomas F. Rutherford, "Unilateral Climate Policy Design: Efficiency and Equity Implications of Alternative Instruments to Reduce Carbon Leakage" (2012) 34(S2) *Energy Economics* S208. https://doi.org/10.1016/j.eneco.2012.09.011

36 Bueb, Julien, Lilian Richieri Hanania, and Alice Le Clézio, 'Border Adjustment Mechanisms: Elements for Economic, Legal, and Political Analysis', in Douglas Arent, and others (eds), *The Political Economy of Clean Energy Transitions* (Oxford, 2017; p. 67 online edn, Oxford Academic, 18 May 2017), https://doi.org/10.1093/oso/9780198802242.003.0004, accessed 30 Jan. 2026.

indefinite internal compensation. The credibility of this leadership claim, however, depends on whether the EU can sustain a consistent long-term pathway to decarbonisation while preserving economic performance and social legitimacy. In practice, other countries are more likely to respect and emulate EU leadership if the Union can provide evidence that its policy mix delivers strong economic growth, measurable emissions reductions, stimulates technological upgrading, and remains politically durable over time. Leadership in this sense is not merely rhetorical; it requires institutional consistency, predictable policy trajectories, and demonstrable results. It also involves developing and testing novel instruments that may later serve as global reference points. As the first comprehensive border adjustment mechanism implemented by the EU as major trading bloc, CBAM is therefore closely observed by governments, firms, and international organisations as a potential prototype for future climate-trade measures and as a possible emerging benchmark for embedded-emissions accounting and verification practices.

CBAM is also frequently presented as an external incentive mechanism: exporters can reduce or eliminate their CBAM liability either by lowering the embedded emissions of their products or by paying a carbon price at home that can be credited against the CBAM obligation. In theory, this creates a pathway toward partial convergence in carbon constraints across jurisdictions, particularly in energy-intensive and trade-exposed sectors. It is consistent with the expectation that climate leaders not only internalise climate ambition but also encourage others to follow, by reshaping incentives in global markets. Under CBAM, access to the EU market increasingly rewards lower-carbon production, and this may strengthen the case for domestic decarbonisation strategies in exporting countries, especially where the EU market is commercially significant and where investment conditions allow technological upgrading. Nonetheless, CBAM's incentive logic reinforces a broader geopolitical claim: that climate ambition can be translated into competitive advantage and that a stringent domestic carbon price can be sustained only if trade-exposed sectors operate under conditions in which carbon costs are progressively internalised across borders.

* * *

This leadership dimension is inherently double-edged. The most persuasive demonstration effect of EU climate policy is not regulatory ambition alone but the combination of decarbonisation with sustained economic performance. If Europe can maintain growth, competitiveness, and industrial resilience while tightening climate constraints, it strengthens the credibility of similar policy trajectories elsewhere and supports diplomatic efforts to encourage stronger NDCs under the Paris Agreement. Conversely, if the EU dilutes or reverses core elements of its climate framework, whether due to cost pressures, political backlash, or industrial lobbying, this may be interpreted as evidence that Europe's approach was excessive, encouraging other jurisdictions to slow down ambition or resist stronger commitments. In that sense, CBAM's role is intertwined with the broader political economy of the European transition: it is meant to reduce the domestic pressures that could otherwise force retrenchment of climate policy. The long-term sustainability of CBAM will therefore depend not only on its technical robustness but also on its capacity to remain embedded within a cooperative international strategy that supports comparability, flexibility, and differentiated adjustment capacities, ensuring that the EU's pursuit of climate neutrality remains both environmentally effective and politically legitimate.

The opportunities here are significant: CBAM can help the EU maintain a high level of internal ambition without inducing immediate import substitution, thereby strengthening the credibility of climate targets. **The challenges** are largely governance-related and international credibility, procedural fairness, and the building of cooperative pathways (for example, through climate clubs, sectoral arrangements or mutual recognition of measurement systems). **The risks** are geopolitical: if CBAM is interpreted as unilateral economic coercion, it can frustrate cooperation, invite retaliation, and entrench conflict over standards at a moment when global coordination is needed for hard-to-abate sectors.

CBAM to Supersede Free Allowances

For most of the history of the ETS, the primary instrument used to address the risk of carbon leakage has been the **free allocation of emission allowances** to energy-intensive, trade-exposed sectors. Free allocations were introduced to mitigate competitiveness concerns by reducing the effective carbon cost borne by EU installations facing international competition. By shielding producers from full exposure to the carbon price, free allocations helped prevent abrupt relocation of production and facilitated political acceptance of progressively tighter ETS caps.[37] It also played a dual role: not only did it protect EU producers from import competition, but it also helped to decarbonise the process of production and to **maintain the competitiveness of EU exports** in global markets where competitors were not subject to comparable carbon constraints[38].

Despite these advantages, free allocations have long been controversial in both economic and normative terms. From an efficiency perspective, free allocations weaken the **marginal incentive to abate emissions** when allowances are granted in proportion to historical production or benchmark output levels. Although firms still face an opportunity cost of emissions, empirical studies have shown that free allocations can reduce effective

37 European Commission, *Impact Assessment accompanying the revision of the EU ETS*, SWD(2021) 601 final.

38 Evans, S., Mehling, M. A., Ritz, R. A., & Sammon, P. (2021). Border carbon adjustments and industrial competitiveness in a European Green Deal. *Climate Policy*, *21*(3), 307–317. https://doi.org/10.1080/14693062.2020.1856637

exposure to carbon price signals, particularly where firms anticipate continued protection[39]. In addition, free allocations have generated **windfall profits**, as firms passed through the opportunity cost of allowances into prices despite receiving them for free[40]. This outcome has raised concerns about fairness and the credibility of the polluter-pays principle.

From a dynamic perspective, free allocations also become increasingly problematic as the ETS cap tightens. In a declining cap-and-trade system aligned with climate neutrality objectives, the pool of available allowances shrinks over time. Maintaining large volumes of free allocations under such conditions risks crowding out auctioning revenues, complicating cap management, and undermining the long-term consistency of the system. As a result, free allocation has been widely recognised as a **transitional tool**, not a permanent solution to leakage risk.

The CBAM is explicitly designed to replace free allocations as the EU's main anti-leakage instrument for covered sectors. The CBAM Regulation foresees a **gradual phase-out of free allowances between 2026 and 2034**, synchronized with the progressive introduction of CBAM obligations[41]. The underlying economic logic marks a significant shift in approach. Rather than reducing the carbon cost borne by EU producers, CBAM seeks to **equalise carbon costs between domestic and foreign producers at the border**, thereby preserving the full marginal carbon price signal within the EU market.

This distinction between free allocations and CBAM is central to understanding their differing incentive effects. Free allocations primarily **protect existing production** by dampening the impact of carbon pricing on incumbent installations. While this may limit leakage in the short run, it also risks slowing structural transformation by reducing pressure to invest in low-carbon technologies. CBAM, by contrast, leaves EU producers fully exposed to the ETS carbon price while extending an equivalent carbon cost to imports. In doing so, CBAM strengthens incentives for **innovation, adopting carbon efficient technologies, fuel switching, and process transformation** in hard-to-abate sectors, while reducing the reliance on internal compensation mechanisms[42].

From a trade perspective, this shift also enhances the **internal coherence and legal defensibility** of EU climate policy. Free allocation has often been criticised as a hidden subsidy that distorts competition within the internal market and complicates compliance with state aid and trade disciplines. By moving leakage protection to the border, CBAM reduces the need for sector-specific exemptions within the ETS and clarifies the application of the carbon

39 Ellerman, A. D., Marcantonini, C., & Zaklan, A. (2016). "The EU ETS: Eight Years and Counting." *Review of Environmental Economics and Policy*, 10(1), 89–107

40 Sijm, J., Neuhoff, K., & Chen, Y. (2006). "CO_2 Cost Pass-Through and Windfall Profits in the Power Sector." *Climate Policy*, 6(1), 49–72

41 European Parliament Research Service.*Carbon Border Adjustment Mechanism: gradual replacement of free allocation under the EU ETS and phase-in of CBAM obligations (2026–2034)* (EPRS ATA(2023)754626, November 2023), summarising phasing-in of CBAM and phasing-out of free ETS allowances.

42 Böhringer, C., Carbone, J. C., & Rutherford, T. F. (2016). "The Strategic Value of Carbon Tariffs." *American Economic Journal: Economic Policy*, 8(1), 28–51

price across domestic production[43].

However, CBAM introduces a new asymmetry that free allocation partially addressed: the **export side**. Free allocations supported EU exporters by lowering their effective carbon costs when competing in third markets. CBAM, by design, applies only to imports and does not provide a corresponding adjustment for exports. As free allocations are phased out, EU exporters in CBAM-covered sectors may therefore face higher carbon costs than foreign competitors in destination markets, potentially eroding export competitiveness and creating a renewed leakage risk through the export channel[44].

Proposals to address this asymmetry, such as export rebates or carbon cost compensation for exports, remain highly contentious. Export rebates are frequently discussed as a potential instrument to address the **export-side asymmetry** created by CBAM, whereby EU producers face full ETS carbon costs when competing in third-country markets that do not impose comparable carbon constraints. In principle, rebating carbon costs on exports could help preserve the competitiveness of EU firms and reduce incentives for production relocation driven by export exposure. However, export rebates raise **significant legal and policy concerns**, particularly under WTO subsidy disciplines and the chapeau of GATT Article XX[45], as they risk being characterised as export subsidies (under ASCM[46]) or as undermining the environmental integrity of the ETS. Moreover, poorly designed rebates could weaken domestic decarbonisation incentives by insulating exporters from carbon price signals, reintroducing some of the distortions associated with free allocation. As a result, while export rebates remain part of the policy debate, they are widely viewed as a high-risk and politically contentious complement to CBAM rather than a straightforward solution. At the same time, failure to address the export dimension may generate political pressure from affected industries and some concerned Member States, particularly in sectors with high export exposure.

An innovative response to this problem is contained in the December 2025 proposal for the **Temporary Decarbonisation Fund (TDF)**[47]. The Fund is designed to provide **targeted, time-limited financial support** to EU producers of certain CBAM-covered goods that may remain **exposed to a heightened residual risk of carbon leakage** as free allocation under the EU ETS is phased out. In this respect, the Fund functions as a transitional "safety valve" within the broader CBAM/ETS alignment, recognising that the

43 Mehling, M. et al. (2019). "Designing Border Carbon Adjustments for Enhanced Climate Action." *American Journal of International Law*, 113(3), 433–481.

44 Monjon, S., & Quirion, P. (2011). "A Border Adjustment for the EU ETS." *Climate Policy*, 11(3), 1075–1102

45 Charnovitz, S. (2017). "The Law of Environmental PPMs in the WTO." *Yale Journal of International Law*, 42, 137–170

46 Agreement on Subsidies and Countervailing Measures; https://www.wto.org/english/docs_e/legal_e/24-scm.pdf

47 Proposal for a Regulation of the European Parliament and of the Council establishing the Temporary Decarbonisation Fund , Brussels, 17.12.2025, COM(2025) 990 final, https://eur-lex.europa.eu/resource.html?uri=cellar:95ee45d7-db37-11f0-8da2-01aa75ed71a1.0001.02/DOC_1&format=PDF

progressive reduction of free allocation and the CBAM may not fully eliminate leakage risks for all installations and goods in the short run.

The Fund is explicitly framed as supporting the Union's industrial transition toward **climate-neutral production processes**, while maintaining the **environmental integrity of the ETS**, that is, ensuring that carbon pricing translates into real emissions reductions rather than relocation of emissions outside the EU. Eligibility is restricted to goods and installations meeting criteria of heightened remaining leakage exposure, with the detailed list and scope to be specified through the applicable annexes and implementing arrangements. Support is intended to be conditional upon credible decarbonisation efforts, including investment-oriented measures and, where relevant, the adoption of a climate-neutrality plan.

The proposed mechanism is deliberately **temporary and narrowly bounded in time**. It is intended to operate only in **2028 and 2029**, serving as an interim instrument pending a broader review of long-term solutions to carbon leakage and competitiveness concerns, including the planned revision of the ETS framework. The Commission emphasises that the Fund is limited in scope and duration in order to avoid overlap with longer-term policy redesign and to preserve budgetary discipline. This design choice also reflects a wider simplification agenda, seeking to avoid the creation of permanent new structures and to rely instead on existing administrative capacities developed under the EU ETS and CBAM.

From a financing perspective, the Fund is structured around a **Member State contribution model**, linked to early CBAM revenues. Member States are expected to contribute an amount corresponding to **25% of the revenues** they have collected from the sale of CBAM certificates to authorised declarants established in their territory, while the remaining **75%** of CBAM revenue is still envisaged as an **EU own resource**. This approach embeds the Fund within the emerging fiscal architecture of CBAM while preserving the principle that the main share of receipts accrues to the EU budget framework. Operationally, the Fund would be implemented by the Commission under direct management, in close cooperation with Member States, and accompanied by monitoring and evaluation requirements aligned with EU financial rules and anti-fraud safeguards.

Access conditions are designed to ensure that support is granted only where it supports genuine transformation rather than prolonging carbon-intensive incumbency. Producers of eligible goods will need to apply through their national competent authorities within a defined timeframe and demonstrate decarbonisation commitments consistent with the Fund's eligibility logic. The overall policy intention is therefore not to dilute the carbon price signal, but to sustain and supplement CBAM and to support investments that reduce exposure to leakage risk while maintaining the credibility of EU climate ambition during the most politically sensitive period of free allocation phase-out.

* * *

In sum, CBAM represents a **paradigmatic shift** in the EU's approach to carbon leakage and trade impact on the EU industry. By replacing free allocation with a border-based adjustment, the EU seeks to preserve ETS integrity, strengthen decarbonisation incentives, and align leakage protection with the polluter-pays principle. Yet the transition is not without trade-offs. While CBAM corrects many of the shortcomings of free allocation on the import side, it leaves unresolved questions about export competitiveness and the long-term balance between climate ambition and trade exposure. The **Temporary Decarbonisation Fund is time-limited support without addressing long-term problem.** These issues are likely to remain central in the ongoing evolution of CBAM and the broader EU climate policy framework.

Opportunities which lie down in the shift from free allocation to CBAM and include stronger ETS integrity and clearer alignment with polluter-pays principles. **The challenge** is synchronisation: phasing out free allocation too quickly risks competitiveness shocks; doing it too slowly risks 'double protection' and weaker incentives. **Risks** include unresolved export leakage, renewed pressure for compensatory instruments, and heightened legal contestation.

Incentivising Other Countries

CBAM is frequently presented as an **external incentive mechanism**: exporters to the EU can reduce or eliminate their CBAM liability either by lowering the embedded emissions of their products or by paying a carbon price in the country of production that can be credited against the CBAM obligation. This is directly mentioned in Article 1.1 of the CBAM Regulation. In theory, the CBAM design creates a pathway toward **partial convergence of carbon prices** across jurisdictions and may support the emergence of a de facto "climate club" for countries establishing high carbon prices for energy-intensive, trade-exposed sectors such as steel, cement, aluminium, and fertilisers.[48] The strength and direction of these incentives are highly heterogeneous. They depend crucially on the relative importance of the EU market for exporters, the availability of capital and technology for decarbonisation, and the institutional capacity to implement complex monitoring, reporting, and verification systems[49].

A first critical aspect of incentivising other countries concerns **methodological convergence and standard-setting power**. Exporting to the EU under CBAM requires firms, and, indirectly but importantly, governments, to adopt

48 Mehling, M., van Asselt, H., Droege, S., Das, K., & Verkuijl, C. (2019). *Designing border carbon adjustments for enhanced climate action*. American Journal of International Law, 113(3), 433–481

49 Aaron Cosbey & Susanne Droege & Carolyn Fischer & Clayton Munnings, 2019. "*Developing Guidance for Implementing Border Carbon Adjustments: Lessons, Cautions, and Research Needs from the Literature*," Review of Environmental Economics and Policy, Association of Environmental and Resource Economists, vol. 13(1), pages 3-22.

EU-defined methodologies for calculating embedded emissions, as well as EU-compatible approaches to monitoring and third-party verification[50]. This requirement goes beyond incentivising emissions reductions as such; it also incentivises the **emulation of the EU regulatory model.** The recent implementing act[51] sets out how third-country producers must monitor and calculate embedded emissions for CBAM goods. Whether emissions are reported using actual data or default values, calculations must follow Annex IV of the CBAM Regulation. Producers are expected to monitor emissions at installation level, identify the emissions attributable to specific production processes, and then allocate them to the goods produced under those processes. To ensure consistency, the act aligns key system boundaries and monitoring requirements with the EU ETS methodology and MRV rules. This lies fully within the CBAM logic, but for some countries, this can be problematic as they already apply different accounting frameworks for product-level or facility-level emissions, including approaches based on ISO standards, life-cycle assessment (LCA), or national regulatory benchmarks[52]. The coexistence of multiple methodologies complicates comparison of mitigation efforts across countries and sectors, but CBAM resolves this complexity unilaterally by privileging the EU ETS approach. While this may enhance transparency and comparability within the EU market, it risks being perceived as an attempt to export EU regulatory preferences rather than to foster genuinely multilateral agreement on embedded-emissions accounting[53]. It could therefore be argued that CBAM's transparency gains come at the cost of accepting the same **methodological approach**, potentially triggering disputes over system boundaries, treatment of indirect emissions, and recognition of alternative "equivalent" approaches.

A second limitation of the incentive narrative relates to **market structure and global trade dynamics**. Although the EU remains one of the world's largest importers of CBAM-covered products, it is no longer the sole destination for many exporters, the dominant or even major export market[54]. As CBAM raises the cost and administrative burden of exporting to the EU, firms, particularly in capital-constrained and lower-income economies, may increasingly divert exports to alternative markets where carbon costs are absent or lower. This **erosion of the EU's relative market share** weakens the scale and credibility of CBAM's incentive effect. Where access to the EU market represents only a modest share of total exports, the rational response may be trade diversion rather than investment in decarbonisation or building MRV capacity[55]. From a global climate perspective, this adjustment pathway implies **carbon**

50 European Commission. *Regulation (EU) 2023/956 establishing a Carbon Border Adjustment Mechanism*.

51 Regulation laying down rules for the application of Regulation (EU) 2023/956 of the European Parliament and the Council as regards the methods for the calculation of emissions embedded in goods, (EU) 2025/2547 https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:L_202502547

52 Brenton, P., Edwards-Jones, G., & Jensen, M. F. (2009). Carbon Labelling and Low-income Country Exports: A Review of the Development Issues. *Development Policy Review*, *27*(3), 243-267. https://onlinelibrary.wiley.com/doi/10.1111/j.1467-7679.2009.00445.x

53 Charnovitz, S. (2017). *The law of environmental "PPMs" in the WTO*. Yale Journal of International Law, 42, 137–170.

54 UNCTAD. *A European Union Carbon Border Adjustment Mechanism: Implications for Developing Countries* (2021).

55 Bruegel (Zachmann, G., & McWilliams, B.). *A European carbon border tax: much pain, little gain* (2020).

diversion rather than carbon reduction: emissions remain embedded in production but are redirected to other markets.

These two aspects, standard-setting through MRV requirements and the declining exclusivity of the EU market, interact in important ways. The more demanding and EU-specific the compliance requirements become, the stronger the incentive for exporters with alternative outlets to disengage from the EU market altogether[56]. As a result, CBAM may simultaneously improve transparency and emissions intensity within the EU import profile while delivering weaker incentives for **systemic decarbonisation beyond it**. One should be cautious in estimating the contribution of CBAM to global carbon price convergence and emissions transparency as they will remain partial and uneven, unless it is complemented by broader international cooperation on accounting standards and by measures that address the asymmetric adjustment capacities of trading partners[57]. It was very symptomatic that at the UNFCCC COP30 in Belém, unilateral climate-related trade measures emerged as one of the most contentious issues in the negotiations. The European Union defended instruments such as CBAM and deforestation-related import rules as necessary to safeguard climate ambition and prevent carbon leakage, while many developing countries, as well as the BASIC group, criticised them as inconsistent with the multilateral spirit of the UNFCCC and the principle of common but differentiated responsibilities. Several participants framed these measures as "green protectionism" or even "green neocolonialism," stressing unequal capacities to comply. The compromise outcome avoided binding rules but launched structured dialogues on trade and climate, confirming that it will remain an issue in future climate governance debates. This confirms that the EU's intention to use the CBAM as a tool to encourage the implementation of climate measures may not be as well received as hoped in a number of developing countries.

* * *

During the legislative debate preceding the adoption of CBAM, numerous proposals envisaged using CBAM revenues themselves as a lever to reinforce its incentivising effect, notably by recycling proceeds to support decarbonisation, monitoring capacity, and adjustment costs in developing trading partners. Ultimately, however, CBAM revenues were designated as general own resources of the EU budget, rather than earmarked for external climate or development purposes. Nevertheless, the EU has sought to complement CBAM through other financial instruments, including the Global Gateway initiative[58], which supports infrastructure, energy transition, and connectivity in partner countries. Although Global Gateway pursues broader strategic objectives, closer alignment with CBAM-related needs, such as low-carbon energy supply and MRV capacity, could indirectly strengthen

56 E3G & Sandbag. *The geopolitics of the European Union's carbon border adjustment mechanism* (2021).

57 World Bank. *Carbon Leakage: Theory, Evidence and Policy Design* (Partnership for Market Readiness series).

58 European Commission, *The Global Gateway*, JOIN(2021) 30 final. https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52021JC0030

incentives for least and middle developed countries to decarbonise and maintain access to the EU market.

Opportunities arising from CBAM's role as an external incentive mechanism include the potential to promote partial convergence of carbon prices and to improve transparency of embedded emissions through more systematic monitoring, reporting, and verification. By allowing the deduction of carbon prices paid abroad and by conditioning EU market access on documented emissions intensity, CBAM can encourage cleaner production for EU-bound exports and support the emergence of common reference points for emissions accounting in energy-intensive sectors. **The challenges** are structural and political. Incentives are uneven across countries and firms, depending on market dependence, access to capital and technology, and administrative capacity, while the requirement to apply EU-defined methodologies risks privileging regulatory emulation over genuine multilateral convergence. **The risks** are strategic and systemic: if compliance costs and methodological rigidity outweigh market access benefits, exporters may divert trade rather than decarbonise, leading to carbon diversion rather than global emissions reduction; if CBAM is perceived as exporting EU regulatory preferences, it may intensify "green protectionism" narratives and weaken cooperation under the UNFCCC.

Impact on Prices in the EU and Beyond

CBAM operates as a price wedge at the EU border: importers must acquire certificates proportional to embedded emissions, priced by reference to the EU ETS. As a result, the direct economic incidence of CBAM is expected to fall primarily on EU market participants - importers and, through pass-through, downstream firms and consumers[59]. The extent of pass-through depends on market structure, the elasticity of demand for the covered products, and the availability of alternative suppliers (including EU domestic production)[60].

Price effects are not limited to imported goods. By reducing the price advantage of higher-emission imports, CBAM can raise the equilibrium price of covered goods in the EU market, including goods produced within the EU. Domestic producers may be able to price closer to the carbon-inclusive import price, especially where EU demand is inelastic or where capacity is tight. This implies that CBAM can increase prices of basic materials in the EU, with downstream consequences for construction, manufacturing and

59 Karsten Neuhoff & Robert A. Ritz, 2019. "*Carbon cost pass-through in industrial sectors*," Working Papers EPRG1935, Energy Policy Research Group, Cambridge Judge Business School, University of Cambridge.

60 See European Commission, *Impact Assessment Accompanying the Proposal for a Regulation Establishing a Carbon Border Adjustment Mechanism*, SWD(2021) 643 final, sections 2.3 and Annexes 6 and 11, which assume significant pass-through of CBAM costs to EU prices. This is consistent with standard tax and trade incidence theory, according to which the economic burden of border charges is borne by consumers or factors with lower elasticities rather than by foreign producers; see Atkinson and Stiglitz (2015); Krugman, Obstfeld and Melitz (2018).

even agriculture (via fertilisers). These distributional and inflation-related concerns matter politically because they translate a border instrument into visible domestic cost pressures. This is particularly important in the politically sensitive markets (like agriculture) and a reason for a proposal amending the CBAM regulation[61] by introducing Article 27a serving as a general safeguard allowing for reaction in the situation of significant price increases. Not surprisingly, in the first instance it might be applied to fertilisers[62]. The impact of CBAM on prices might also be visible outside the scope of CBAM goods. OECD analysis finds that the removal of free allowances together with CBAM has uneven effects on EU sectors' prices and value added and, while partially offsetting competitiveness losses in covered upstream sectors, introduces competitiveness challenges for downstream sectors (e.g., construction and manufacturing).[63]

By differentiating border charges according to embedded emissions, CBAM introduces a de facto price wedge between otherwise physically identical products based on their carbon intensity. Low-carbon variants of steel, aluminium, cement, fertilisers or electricity entering the EU market will face little or no CBAM liability, while high-carbon variants will incur a substantially higher charge reflecting the EU ETS price. This differentiation is not incidental but central to CBAM's logic: it rewards cleaner production by improving relative market access and price competitiveness in the EU. Over time, this mechanism is likely to foster a distinct EU-oriented market segment for low-carbon basic materials, in which foreign producers with access to clean energy, advanced technologies, or effective mitigation strategies can compete directly with EU producers. As a result, CBAM does not merely shield EU industry but also exposes it to intensified competition in low-carbon product niches[64], reinforcing incentives for domestic decarbonisation and innovation. The mirror image of this process is the treatment of high-carbon products. As access to the EU market becomes more costly or unviable, producers relying on carbon-intensive technologies are likely to redirect exports toward markets without comparable border carbon charges. This reorientation can increase supply in alternative destinations and exert downward pressure on prices of high-carbon goods in those markets.

Internationally, CBAM can influence world prices through import demand effects. If the EU reduces imports of certain carbon-intensive products, global producers may face increased competition in alternative markets, potentially depressing world prices - especially where global overcapacity exists. In such circumstances, lower world prices can partially offset CBAM's

61 Proposal for a Regulation amending Regulation (EU) 2023/956 as regards the extension of its scope to downstream goods and anti-circumvention measures, Brussels 17.12.2025, COM(2025) 989 final https://eur-lex.europa.eu/resource.html?uri=cellar:a837cf93-db4d-11f0-8da2-01aa75ed71a1.0001.02/DOC_1&format=PDF

62 See outcome of meeting of ministers of agriculture with the Commission on 7 January 2026. https://webgate.ec.europa.eu/circabc-ewpp/d/d/workspace/SpacesStore/d706162e-0335-4ce7-a930-e4530a407e05/download

63 Dechezleprêtre, A. et al. (2025), "Carbon Border Adjustments: The potential effects of the EU CBAM along the supply chain", *OECD Science, Technology and Industry Working Papers*, No. 2025/02, OECD Publishing, Paris, https://doi.org/10.1787/e8c3d060-en.

64 Pietras J. (2024), Carbon Border Adjustment Mechanism as a Trade Policy instrument to Achieve Global Climate Neutrality, in: A Green Deal for the Globe, College of Europe Natolin, Warsaw, pp. 60-79

intended price effect for EU buyers and can erode the competitiveness gains for EU producers. This interaction is particularly relevant in sectors like steel and aluminium, where global capacity and state-supported production can drive price cycles.

* * *

From a global perspective, CBAM implies a segmentation of world markets: a higher-price, low-carbon segment linked to jurisdictions with stringent climate policies, and a lower-price, high-carbon segment serving markets with weaker or no carbon constraints. While this price differentiation is consistent with CBAM's intent to internalise carbon costs in the EU, it also raises the risk that emissions are displaced in larger proportion than reduced, as cheaper high-carbon products find new outlets, potentially weakening the overall effectiveness of EU CBAM on global decarbonisation efforts.

Opportunities include reinforcing low-carbon investment incentives by making carbon-intensive production less competitive in the EU market and potentially stimulating innovation in low-carbon materials. **The main challenge** is managing downstream competitiveness and distributional effects. **Key risks** include politically salient price increases, downstream relocation pressures where CBAM does not extend to finished goods, and the possibility that world price declines offset some of CBAM's intended market rebalancing while shifting high-carbon production to other markets.

CBAM as a Source of Revenue

The CBAM generates public revenue as EU importers are required to purchase and surrender CBAM certificates corresponding to the greenhouse gas emissions embodied in the covered imports. Unlike traditional customs duties, CBAM revenue is not a stable or autonomous fiscal stream but an **endogenous outcome of market conditions and policy responses**. Its magnitude depends on a set of interrelated variables that are inherently uncertain: the EU ETS allowance price, import volumes of CBAM-covered goods, their carbon intensity, and the behavioural responses of firms and governments to the mechanism itself.[65] Early estimates by the European Commission and independent analysts provide a sense of the range of expected revenue. On average over the early implementation period (2026–2030), the Commission projected that CBAM could generate roughly **€1.0–1.5 billion per year** for the EU budget.[66] This figure is anchored in CBAM's initial limited scope, covering primary materials from sectors such as iron and steel, cement, aluminium, fertilisers, electricity and hydrogen, and it takes

65 Mehling MA, van Asselt H, Das K, Droege S, Verkuijl C. Designing Border Carbon Adjustments for Enhanced Climate Action. *American Journal of International Law*. 2019;113(3):433-481. doi:10.1017/ajil.2019.22

66 European Commission Press Corner, *CBAM own resource estimates* (2023).

into account the gradual withdrawal of free allowances. In the own-resources context, the Commission's own resources proposal estimated annual CBAM revenue of around **€1.5 billion (2018 prices)** from 2028 onwards. The European Parliamentary Research Service echoed similar figures, suggesting average annual revenue of **approximately €1.5 billion** in the late 2020s[67]. Other analysis show broader ranges, reflecting alternative assumptions about import growth, ETS allowance prices, and CBAM scope expansion. A modelling exercise by S&P Global suggested that, under certain long-term carbon price trajectories and trade volumes, CBAM could raise **over US $80 billion annually** by 2040.[68]

A defining feature of CBAM revenue is its **direct linkage to the EU ETS**. The price of CBAM certificates mirrors the average auction price of EU allowances, meaning that CBAM revenues are exposed to the same sources of volatility that characterise the ETS: tightening cap trajectories, energy price shocks, macroeconomic fluctuations, regulatory expectations, and political interventions.[69] While many analysts anticipate upward pressure on carbon prices as the EU pursues more ambitious decarbonisation targets, the price path is unlikely to be smooth. Consequently, CBAM revenues may fluctuate significantly from year to year, even in the absence of changes in import volumes. This raises concerns about framing CBAM as a predictable "own resource" for the EU budget, given that its fiscal yield is tied to a market-based instrument designed primarily for emissions control rather than revenue generation.[70]

CBAM revenue is also **self-limiting by design**. Its yield is inversely related to the mechanism's effectiveness in achieving climate objectives. If foreign producers decarbonise production, switch to lower-emission installations, or operate in jurisdictions that introduce carbon pricing mechanisms recognised under CBAM, the number of certificates required declines. In the extreme case of full convergence of carbon prices across major trading partners, CBAM revenues would approach zero. Similarly, as the EU economy moves toward deep or near-complete decarbonisation, demand for carbon-intensive imports is expected to fall, eroding the CBAM revenue base over time. CBAM revenues should therefore be understood as **transitional instrument rather than permanent**, declining as decarbonisation progresses.[71]

The fiscal and political debate surrounding CBAM proceeds has been particularly intense. Some have considered CBAM as a new and potentially significant source of revenue to the European budget[72]. During the legislative process, numerous stakeholders, including Members of the European

67 European Parliamentary Research Service, *Expected revenues*, Epthinktank (Feb 2025).

68 S&P Global Energy, *CBAM revenue projections* (2023). https://www.spglobal.com/sustainable1/en/insights/special-editorial/eu-carbon-border-adjustment-mechanism-to-raise-80b-per-year-by-2040

69 European Commission, *Impact Assessment accompanying the CBAM proposal*, SWD(2021) 643 final.

70 Zachmann, G. & McWilliams, B., *A European Carbon Border Tax: Much Pain, Little Gain*, Bruegel (2020).

71 Boratyński, J. et al., *CBAM and Budgetary Revenue: Prospects for the EU and Poland*, Institute of Environmental Protection – National Research Institute / KOBiZE, Warsaw (2025).

72 Krenek, A., Sommer, M., & Schratzenstaller, M. (2019). *Sustainability-oriented Future EU Funding: A European Border Carbon Adjustment* (WIFO Working Papers, No. 587). Austrian Institute for Economic Research (WIFO).

Parliament and civil society organizations, argued that CBAM proceeds should be earmarked for **climate-related purposes**, notably to support decarbonisation efforts in low and middle income countries (LMICs) affected by the mechanism, or to finance industrial transition and innovation within the EU[73]. Such earmarking was seen as a way to enhance the international legitimacy of CBAM and align it with principles of climate justice and common but differentiated responsibilities. The final CBAM Regulation, however, **does not establish any binding earmark**. Instead, CBAM revenues are allocated to the **general EU budget** as part of the Union's system of own resources, contributing inter alia to the financing of common expenditures and debt servicing. This choice reinforces perceptions of CBAM as a fiscal and industrial policy instrument as much as a climate instrument, particularly among trading partners. Additionally, rising ETS prices and expanding CBAM scope increase incentives for **avoidance, non-compliance and circumvention**. Higher implicit carbon charges strengthen incentives for strategic behaviour such as misreporting emissions, restructuring supply chains, or "resource shuffling"[74]. These dynamics could not only undermine environmental integrity but also further destabilise CBAM revenue projections and raise administrative and enforcement costs.

Distributional effects across EU Member States further complicate the revenue picture. CBAM revenues accrue at EU level, but their nominal contribution depends on **where imports physically enter the EU customs territory**, not on where goods are ultimately consumed. As shown by Boratyński et al. (2025), Member States with large ports, logistics hubs, and energy-intensive industrial supply chains, such as Germany, Italy, the Netherlands, France and Spain, are likely to account for a disproportionate share of CBAM certificate purchases[75]. By contrast, Member States with smaller industrial bases or lower direct imports of CBAM goods will contribute less to aggregate revenue, even if their firms and consumers face indirect price effects through value chains. This mechanism creates a **vertical and horizontal distributional imbalance**[76]. Revenues are pooled at EU level, while the costs, higher input prices and consumer prices, are borne nationally. Countries with limited import exposure may not register CBAM revenues while still experiencing price increases, whereas major importing hubs may face both higher adjustment costs and higher nominal contributions without receiving commensurate fiscal compensation. Poland illustrates this asymmetry: while direct CBAM imports are relatively modest, indirect exposure through downstream industries may be significant, with limited offsetting fiscal benefit.[77]

* * *

73 European Parliament, *Resolution of 10 March 2021 towards a WTO-compatible CBAM*, P9_TA(2021)0071

74 Jarosław Pietras, *Navigating CBAM Between Non-Compliance and Circumvention*, Wilfried Martens Centre for European Studies, Brussels (2023).

75 Boratyński et al. (2025), chapters 3–4

76 Amendola, Marco. "Winners and losers of the EU carbon border adjustment mechanism. An intra-EU issue?." *Energy Economics*, vol. 142, 2025, p. 108139. *ScienceDirect*, doi:10.1016/j.eneco.2024.108139.

77 Boratyński et al. (2025), pp. 45–52

From an economic incidence perspective, it is crucial to emphasise that **CBAM revenues are ultimately borne by EU consumers**. Although the legal obligation to surrender certificates lies with EU importers, standard incidence analysis suggests that a substantial share of CBAM costs will be passed through into prices, particularly in sectors producing relatively homogeneous, energy-intensive goods.[78] In addition, reduced competitive pressure from non-EU suppliers may enable EU producers of CBAM-covered goods to raise prices, further amplifying consumer impacts. In this sense, CBAM operates as an implicit, carbon-differentiated consumption charge within the EU internal market, with revenues reflecting higher prices paid domestically rather than a direct fiscal transfer from exporting countries.

Opportunities associated with the CBAM revenue lie primarily in its potential to generate additional EU-level fiscal resources while reinforcing the polluter-pays principle by internalising carbon costs in the prices of imported goods. In the short to medium term, CBAM revenues may support common budgetary priorities and strengthen the political sustainability of ambitious climate policy. **The central challenge** is predictability: CBAM revenues are intrinsically volatile, as they depend on ETS price dynamics, import volumes, the carbon intensity of traded goods, and behavioural responses by exporters and consumers. This makes budgeting difficult and complicates expectations about CBAM as a stable "own resource." **The risks** are twofold. First, revenues are largely borne by EU consumers and are unevenly distributed across Member States, raising distributional, inflationary and political concerns. Second, as decarbonisation progresses and trade patterns adjust, the CBAM revenue base may erode over time, potentially undermining its fiscal role.

Circumvention

Like any border instrument that alters relative prices and market access conditions, the CBAM encourages economic actors to adapt their behaviour in order to minimise compliance costs. EU legislators explicitly recognised this risk during the drafting process and incorporated anti-circumvention provisions, most notably Article 27 of the CBAM Regulation, to address practices that could undermine the environmental integrity of the mechanism. Yet the conceptual challenge is that "circumvention" does not always coincide with illegality. Many forms of avoidance are best understood as rational market responses to new regulatory constraints rather than fraudulent behaviour.

A central example is so-called *resource shuffling*. This refers to reallocating production or exports such that goods destined for the EU market are sourced from lower-emission installations, while more carbon-intensive production is redirected to domestic markets or to jurisdictions without comparable

78 Aaron Cosbey & Susanne Droege & Carolyn Fischer & Clayton Munnings, 2019. "*Developing Guidance for Implementing Border Carbon Adjustments: Lessons, Cautions, and Research Needs from the Literature*," Review of Environmental Economics and Policy, Association of Environmental and Resource Economists, vol. 13(1), pages 3-22.

carbon constraints. It should be remembered that these are firms that make decisions on export and calculates their profitability. Resource shuffling might be encouraged by governments, but they cannot enforce business strategies. If continuation of exports from carbon inefficient installations is not profitable firms will stop doing it. If companies that already produce in more carbon efficient ways see a chance to get better access and better prices in Europe they will go for it. From a legal and economic perspective, such behaviour is fully legitimate. Indeed, in its narrow sense, resource shuffling is an intended effect of CBAM: the mechanism is designed precisely to reward lower embedded emissions in EU-bound goods. The difficulty arises because resource shuffling may have little or no impact on total emissions at the firm, sectoral, or national level. Cleaner production is exported, while dirtier production continues to be shipped elsewhere, leading to limited global mitigation benefits[79].

This tension highlights a fundamental limitation of border-based climate instruments. CBAM can change the composition of EU imports without necessarily changing the composition of production elsewhere and the corresponding *level* of emissions generated abroad. The environmental effectiveness of the mechanism thus depends not only on trade responses but also on whether CBAM induces genuine technological upgrading rather than mere reallocation of existing capacity. Empirical studies on carbon leakage and border adjustments have long emphasised this distinction between changes in trade patterns and changes in production technology[80].

Another form of avoidance involves marginal changes in production inputs that reduce reported embedded emissions without requiring large capital investments. An often-cited example is increased use of industrial steel scrap in primary steelmaking[81]. Scrap-based production has lower reported emissions and can therefore reduce CBAM liabilities. The Commission has recognised the risk for CBAM effectiveness related to the treatment of metals scrap and is considering closing the so-called scrap-loophole as part of the proposal to strengthen the CBAM[82].While this shift is consistent with circular-economy principles, it also illustrates an asymmetry: scrap availability is much higher in matured industrial economies than in countries at earlier stages of industrialisation[83]. As a result, such adjustment options may be structurally available to exporters from countries that are developed to such

79 F. Branger & P. Quirion, "Climate policy and the 'carbon haven' effect," *Energy Policy* 38(6) (2014).

80 Maria, C.D., van der Werf, E. Carbon leakage revisited: unilateral climate policy with directed technical change. *Environ Resource Econ* 39, 55–74 (2008). https://doi.org/10.1007/s10640-007-9091-x

81 It is mentioned in Mario Draghi Report, The future of European competitiveness Part B, In-depth analysis and recommendation, (2024) "CBAM is potentially easy to circumvent. As an example, as it is structured, exporters to the EU will not be taxed if they serve the European market from their low-emission plant segments and sell CO2 -intensive steel on domestic or other third-country markets instead. Similarly, the zero-emissions assumption for recycled material, including industry scrap, could provide incentives for deliberate scrap generation to export the secondary material (exempt from CBAM) instead of the primary one (within CBAM) to Europe (relevant, notably, for aluminium where recycling costs are low). Moreover, monitoring and verification may be very difficult without strong cooperation." p. 104

82 Report on the application of the Regulation on the Carbon Border Adjustment Mechanism, p.52 Brussels, 16.12.2025 COM(2025) 783 final; https://eur-lex.europa.eu/resource.html?uri=cellar:05f0b7f5-da86-11f0-8da2-01aa75ed71a1.0001.02/DOC_1&format=PDF

83 International Energy Agency (IEA), *Iron and Steel Technology Roadmap. Towards more sustainable steelmaking.* (2020).

an extent that they have accumulated sufficient resources of metal scrap. In the situation of least and even medium income countries (LMICs) such shift in production might be more difficult reinforcing the perception of imbalanced impact of CBAM on Europe's most vulnerable trading partners.

Avoidance strategies can also exploit product scope and customs classification. Because CBAM initially covers a limited range of relatively low-processed goods, firms may respond by shifting exports to products classified under Harmonised System (HS) in a manner that goes beyond CBAM coverage. Exporting more processed downstream products that fall outside the mechanism's scope results in *downstream carbon leakage and* can shift value added away from the EU while leaving embedded emissions largely unchanged[84]. It mirrors classic problems in tariff escalation and effective protection theory, where differential tariff treatment of inputs and outputs alters production incentives in unintended ways[85]. In trade policy and negotiations, it is generally an argument to keep low tariffs on low processed goods, and higher on more processed products. CBAM reverses this logic.

The evidence of circumvention might increase with the expected stringency of climate policy. Such a stringency increases incentives for firms to seek indirect pathways to maintain market access, whether through trade reorientation, restructuring of supply chains, or strategic investment in locations with regulatory advantages[86]. Achieving climate neutrality by 2050 implies sustained upward pressure on carbon prices, at least in the absence of rapid technological breakthroughs. If CBAM is to prevent carbon leakage effectively under such conditions, its economic impact must be significant. However, because imports of CBAM products are not limited in quantities, and if European production will become difficult under carbon constraints, the costs of CBAM certificates might not constitute an effective barrier for the continuation of imports of carbon intensive products.

EU institutions have attempted to respond to these risks through increasingly detailed anti-circumvention provisions. The CBAM Regulation empowers the Commission to investigate practices that undermine the mechanism's objectives and to adopt remedial measures where necessary. However, the scope for intervention is constrained. Distinguishing between legitimate commercial adaptation and deliberate circumvention, and particularly illegitimate is legally and practically difficult, particularly when production decisions occur entirely outside EU jurisdiction. Additionally, at the definitive stage of CBAM the Commission is proposing a set of safeguards[87] aimed at reducing the risk of CBAM circumvention, including

84 Muhua Li, Yan Sun, Yan Xia, Zhaofu Yang, Chuxin Chen, Yongna Yuan, Pu Wang, (2026) The impacts of Carbon Border Adjustment Mechanism (CBAM) on international trade and policy responses: from an economic and environmental equity perspective, Energy Policy Volume 210, https://doi.org/10.1016/j.enpol.2025.115014

85 R. E. Caves, J. A. Frankel & R. W. Jones, *World Trade and Payments* (Pearson, 2007).

86 European Commission, *Impact Assessment accompanying the CBAM proposal* (SWD(2021) 643.

87 Proposal for a Regulation of the European Parliament and of the Council amending Regulation (EU) 2023/956 as regards the extension of its scope to downstream goods and anti-circumvention measures, Brussels, COM(2025) 989 final 17.12.2025, https://eur-lex.europa.eu/resource.html?uri=cellar:a837cf93-db4d-11f0-8da2-01aa75ed71a1.0001.02/DOC_1&format=PDF

misreporting of embedded emissions and other abusive practices. First, it treats pre-consumer aluminium and steel scrap, materials discarded during manufacturing before products reach consumers, as a CBAM precursor when calculating embedded emissions. This provision is intended to prevent strategic use of scrap classification and to improve the robustness of emissions accounting. The draft also strengthens traceability by allowing the Commission and national competent authorities to request evidence confirming that imported goods were produced in the installation declared by the importer, and during the stated production period. This is designed to limit the scope for misdeclaration of emissions intensity through shifts in documentation rather than changes in production.

To address broader abusive practices, the draft further authorises the Commission to impose additional conditions for using actual emissions data in specific high-risk situations, based on particular combinations of goods and origins. In such cases, actual values could only be accepted if importers provide supplementary documentation demonstrating that producers have not engaged in circumvention. Where the Commission finds sufficient evidence of a heightened risk, it is required to adopt mitigating measures within three months. Finally, national competent authorities of the Member States will be enabled to request a financial guarantee where an authorised CBAM declarant fails to surrender the required number of CBAM certificates at the end of a quarter, strengthening enforcement and reducing the risk of non-compliance.

Attempts to prohibit exporters from allocating cleaner output to the EU market would be extremely difficult to enforce and could conflict with fundamental principles of market freedom. Resource shuffling illustrates these limits particularly clearly. Measures that extend beyond importers to affect foreign producers or national authorities risk legal contestation and diplomatic tension[88]. Moreover, such restrictions could collide with WTO rules, which permit firms to choose production and sales strategies freely[89]. In practice, enforcement is likely to focus on preventing fraud, such as misreporting emissions data, or misclassifying products, rather than eliminating economically motivated reallocations.

The administrative burden associated with preventing circumvention also deserves attention. CBAM already requires complex documentation, verification of emissions data, and coordination across supply chains. Adding further layers of scrutiny to address avoidance risks may strain administrative capacities, particularly in exporting countries with weak public administration. Smaller firms, especially in developing economies, may find compliance disproportionately costly, effectively excluding them from the EU market[90].

88 S. Charnovitz, "*Border tax equalization*" The World Trade System, January 2016 DOI:10.7551/mitpress/9780262035231.003.0002 (pp.25-53).

89 WTO Appellate Body, *US – Shrimp* (1998; 2001), compliance.

90 UNCTAD, *Trade and Environment Review: Climate Mitigation and Trade* (2021).

At the same time, large multinational firms are often well equipped to manage regulatory complexity. They can reorganise global value chains, adjust accounting practices, and absorb compliance costs more easily than small and medium-sized enterprises. This asymmetry raises concerns that CBAM's anti-circumvention efforts could inadvertently favour large incumbents while accelerating the marginalisation of smaller exporters[91].

From a broader economic perspective, CBAM operates like a border tax whose incidence depends on market structure, demand elasticity, and the availability of substitutes. If imports of CBAM-covered goods decline while EU demand remains relatively inelastic, prices may rise, allowing domestic producers to pass through carbon costs more easily. Higher prices can support investment in low-carbon technologies but may also prolong the operation of existing carbon-intensive assets if consumers lack alternatives. In such cases, the combination of CBAM and high carbon prices risks producing outcomes that are environmentally ambiguous: reduced imports and higher domestic prices, but slower-than-expected structural transformation.

* * *

In sum, circumvention under CBAM should not be understood solely as a problem of enforcement or compliance. It reflects deeper tensions between border-based climate instruments and the realities of global production networks. While outright fraud can and should be addressed through legal remedies, many forms of avoidance are inseparable from legitimate market adaptation. Managing these dynamics requires not only technical anti-circumvention rules but also complementary policies, such as support for technological upgrading, international cooperation on emissions accounting, and gradual expansion of CBAM scope, that reduce the incentives for purely distributive adjustments without emissions reductions. The ultimate test of CBAM will therefore lie less in its ability to eliminate all forms of circumvention than in its capacity to align trade incentives with genuine global decarbonisation.

The principal opportunity in addressing circumvention under CBAM lies in steering market adaptation toward genuine emissions reductions rather than mere reallocation of production. By combining anti-circumvention rules with support for technological upgrading and improved emissions accounting, CBAM can help align trade responses with global decarbonisation objectives. **The challenges** are regulatory and practical: distinguishing legitimate market adaptation from abusive practices, managing administrative complexity across global value chains, and enforcing rules without excessive intrusiveness or legal vulnerability. **The risks** are structural. If circumvention primarily takes the form of resource shuffling or downstream trade diversion, CBAM may green the EU import basket without reducing global emissions, undermining both its environmental effectiveness and its political legitimacy.

91 OECD, *Carbon Leakage and Competitiveness* (2022).

Trade Dimension of CBAM

CBAM is a multipurpose tool, and it affects the intersection of climate policy, customs and trade law and international economic relations. Its trade effects arise not only from the implied carbon charge but also from administrative requirements that condition market access. The trade dimension therefore includes regulatory compliance effects and contestability under the WTO rules, traditional tariff-like price wedge effects leading to carbon diversion, downstream carbon leakage or reverse carbon leakage, and broader geopolitical responses.

WTO Compatibility: Legal Design, Unilateralism, and Contestability

The European Commission has designed the Carbon Border Adjustment Mechanism with the explicit objective of maximising its likelihood of compatibility with World Trade Organization rules. Extensive legal analysis accompanied the proposal, and the CBAM regulation as such has been framed as a climate measure rather than a trade policy instrument. Nevertheless, CBAM remains a legally novel and economically consequential trade measure[92]. Even if the discussion concerning border adjustments within GATT is long standing[93], the particular motivation for this border adjustment, the scope of application going beyond the traditional approach to goods and differentiating them on the bases of production processes and methods, and administrative complexity make the WTO discussion more intense. By affecting imports valued in the tens of billions of Euros annually, it creates incentives for legal challenge that far exceed those present in earlier WTO disputes involving environmental trade restrictions[94]. The scale of interests affected by CBAM suggests that its WTO compatibility will be tested not only doctrinally but politically[95].

At the core of potential WTO contestation are the **fundamental non-discrimination principles of the General Agreement on Tariffs and Trade (GATT)**. CBAM may be alleged to infringe the most-favoured-nation (MFN) obligation under Article I if it results in differential treatment among imports based on the exporting country's climate policies or emissions intensity. Although CBAM is intentionally formally origin-neutral to ensure non-discrimination, applying the same methodology to all imports, de facto discrimination may arise if access to emissions data, verification services, or

92 Charles E. McLure, Jr., *The GATT-Legality of Border Adjustments for Carbon Taxes and the Cost of Emissions Permits: A Riddle, Wrapped in a Mystery, Inside an Enigma*, 11 Florida Tax Review 225 (2011).

93 See for example Report of the OECD Working Party on Border Tax Adjustments adopted on 2 December 1970 (L3464) https://www.worldtradelaw.net/document.php?id=reports/gattpanels/bordertax.pdf and also Rolf Weber, (2015); "*Border Tax adjustment – legal perspective*," Climatic Change, Springer, vol. 133(3), pages 407-417, December.

94 Pauwelyn, J. (2021). "Carbon Border Measures and WTO Law." *Review of European, Comparative & International Environmental Law*, 30(1), 17–25.

95 "Since no state has implemented a CBAM before, a CBAM's compatibility with trade rules has not been tested." p.11;Leal-Arcas, Rafael, et al. "A Legal Exploration of the European Union's Carbon Border Adjustment Mechanism." *European Energy and Environmental Law Review*, vol. 31, no. 4, 2022, pp. 223-240.

recognised carbon pricing differs systematically across countries[96]. National treatment concerns under Article III may also be raised if imports are found to face less favourable competitive conditions than domestic products, particularly during the transitional period when EU producers continue to receive free allocation of allowances under the EU Emissions Trading System.

Even if a prima facie inconsistency with Articles I or III were established, CBAM could still be justified under **GATT Article XX**, which permits exceptions for measures necessary to protect human, animal, or plant life or health (paragraph (b)) or relating to the conservation of exhaustible natural resources (paragraph (g)). Climate change mitigation has increasingly been recognised as falling within the scope of these exceptions. WTO jurisprudence has interpreted "exhaustible natural resources" dynamically, encompassing global environmental commons such as clean air and living species[97]. The EU's argument is that CBAM is integrally linked to the ETS and is necessary to prevent carbon leakage that would otherwise undermine domestic climate ambition.

In practice, however, WTO legality is rarely determined only by the selected paragraph of Article XX alone. The decisive test lies in the **chapeau of Article XX**, which requires that a measure not be applied in a manner constituting arbitrary or unjustifiable discrimination between countries where the same conditions prevail, or a disguised restriction on international trade. This requirement reflects a concern that legitimate policy objectives not be pursued through rigid or coercive trade measures[98]. WTO case law, most notably the Appellate Body's reasoning in *United States – Shrimp/Turtle,* demonstrates that environmental measures may fail the chapeau not because their objectives are illegitimate, but because of how they are implemented[99].

The *Shrimp/Turtle* jurisprudence is particularly instructive for CBAM. The Appellate Body accepted that protecting endangered species was a valid objective under Article XX(g), but found the US measure inconsistent with the chapeau because it imposed inflexible requirements, failed to engage in serious multilateral negotiations, and effectively required exporting countries to adopt regulatory programmes identical or similar to those of the United States[100]. In subsequent compliance proceedings, the Appellate Body clarified that measures allowing for **"comparable effectiveness"**, rather than identical policy instruments, were more likely to satisfy the chapeau[101]. This logic has become central to any other assessments of environmental and climate-related trade measures.

CBAM's legal vulnerability therefore turns on whether it is applied with

96 Mehling MA, van Asselt H, Das K, Droege S, Verkuijl C. Designing Border Carbon Adjustments for Enhanced Climate Action. *American Journal of International Law*. 2019;113(3):433-481. doi:10.1017/ajil.2019.22

97 WTO Appellate Body, *US – Shrimp/Turtle*, WT/DS58/AB/R (1998).

98 GATT 1994, Article XX chapeau.

99 WTO Appellate Body, *US – Shrimp/Turtle*, paras. 161–186.

100 Ibid.

101 WTO Appellate Body, *US – Shrimp/Turtle (Article 21.5)*,

sufficient **flexibility, procedural fairness, and recognition of regulatory diversity**. Although the mechanism allows deductions for explicit carbon prices paid abroad, critics argue that this may privilege carbon pricing over other climate policy instruments, such as regulatory standards, compensatory or subsidy-based approaches. If CBAM effectively rewards only EU-style policy instruments, it risks being characterised as coercive harmonisation rather than legitimate environmental regulation[102]. Such rigidity would strengthen claims of unjustifiable discrimination under the chapeau.

A further layer of complexity arises from CBAM's reliance on **non-product-related process and production methods (NPR-PPMs)**. CBAM differentiates between physically identical products, such as steel, aluminium or cement, based on embedded emissions generated during production. Historically, WTO law has been cautious toward NPR-PPMs, as illustrated by the not adopted GATT panel reports in *Tuna–Dolphin I and II*, which rejected import restrictions based on production methods[103]. However, subsequent jurisprudence, particularly *Shrimp/Turtle*, softened this stance by recognising that environmental measures may legitimately take account of production processes, provided they meet Article XX requirements.

It could be argued that WTO law does not categorically prohibit PPM-based measures and that environmental regulation almost inevitably targets production processes rather than final product characteristics[104]. The critical issue is not whether PPMs are used, but whether their application respects the chapeau's disciplines. In the context of CBAM, this means ensuring that emissions-based differentiation does not translate into systematic exclusion of exporters lacking administrative or financial capacity to comply with EU instruments.

Applying the default emissions values illustrates this risk. Where verified data are unavailable, CBAM applies conservative default values, often based on high-emissions benchmarks. While defensible from an environmental-integrity perspective, this approach may disproportionately affect exporters in developing countries with limited monitoring, reporting, and verification infrastructure. Default values, being in many cases much higher than actual ones, can function as de facto penalties rather than neutral safeguards, and therefore may be vulnerable to challenge as arbitrary discrimination[105]. The recently introduced methodology of looking at product carbon content diminishes intensity of dispute, but doesn't eliminate the risks of judging it as potential discrimination.

Beyond doctrinal and legal questions, CBAM has generated **strong political opposition among several WTO members**, reinforcing its contestability. India and China have repeatedly characterised CBAM as a unilateral trade measure inconsistent with equity and development principles, framing

102 Charnovitz, S. (2002). *Trade and the Environment*. Washington, DC: American University Press.

103 GATT Panels, *US – Tuna/Dolphin I & II* (1991, 1994).

104 Charnovitz, S. (2002), op. cit.

105 UNCTAD (2021). *A European Union Carbon Border Adjustment Mechanism: Implications for Developing Countries.*

it as "green protectionism.[106]" The BASIC group (Brazil, South Africa, India, and China) has jointly opposed unilateral carbon border measures in climate and trade fora, invoking the principle of common but differentiated responsibilities. Least developed countries have raised concerns that CBAM imposes compliance costs without providing commensurate support[107]. While political opposition does not determine legal outcomes, it increases the likelihood of engagement in formal dispute settlement and shaping interpretive context.

The United States occupies a more ambiguous position. While some US policymakers support the concept of carbon-intensity-based trade measures, the US relies primarily on subsidies and regulatory standards rather than carbon pricing. As a result, US exporters may face CBAM charges without full credit for domestic climate efforts, fuelling concerns about discriminatory treatment[108]. This ambivalence underscores the fragility of CBAM's claim to broad acceptance even among advanced economies.

CBAM also can be considered in the context of the WTO Agreement on Subsidies and Countervailing Measures (SCM Agreement), as climate policy increasingly relies on financial support alongside carbon pricing. Within the EU, decarbonisation is promoted through extensive national and EU-level subsidies, and free allocation under the EU ETS has often been characterised as having subsidy-like effects by shielding installations from full carbon-cost exposure. The proposed Temporary Decarbonisation Fund may further reinforce this perception by providing targeted support to vulnerable CBAM sectors during the phase-out of free allowances. Conversely, the absence of carbon constraints in some exporting countries, often combined with explicit fossil-fuel subsidies, can be seen as an implicit competitive advantage akin to subsidising carbon-intensive production.

In sum, CBAM's WTO compatibility is **plausible but vulnerable**. WTO law does not preclude unilateral environmental trade measures, nor does it categorically reject reference to NPR-PPMs. However, CBAM's legality will hinge on its **application in practice**, particularly under the Article XX chapeau. Flexibility in recognising different climate policy approaches, procedural fairness in administration, genuine efforts at cooperation, and sensitivity to differing national circumstances will be decisive. Without these elements, CBAM risks being perceived, and potentially adjudicated, not as a legitimate climate measure, but as a disguised restriction on international trade.

Beyond its compatibility with World Trade Organization rules, the European Union's Carbon Border Adjustment Mechanism must also be situated within the broader framework of international climate and environmental governance. The EU has repeatedly framed CBAM as an instrument necessary to safeguard the integrity of its climate ambition and to deliver on

106 Government of India, Ministry of Commerce statements on CBAM (2023).

107 BASIC Joint Statement on Climate Change (2021)

108 U.S. Congressional Research Service (2023). *Carbon Border Adjustment Mechanisms: Considerations for Congress.*

internationally agreed objectives to mitigate anthropogenic climate change. Those objectives are anchored primarily in the United Nations Framework Convention on Climate Change (UNFCCC) and the Paris Agreement. Yet the unilateral nature of CBAM creates a persistent tension between the EU's climate leadership narrative and long-standing international caution toward unilateral trade measures used to address global environmental problems.

The UNFCCC and the Paris Agreement differ fundamentally from the WTO in institutional design, legal structure, and enforcement logic. The WTO is a rules-based system governing cross-border trade in goods and services, backed by a highly developed dispute settlement mechanism and the possibility of authorised retaliation. Even if now the Dispute Settlement body is blocked by (the climate sceptic) American administration, the EU is adhering to an interim dispute resolution arrangement of equal stringency[109]. By contrast, the UNFCCC and the Paris Agreement are cooperation-oriented regimes centred on voluntary commitments, nationally determined contributions (NDCs), and peer pressure rather than coercive enforcement. This institutional asymmetry explains how unilateral measures such as the CBAM are perceived and contested at the international level[110].

Article 3(5) of the UNFCCC is particularly relevant. It provides that Parties "should cooperate to promote a supportive and open international economic system" and that measures taken to combat climate change, "including unilateral ones," should not constitute arbitrary or unjustifiable discrimination or a disguised restriction on international trade[111]. The language closely mirrors the chapeau of Article XX of the General Agreement on Tariffs and Trade (GATT), underscoring an early effort to reconcile environmental action with trade openness. Importantly, Article 3(5) does not prohibit unilateral climate measures outright; rather, it conditions their legitimacy on non-discrimination and good faith application. This conditional acceptance reflects a political compromise reached in 1992, driven by concerns among developing countries that environmental objectives could be instrumentalised as trade barriers.

The Paris Agreement builds on this framework but does not introduce operational rules governing trade measures. Its architecture is based on nationally determined contributions, reflecting respect for national sovereignty over mitigation pathways[112]. Paris Agreement therefore addresses emissions primarily on an origin basis, within the territory of each Party, whereas CBAM operates on a destination basis, conditioning market access on the carbon intensity of imported products[113]. This structural divergence explains why CBAM, though arguably aligned with the environmental objectives of Paris

109 Multi-Party Interim Appeal Arbitration Arrangement (MPIA); https://www.wto.org/english/tratop_e/dispu_e/altds_e.htm

110 Keohane, R. O., & Victor, D. G. (2016). Cooperation and discord in global climate policy. *Nature Climate Change*, 6(6), 570–575.

111 UNFCCC, Article 3(5), 1992.

112 Paris Agreement, Articles 2–4, 2015

113 Durán, Gracia Marín. "Securing compatibility of carbon border adjustments with the multilateral climate and trade regimes." *International & Comparative Law Quarterly* 72.1 (2023): 73-103.

Agreement, is not explicitly mandated or endorsed by it[114]. The absence of trade-related provisions in Paris Agreement also means that CBAM cannot rely on it the as a direct legal shield against trade challenges.

This tension is reinforced by earlier multilateral environmental declarations, notably the 1992 Rio Declaration on Environment and Development and the outcome document of the 2012 Rio+20 Conference, *The Future We Want*. Principle 12 of the Rio Declaration explicitly cautions that unilateral actions to deal with environmental challenges outside the jurisdiction of the importing country "should be avoided" and that global environmental problems should, as far as possible, be addressed on the basis of international consensus. Similar language appears in *The Future We Want*, which urges states to refrain from unilateral economic, financial, or trade measures to address environmental challenges beyond their jurisdiction[115]. These texts were negotiated with strong EU involvement and support, and they remain central reference points in contemporary diplomatic debates.

CBAM therefore operates in a normative environment that is, at best, ambivalent toward unilateral trade measures. Legally, CBAM must be defended primarily through WTO law, particularly under GATT Article XX. Politically and diplomatically, however, it is assessed against climate and sustainable-development norms that privilege cooperation, differentiation, and consensus. This dual evaluation explains why CBAM is simultaneously defended by the EU as a climate-integrity measure and criticised by many partners as an instance of "green protectionism" or regulatory overreach

The political sensitivity of unilaterality has been particularly visible in UNFCCC discussions on "response measures" - the adverse economic impacts of climate policies adopted by others. Developing countries have consistently raised concerns that unilateral climate measures affecting trade undermine the principle of common but differentiated responsibilities and respective capabilities (CBDR-RC)[116]. From this perspective, CBAM is seen as shifting adjustment costs onto countries with limited historical responsibility for emissions and constrained capacity to decarbonise[117]. The fact that CBAM conditions access to the EU market on compliance with EU-defined methodologies for emissions accounting further reinforces perceptions of this asymmetry. Different approaches to calculating embedded emissions

114 "Nothing in the Paris Climate Agreement formally opposes the implementation of such an instrument. The agreement recognizes the diversity of situations, calls for action by all countries without requiring uniformity or equivalence of effort; but nevertheless enjoins countries to take strong and rapid action that is capable of putting them on the path to carbon neutrality before the end of the century, and proposes a set of procedures based on trust, cooperation and accountability". Colombier, M., Voituriez, T., & Levaï, D. (2021). *Europe's Carbon Border Adjustment Mechanism: the need for an improved dialogue prior to project finalization* (Policy Brief No. 01/21). IDDRI. https://www.iddri.org/en/publications-and-events/other-publication/europes-carbon-border-adjustment-mechanism-need-improved; p.4

115 United Nations, *The Future We Want*, para. 58(j), 2012.

116 UNFCCC, Subsidiary Body discussions on response measures; see also Brandi, C., & Helble, M. (2011). Climate change and trade. *World Economy*, 34(11), 1837–1862.

117 Venzke, Ingo and Vidigal, Geraldo, Are Trade Measures to Tackle the Climate Crisis the End of Differentiated Responsibilities? The Case of the EU Carbon Border Adjustment Mechanism (CBAM) (January 10, 2022). Amsterdam Law School Legal Studies Research Paper No. 2022-02. A revised version of this paper is available in 51 Netherlands Yearbook of International Law 2020 187, Available at SSRN: https://ssrn.com/abstract=4013767 or http://dx.doi.org/10.2139/ssrn.4013767

and determining effective carbon prices make it difficult to ensure that CBAM is perceived as fair and consistent with the specific circumstances of developing countries. This concern underlies the initiative presented already in 2023 by WTO Director-General Ngozi Okonjo-Iweala to launch a global carbon pricing task force[118]. The aim was to develop within WTO shared methodologies so that border measures, including CBAM, based on embedded emissions do not disproportionately or unfairly penalise developing countries, whose policy frameworks and capacities often differ from those of advanced economies. Establishing harmonised approaches to carbon accounting and pricing would therefore reduce uncertainty, improve transparency, and support a more cooperative alignment between climate policy and international trade.

These concerns have resurfaced forcefully in the lead-up to COP30 in Belém, where trade measures - including carbon border adjustments and deforestation-related import regulations, emerged as a contentious issue, with several developing countries pressing for their formal recognition on the agenda[119]. Although no binding outcome emerged, the agreement to hold dedicated dialogues on trade and climate reflects the persistence of unease with unilateral instruments. The final COP30 outcome reiterated earlier language that climate measures, including unilateral ones, should not constitute arbitrary or unjustifiable discrimination or disguised restrictions on trade, effectively restating the long-standing compromise rather than resolving it.

From the EU's perspective, CBAM's unilaterality is presented as a second-best response to insufficient global coordination on carbon pricing. EU institutions argue that the mechanism is compatible with both WTO law and international climate objectives because it is non-discriminatory in form, environmentally motivated, and open to crediting foreign carbon prices. Yet this justification does not fully address the political critique that CBAM relies on coercion to promote cooperation. Encouraging other Parties to adopt explicit carbon pricing or EU-equivalent methodologies goes beyond the Paris Agreement's emphasis on nationally determined policy choices.

* * *

The legal and political relevance therefore lies not in a binary assessment of legality, but in the cumulative risk it poses to the legitimacy and stability of the CBAM regime. WTO jurisprudence suggests that unilateral environmental measures can survive legal scrutiny if applied flexibly, transparently, and with genuine efforts at international cooperation. Climate multilateralism, however, places additional weight on equity, differentiation, and process. A rigid or overly prescriptive application of CBAM could undermine trust in multilateral climate cooperation even if it ultimately survives WTO adjudication. In this sense, CBAM exemplifies a broader structural challenge

118 https://www.reuters.com/sustainability/wto-launching-global-carbon-price-task-force-okonjo-iweala-2023-10-17/

119 IISD, *COP30 Outcome: What It Means and What's Next*, 2025.

at the climate-trade interface: the gap between urgent domestic climate action and the slow, consensus-based nature of multilateral environmental governance. The EU's decision to proceed unilaterally reflects frustration with that gap, but it also amplifies long-standing concerns embedded in international environmental agreements themselves.

Opportunities associated with CBAM in the context of WTO compatibility lie in the EU's attempt to anchor ambitious climate action within existing trade rules by designing the mechanism to mirror domestic carbon pricing and to rely on recognised environmental exceptions under GATT Article XX. If carefully applied, CBAM could contribute to the gradual evolution of WTO jurisprudence toward greater accommodation of climate objectives and encourage dialogue on reconciling trade rules with global decarbonisation. **The central challenge** is legal and normative alignment: CBAM operates as a unilateral instrument in a system that traditionally favours multilateral solutions, affects negatively the UNFCCC preference for cooperative approaches and the principle of common but differentiated responsibilities. **The risks** are related to political reactions. If CBAM is perceived as coercive, insufficiently attentive to development constraints, it may trigger WTO disputes, provoke retaliatory measures, and deepen tensions between climate multilateralism and the trade regime, ultimately weakening both the legitimacy and effectiveness of climate-related trade measures.

Trade Between Unequal Partners

International trade theory has long recognised that trade between unequal partners, where one economy is large, diversified and industrialised, while the other is small, less diversified and often dependent on a narrow range of exports, results in **asymmetric adjustment of burdens**. While comparative advantage ensures that both parties may gain from trade in efficiency terms, the **distribution of gains and losses** depends critically on relative market size, elasticity of supply and demand, and the ability to absorb shocks.[120] These asymmetries may have an impact on carbon flows embedded in traded goods when a large economy - the EU - introduces a CBAM applied to trade with smaller and less advanced economies.

In standard trade models, a **large country, meaning** one that can influence world prices, differs fundamentally from a small price-taking economy. When a large country imposes a tariff on imports, it reduces its demand for foreign goods, thereby pushing down the world price of those goods.[121] As a result, the domestic price in the importing country rises by **less than the full tariff**, because part of the burden is shifted onto foreign exporters through a deterioration of their terms of trade. This mechanism implies that exporters from the smaller country receive a lower net price, even before accounting for any reduction in export volumes.

120 Krugman, P. R., Obstfeld, M., & Melitz, M. J. (2018). *International Economics: Theory and Policy*, 10th ed., Pearson, chs. 5–6

121 Feenstra, R. (2016). *Advanced International Trade: Theory and Evidence*, Princeton University Press, ch. 7.

The classic textbook result is unambiguous: while the large importing country may experience a welfare gain if the improvement in its terms of trade and tariff revenue outweighs domestic deadweight losses, the smaller exporting country **rather loses**[122]. It faces lower export prices, reduced export volumes, and contractionary pressures in its export sector. This asymmetry is precisely why economists have long cautioned against evaluating trade policies solely from the perspective of the imposing country's welfare.

The CBAM, although motivated by climate policy objectives rather than revenue or protectionism per se, operates economically as a **border charge on imports** and therefore follows similar to tariff logic. As the EU is one of the world's largest import markets, particularly for carbon-intensive basic materials such as steel, aluminium, cement and fertilisers, it possesses the structural capacity to influence world prices. When CBAM raises the cost of access to the EU market, part of the adjustment can be expected to occur **outside the EU**, through lower export prices received by foreign suppliers[123].

This effect is likely to be strongest for **small Lower and Middle Income Countries (LMICs)** that export relatively homogeneous, carbon-intensive products and act as **price takers** in global commodity markets. In such cases, exporters have limited scope to pass the CBAM cost forward to EU buyers, especially when alternative suppliers or substitute products are available. The adjustment therefore occurs through a combination of **price compression,** lower unit export prices, and **volume contraction**, as some exports become uncompetitive[124].

Importantly, this dynamic does not apply symmetrically across all trading partners. Large and diversified economies, such as the United States, China, Japan, India, Brazil or Korea, are better positioned to absorb CBAM-related shocks. They may try to redirect exports to alternative markets, reshuffle production toward lower-carbon installations, or finance decarbonisation investments and introduce domestic carbon pricing systems that reduce CBAM liabilities. It might not be easy, and there might be a negative impact of CBAM on prices in their case.[125] They also can exercise political pressure on the EU to compensate in one way or another. As recent negotiations with the US have shown, that even the EU is vulnerable in such situations. Small and poorer economies alone often lack these options. Their export structures are narrower, access to capital is limited, and domestic energy systems may constrain rapid decarbonisation, and administrative capacity

122 Bhagwati, J. (1988). *Protectionism*, MIT Press, ch. 2

123 Trade theory shows that when a large importing economy imposes a tariff or tariff-equivalent measure, it can reduce world prices and shift part of the burden onto exporters through terms-of-trade effects, leaving smaller trading partners unambiguously worse off (Johnson 1953; Krugman, Obstfeld and Melitz 2018; Feenstra 2016). These effects are amplified in sectors characterised by persistent global overcapacity, such as steel and aluminium, where depressed world prices and excess supply interact with climate and trade measures (OECD 2019; 2021; 2023; European Commission 2023).

124 Dornbusch, R., Fischer, S., & Samuelson, P. A. (1977). "Comparative Advantage, Trade, and Payments," *American Economic Review*, 67(5), 823–839.

125 Chepeliev, M. (2021). Possible Implications of the European Carbon Border Adjustment Mechanism for Ukraine and Other EU Trading Partners. *Energy RESEARCH LETTERS*, *2*(1). https://erl.scholasticahq.com/article/21527-possible-implications-of-the-european-carbon-border-adjustment-mechanism-for-ukraine-and-other-eu-trading-partners

is not strong enough to efficiently run a domestic carbon pricing scheme. As a result, CBAM may function for them less as an incentive to decarbonise and more as a **negative demand shock** imposed by a dominant trading partner[126].

From a distributional perspective, this reinforces concerns about the **regressive international incidence** of CBAM. While the EU may experience relatively modest internal price adjustments, some countries may experience a greater share of the burden through lower export revenues and lost market access[127]. This outcome is especially likely if part of the cost is shifted backward onto exporters consistently with standard tariff-incidence theory, and as a result small exporting countries could bear a disproportionate burden. It raises not only economic, but also normative questions because measure is justified on global environmental grounds.

* * *

Border measures imposed by large economies on climate grounds may be perceived by smaller partners as unilateral and coercive, particularly when they lack the capacity to respond symmetrically. Even if CBAM is formally non-discriminatory, its **effects de facto** may be highly asymmetric. This tension helps explain why many developing countries frame CBAM as a form of "green protectionism," notwithstanding its environmental rationale. There is also a side effect of CBAM's impact on import prices within the EU. If they fall, CBAM is not fully protecting EU companies in terms of levelling the playing field.

Opportunities in the context of trade between unequal partners arise from CBAM's potential to internalise carbon costs in a manner that reflects relative emissions performance rather than formal country status, thereby rewarding cleaner production wherever it occurs and encouraging efficiency improvements even in export-oriented sectors of small developing economies. **The challenges** are fundamentally distributive and structural: as a large market, the EU can shift part of the CBAM burden onto smaller trading partners through adverse terms-of-trade effects, while limited access to capital, technology, and alternative markets constrains their ability to adjust through decarbonisation rather than price or volume reductions. **The risks** are political. Persistent asymmetries in adjustment capacity may reinforce perceptions of CBAM as a unilateral instrument that imposes disproportionate costs on weaker partners, eroding trust and cooperation in

126 UNCTAD (2021). *A European Union Carbon Border Adjustment Mechanism: Implications for Developing Countries*

127 International Monetary Fund (IMF). *The EU's Carbon Border Adjustment Mechanism: Implications for Member States and Trading Partners*. IMF Working Paper No. WP/25/125, European Department, prepared by Geoffroy Dolphin and Gianluigi Ferrucci (Washington, DC: International Monetary Fund, 2025), available at: https://www.imf.org/-/media/files/publications/wp/2025/english/wpiea2025125-print-pdf.pdf.

the trade-climate nexus.

Reverse Carbon Leakage

The concept of **reverse carbon leakage** is hardly present in the academic and policy debate on carbon border adjustments. But it should serve as a useful counterpoint to the traditional leakage narrative. While conventional carbon leakage refers to the relocation of carbon-intensive production from jurisdictions with stringent climate policies to those with weaker constraints, reverse carbon leakage describes a situation in which **border measures designed to prevent leakage inadvertently prolong carbon-intensive production within the regulating jurisdiction itself.**[128]

The core mechanism underlying reverse carbon leakage is straightforward. CBAM as a border measure **shields domestic producers from international competition** by imposing a carbon-related charge on imports and, at the same time, reducing the supply of these products allowing domestic producer to fill the gap between supply and demand. If this shielding effect is strong, and if domestic decarbonisation pathways remain technologically uncertain, capital-intensive, firms may find it economically rational to continue operating existing carbon-intensive installations rather than undertaking costly transformation. In such circumstances, CBAM can reduce the pressure to exit or upgrade legacy production, effectively slowing down the pace of structural change.[129] The policy thus risks shifting emphasis from **transformation** to **protection**, even if unintentionally.

One may distinguish between "helpful" and "harmful" forms of reverse carbon leakage. If CBAM induces import substitution primarily through higher costs but does not accelerate technological upgrading, it may contribute to harmful reverse leakage by prolonging carbon-intensive production inside the EU without reducing global emissions. Conversely, if border adjustment supports the scaling of genuinely low-carbon industrial processes, reverse leakage can be helpful in the sense of shifting demand toward cleaner production and reducing total emissions[130]. **Harmful reverse carbon leakage** arises when border protection merely preserves incumbent high-emission production without accelerating innovation or emissions reductions[131]. For example, if a steel producer relying on blast furnace technology faces reduced import competition due to CBAM but does not face sufficiently strong internal carbon constraints or credible expectations of rising carbon prices, the firm may delay investment in low-carbon alternatives such as hydrogen-based

128 Brunel, C., Levinson, A., & Taylor, M. S. (2016). *Pollution offshoring and emission reductions in developed countries*. Journal of Environmental Economics and Management, 77, 85–103

129 Cosbey, A., Droege, S., Fischer, C., & Munnings, C. (2019). *Developing guidance for implementing border carbon adjustments*. Energy Policy, 132, 556–566.

130 Young, T, Xue, M, Tang, W. (2026). When carrots meet sticks: Reverse carbon leakage driven by carbon regulation conflicts in Journal of Management Science and Engineering 11/2 275-287 https://doi.org/10.1016/j.jmse.2026.03.002

131 Ambec, S., Esposito, F., & Pacelli, A. (2024). The economics of carbon leakage mitigation policies. *Journal of Environmental Economics and Management*, 125, 102973. https://doi.org/10.1016/j.jeem.2024.102973

direct reduction of iron. In this case, emissions are not reduced more quickly than they would have been without CBAM; instead, the policy may entrench existing production patterns[132]. Such outcomes are most likely if the domestic carbon price is volatile or politically constrained, if free allocation persists for too long, or if complementary innovation and infrastructure policies lag behind.

By contrast, "**helpful" reverse carbon leakage** can occur when border measures buy time for domestic industries to decarbonise under credible and tightening internal constraints. In this interpretation, temporary shielding from high-carbon imports prevents abrupt loss of market share and capital destruction, while a steadily tightening emissions cap and targeted public support push firms to invest in cleaner technologies.[133] For example, CBAM combined with a declining ETS cap, predictable carbon price trajectories, and public funding for first-of-a-kind low-carbon cement or steel plants can sustain domestic production during a transition phase, while ensuring that continued operation is conditional on genuine emissions reductions. In this case, reverse leakage is not a failure but a **transitional feature** that supports orderly decarbonisation rather than carbon lock-in.

Whether CBAM leads to harmful or helpful reverse carbon leakage depends on its **interaction with European climate policy**. Border measures alone cannot deliver decarbonisation; it can only reshape competitive conditions.[134] The decisive factor remains the strength and credibility of ETS carbon constraints, particularly the emissions cap and long-term climate target. If the cap tightens as planned and free allocations are phased out on schedule, the incentive to maintain carbon-intensive production diminishes even under border protection. Conversely, if political pressure weakens the ETS or delays key reforms, CBAM may unintentionally function as a protective device that undermines long-term climate objectives.

* * *

Reverse carbon leakage highlights a central trade-off in CBAM design. While the mechanism aims to prevent emissions from relocating abroad, it must also avoid **slowing the exit from carbon-intensive production at home.** Recognising this risk does not invalidate the importance of CBAM, but it reinforces the argument of aligning border measures with ambitious, credible, and time-consistent domestic decarbonisation policies.

Opportunities associated with reverse carbon leakage lie in using CBAM as a transitional instrument that preserves competitiveness while buying time for deep technological transformation. When combined with a tightening ETS cap and targeted support for low-carbon innovation, CBAM can help ensure that protection at the border does not translate into complacency.

132 Fowlie, M., Reguant, M., & Ryan, S. P. (2016). *Market-based emissions regulation and industry dynamics*. Journal of Political Economy, 124(1), 249–302.

133 Aghion, P., Dechezleprêtre, A., Hémous, D., Martin, R., & Van Reenen, J. (2016). *Carbon taxes, path dependency, and directed technical change*. Journal of Political Economy, 124(1), 1–51

134 Mehling, M., van Asselt, H., Droege, S., Das, K., & Verkuijl, C. (2019). *Designing border carbon adjustments for enhanced climate action*. American Journal of International Law, 113(3), 433–481.

The challenges are related to policy coordination: avoiding the unintended prolongation of carbon-intensive production requires credible signals that border protection will not substitute for domestic phase-out, and that high-emission processes face steadily increasing pressure to transform or exit. **The risks** are linked to consistency. If CBAM dampens competitive pressure without sufficiently accelerating low-carbon deployment, it may entrench legacy technologies, delay capital reallocation, and ultimately weaken both domestic decarbonisation and global emissions outcomes in the presence of inward inertia.

Carbon Diversion

In principle, CBAM is expected to induce **trade creation** in favour of low-carbon products and producers, while discouraging imports of carbon-intensive goods. From the EU's perspective, this is a desired outcome: imports increasingly reflect cleaner production methods, and EU climate ambition is not undermined by carbon-intensive substitution[135]. It should be noted that CBAM affects countries via the impact on particular exporters who might have different levels of carbon intensity of production even within the same country. In larger economies there might be a significant number of facilities having different carbon intensities of their production. CBAM will not affect them in a uniform manner. Those that are more carbon efficient may increase prices and those who are more carbon intensive could face a decline in prices of their exports. It is confirmed by a study of steel exports from India[136], even before CBAM is really in place. However, this mechanism implicitly assumes that exporting countries can respond to CBAM through **resource shuffling**, technological upgrading, or the introduction of domestic carbon pricing[137]. While such responses may be feasible for large, diversified economies with access to capital and technology, they are far less realistic for LMICs with narrow industrial bases and limited fiscal space[138]. For these economies, predominantly CBAM does not primarily function as an incentive to decarbonise production for the EU market. Instead, it risks operating as a **trade-diverting instrument,** redirecting exports away from the EU toward markets where carbon is not priced at the border, with limited or no impact on global emissions.

For these countries, the cost of compliance with CBAM, covering emissions monitoring, reporting and verification, third-party certification under EU methodologies, and ultimately the purchase of CBAM certificates, can be

135 European Commission. *Impact Assessment accompanying the proposal for a Carbon Border Adjustment Mechanism* (SWD(2021) 643 final).

136 "High-emission-intensity firms have seen a statistically significant decline in both average shipment sizes and unit prices in their CBAM product exports to the EU, whereas low-emission-intensity firms maintained volumes and achieved modest price increases. This suggests CBAM is already differentiating between cleaner and more carbon-intensive producers, in line with policy objectives." See: Vriz, Gian Luca and Cojoianu, Theodor and Fischer, Carolyn and Taschini, Luca, Early Signs the EU Carbon Border Adjustment Mechanism Is Reshaping EU-India Steel Trade (September 24, 2025). Available at SSRN: https://ssrn.com/abstract=5524624 or http://dx.doi.org/10.2139/ssrn.5524624 page 9.

137 See Assous A., Vanegas-Hernandez M., Woods D., Barre C., Sandbag/KAS (2025)., *The EU CBAM: Two-way Street to Climate Integrity*.

138 Cosbey, A., Droege, S., Fischer, C., & Munnings, C. (2019). *Developing guidance for implementing border carbon adjustments*. Energy Policy, 132, 556–566

prohibitive relative to export margins[139]. The alternative strategy, namely adopting a domestic carbon price to offset CBAM obligations, poses even greater challenges. Implementing an economy-wide carbon pricing mechanism at a level comparable to the EU ETS would impose significant costs on domestic production and consumption, with potentially regressive social impacts and limited administrative feasibility[140]. As a result, many LMICs exporters face a constrained choice set: absorb the CBAM cost and weaken competitiveness in the EU market, or **divert exports to alternative destinations** where no comparable carbon cost applies.

From a global climate perspective, this adjustment pathway raises concerns about **carbon diversion rather than carbon reduction.** If carbon-intensive production continues unchanged but is redirected to other markets, global emissions remain largely unaffected. The EU may record lower embedded emissions in its imports, but the emissions associated with LMICs' production persist elsewhere. This outcome is consistent with the literature on trade diversion in preferential trade regimes, where discriminatory measures alter trade flows without necessarily changing underlying production technologies[141]. In the CBAM context, the risk is that climate ambition is "contained" within the EU market, while emissions are reallocated geographically.

At the same time, CBAM is likely to generate **trade creation effects** in favour of producers – who are often located in more advanced economies that already operate low-carbon installations or have the capacity to invest rapidly in cleaner technologies. These producers can maintain or expand access to the EU market with minimal CBAM liability, reinforcing their competitive position[142]. While this may support global diffusion of low-carbon production in the long run, it also risks **marginalising poorer exporters** that historically relied on carbon-intensive, energy-based comparative advantages and now face a shrinking set of viable export markets.

There is a structural asymmetry in CBAM's incentives. For capital-rich economies, CBAM can act as a catalyst for decarbonisation and market reorientation. For capital-constrained LMICs, it is more likely to function as a **market access constraint**, inducing export diversion rather than technological change[143]. Without complementary measures, such as targeted financial support, technology transfer, or additional arrangements, CBAM may therefore achieve **EU-level decarbonisation gains at the expense of development opportunities**, while delivering smaller net benefits in terms of global emissions reduction.

139 Brenton, P., Edwards-Jones, G., & Jensen, M. F. (2009). *Carbon labelling and low-income country exports*. World Development, 37(2), 356–366.

140 World Bank. *State and Trends of Carbon Pricing* (various editions).

141 Viner, J. (1950). *The Customs Union Issue*. Carnegie Endowment for International Peace.

142 Mehling, M., van Asselt, H., Droege, S., Das, K., & Verkuijl, C. (2019). *Designing border carbon adjustments for enhanced climate action*. American Journal of International Law, 113(3), 433–481.

143 UNCTAD. *A European Union Carbon Border Adjustment Mechanism: Implications for Developing Countries* (2021).

* * *

CBAM may induce producers to reallocate low-emission output toward the EU market while directing higher-emission output to other markets. This can improve the emissions profile of EU imports without necessarily reducing global emissions, particularly if global demand for the products remains robust. Effective anti-circumvention and credible MRV can reduce but not eliminate this risk. In this sense, CBAM illustrates a broader tension between climate-driven trade measures and development economics: when adjustment costs are unevenly distributed, market-based climate instruments may reallocate trade flows more effectively than they reallocate technologies. Recognising this dilemma is essential for assessing CBAM's trade and climate impacts beyond the EU border.

Opportunities associated with trade and carbon diversion lie in CBAM's ability to reshape EU import patterns toward lower-emission production and to signal that carbon intensity increasingly matters for market access in major economies. This can strengthen incentives for cleaner production where adjustment capacity exists and reinforce the EU's climate objectives within its internal market. **The challenges** are distributive: uneven access to capital, technology, and alternative markets means that many exporters, particularly in LMICs, could respond through trade reorientation rather than decarbonisation, while resource shuffling can dilute global mitigation effects. **The risks** can be resulting from possible reaction of countries affected negatively. If CBAM primarily redirects carbon-intensive goods to other markets rather than reducing their production, it may generate carbon diversion instead of carbon abatement and exacerbate development and geopolitical tensions. In such a scenario, EU partners can criticise CBAM as a tool of trade reallocation and not consider it as an instrument of global climate transition.

Downstream Carbon Leakage and Effective Carbon Protection

A central difficulty arises in downstream value chains. CBAM initially covers basic materials and selected intermediates. Downstream producers within the EU - such as manufacturers of vehicles, machinery, appliances, or construction components - may face higher input costs as CBAM raises the domestic price of steel, aluminium or cement[144]. If competing imported finished goods are not subject to equivalent border charges for embedded emissions in their inputs, EU downstream firms can experience a relative disadvantage[145]. Economically, this resembles classic effective-rate-of-protection problems: charging inputs while leaving final goods unadjusted

144 Dechezleprêtre, A. et al. (2025), "Carbon Border Adjustments: The potential effects of the EU CBAM along the supply chain", *OECD Science, Technology and Industry Working Papers*, No. 2025/02, OECD Publishing, Paris, https://doi.org/10.1787/e8c3d060-en.

145 Silvia Márquez Thibaut, (2025), "Carbon border adjustment mechanism : a trade-off between climate goals and competitiveness?: a quantitative study of downstream exposure in the German automotive industry", College of Europe, dissertation.

can produce ‘negative carbon protection’ for domestic processing stages. This is one reason why the Commission has presented a proposal to extend CBAM to selected downstream products[146]. One would expect that debates about extending CBAM to many more downstream goods are likely to intensify during legislative negotiation in the Parliament and the Council and as the definitive operation of CBAM brings noticeable effects.

Standard trade theory distinguishes between **nominal protection**, the tariff or charge applied to a specific product, and **effective protection**, which measures how a policy affects the value added generated by domestic producers once input costs are taken into account. The concept of the **effective rate of protection (ERP)** was developed precisely to address situations in which tariffs on intermediate inputs alter production incentives in ways not captured by nominal rates[147]. Formally, the ERP measures the percentage change in domestic value added caused by a tariff structure. When tariffs (or equivalent charges) on inputs exceed those on outputs, the ERP for downstream processing can be zero or negative, meaning that domestic value added is effectively taxed rather than protected. This insight is central to understanding CBAM’s downstream effects. Although CBAM is not a tariff in a legal sense, it operates economically like a **border charge on intermediate inputs**, raising their domestic price relative to world prices.

In its initial phase, CBAM applies primarily to **low-processed, upstream products** such as cement clinker, basic iron and steel products, aluminium, fertilisers, electricity and hydrogen, reflecting administrative feasibility and alignment with the EU ETS. This created a structurally important asymmetry: **many downstream goods that intensively use CBAM-covered inputs remained outside the mechanism’s scope**. Rather than the relocation of basic material production abroad, the concern is that **EU downstream manufacturing activities may become less competitive relative to imported finished goods**, even when those goods embody the same or higher carbon emissions embedded in earlier stages of production. In trade theory terms, CBAM risks generating **negative effective carbon protection** for downstream sectors, analogous to the well-known case of negative effective rates of tariff protection when intermediate inputs are taxed more

146 See Annex I to the Proposal for a Regulation amending Regulation (EU) 2023/956 as regards the extension of its scope to downstream goods and anti-circumvention measures COM(2025) 989 final Brussels, 17.12.2025; The proposal adds 180 specific CN codes, mainly targeting downstream products with high steel or aluminium content (on average 79% by weight). The vast majority, 94%, of these downstream goods concerned are industrial supply chain products with a high (on average 79%) steel and aluminium content, used in heavy machinery and specialised equipment, such as base metal mountings, cylinders, industrial radiators, or machines for casting. A small share, 6%, of the downstream goods concerned are also household goods.

147 Calculating effective rate of protection (ERP)in the context of CBAM
Formula of ERP =
Let assume simplified parameters to illustrate the issue of ERP in the context of CBAM:
t_{icbam} - CBAM cost on imported inputs for production of downstream product (X): **20%**
t_f-Tariff on the final downstream product (X): **10%**
a - Share of imported CBAM-covered inputs in the final product (X) price: **60%**

$$\text{ERP} = \frac{10\% - 0{,}6 \cdot 20\%}{1 - 0{,}6} = -30\%$$

Considering this simple numerical example it could be said that CBAM potentially affects imports of downstream goods with significant negative effective rate of protection.

heavily than final goods.[148]

Applying ERP logic to carbon pricing reveals a parallel concept: **effective carbon protection.** This refers to the degree to which carbon costs are neutralised across value chains. If carbon is priced at the border only for basic inputs, but not for downstream goods that use those inputs, the policy may protect upstream producers while disadvantaging downstream manufacturers. This is not a theoretical curiosity but a predictable outcome of partial border coverage in vertically integrated trade structures.

The mechanism through which downstream carbon leakage may occur is straightforward. CBAM raises the cost of importing carbon-intensive basic materials into the European Union. Its downstream producers, such as construction firms, machinery manufacturers, automotive producers, or fertiliser-using agricultural sectors, purchase these inputs at higher prices, whether sourced domestically or imported, since CBAM tends to lift the internal EU price of the covered materials.[149]

From a trade perspective, this asymmetry can lead to **substitution away from EU downstream production toward imports of finished goods**, even if those goods embody similar or greater carbon emissions. Production is not relocated at the level of basic materials, the focus of traditional carbon leakage, but rather at later stages of the value chain. The **carbon diversion effect of CBAM** highlights a related but broader concern: that emissions may be **reallocated not only geographically but also along the value chain.**[150] Downstream carbon leakage represents a specific manifestation of this logic. Carbon emissions associated with basic materials production may still occur abroad, but instead of being embodied in exports of basic materials to the EU (and thus priced under CBAM), they are embodied in more processed goods exported to the EU without a carbon charge. It closely mirrors classic trade diversion in the sense described by Viner[151], but with carbon intensity rather than nationality as the basis for discrimination. The difference is that, in the CBAM context, trade diversion can also imply **emissions diversion**, undermining the global environmental effectiveness of the policy.

This creates pressure for **scope expansion**, extending CBAM coverage to downstream goods. However, expansion raises substantial challenges. Administratively, calculating embedded emissions for complex manufactured goods with global supply chains is far more demanding than for basic

148 Barber, C. L., & Corden, W. M. (1966). *The Structure of a Tariff System and the Effective Protective Rate*. Journal of Political Economy.

149 Cosbey, A., Droege, S., Fischer, C., & Munnings, C. (2019). Developing Guidance for Implementing Border Carbon Adjustments: Lessons, Cautions, and Research Needs from the Literature. *Review of Environmental Economics and Policy*, *13*(1), 3-22. https://doi.org/10.1093/reep/rey020

150 Böhringer, C., Carbone, J. C. & Rutherford, T. F. (2016). *The Strategic Value of Carbon Tariffs*. American Economic Journal: Economic Policy, 8(1), 28–51

151 Viner, J. (1950). *The Customs Union Issue*. Carnegie Endowment for International Peace

materials[152]. Legally, broader scope increases **WTO contestability**, as the link between product characteristics and production methods becomes more attenuated. Alternatively, complementary measures, such as rebates, free allocation analogues for downstream sectors, or targeted state aid, could be considered. Yet these options risk reintroducing distortions that CBAM was meant to eliminate and may conflict with state aid rules or international trade obligations.

* * *

The analysis of downstream carbon leakage and effective carbon protection highlights a central tension in CBAM design. By focusing on low-processed basic materials until now, CBAM addresses the most administratively tractable segment of carbon-intensive trade. Yet this focus also creates predictable distortions along value chains, analogous to those long analysed in tariff theory through the concept of effective protection. Economic theory suggests that **partial border measures are inherently prone to negative protection effects**. In the CBAM context, this translates into a risk that EU downstream manufacturing is disadvantaged relative to imported finished goods.

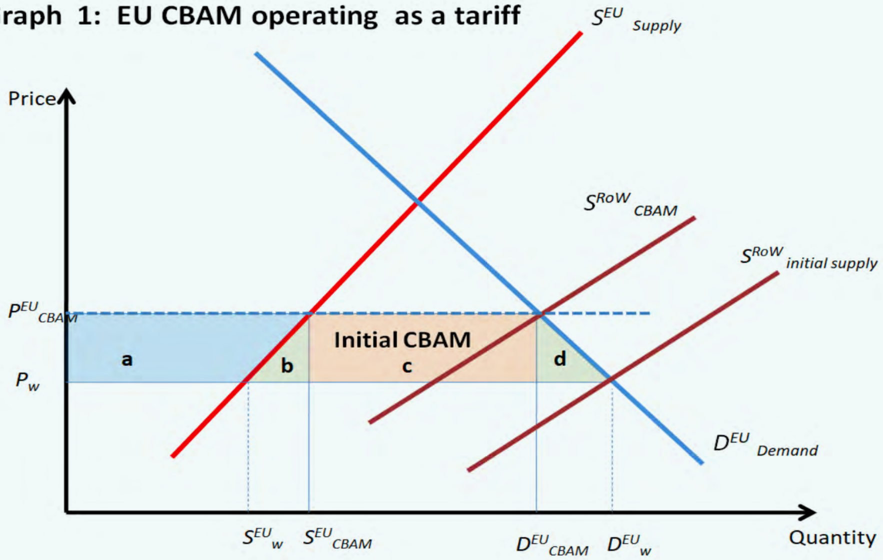
The principal opportunity in downstream leakage lies in the development and refinement of the EU CBAM to ensure effective carbon leakage protection to prevent the erosion of domestic mitigation. The Commission proposal of 17th December 2025 is just a first step. CBAM may also act as a catalyst for dialogue on carbon pricing independent of stages of transformation of products. **The challenges** relate to reconciling efficient border measures for upstream products with the avoidance of leakage via downstream goods. **The risks** are systemic. If CBAM is possible to bypass and as a reaction the larger set of products are covered, it may deepen trade tensions and provoke negative political responses.

152 It can be argued that the complexity costs more than offset the economic costs. Samuel Kortum & David Weisbach, 2017. "The Design of Border Adjustments for Carbon Prices," National Tax Journal, National Tax Association;National Tax Journal, vol. 70(2), pages 421-446, June DOI: 10.17310/ntj.2017.2.07

BOX: Trade effects of CBAM. Graphical Explanation

CBAM operates at the border and increases import costs like a tariff. Its economic effects can therefore be analysed using the traditional tariff framework. Standard graphical tools of tariff analysis, illustrating impacts on prices, quantities, and welfare distribution, can help understanding how CBAM affects trade and market outcomes.

Graph 1: EU CBAM operating as a tariff



Before introducing CBAM the world price (Pw), imports are represented by the gap between EU domestic supply at the world price (SEU) and EU demand at that price (DEU). After the introduction of CBAM, EU demand contracts to DEUCBAM, as consumers face a higher effective price (PEUCBAM). The higher price also induces an expansion of EU domestic supply to SEUCBAM. At the same time, exports from the Rest of the World (RoW) to the EU decline to the new import level, determined by the intersection of the RoW supply curve (adjusted for CBAM) and EU demand.

The area **a** represents gains for EU producers, as they can increase production and benefit from higher prices.

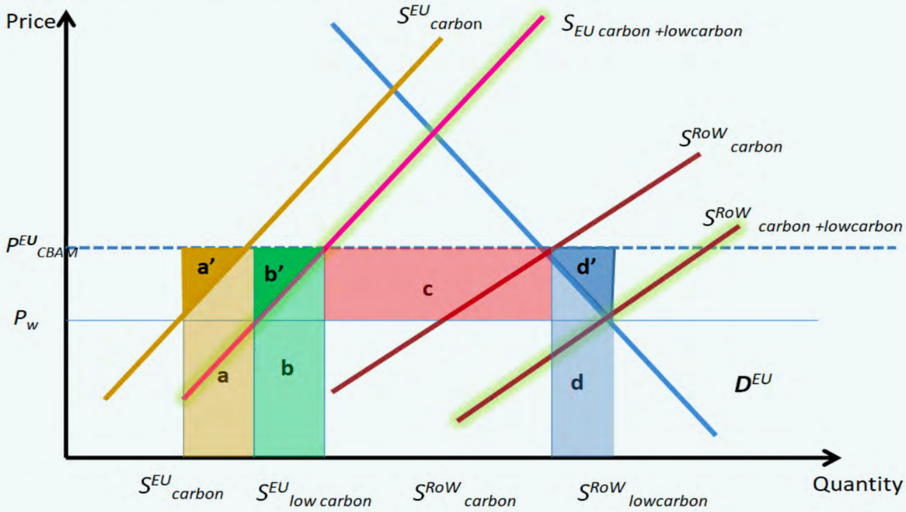
The area **b** reflects the additional production costs within the EU, since the expansion of domestic output occurs only due to the higher price.

The area **c**, often referred to as the “CBAM revenue,” represents the total payments for CBAM certificates and constitutes revenue for the EU public budget.

The area **d** captures the loss for the Rest of the World, as foreign producers export less to the EU market than before.

However, this framework needs to be adjusted to capture CBAM’s dual nature as both a trade measure and a climate policy instrument. What counts is not only the impact on trade but also on CO2 embedded in imported products and the differentiation in the process of production both in the EU and Rest of the World.

Graph 2: Separating impact of CBAM on carbon-intensive and low-carbon EU imports



The combined operation of the EU ETS and CBAM introduces a distinction between physically identical products based on their production methods and embedded emissions. As a result, domestic and foreign supplies of the same product must be treated differently depending on their carbon intensity. In the graphical representation, EU internal supply is therefore split into two components: carbon-intensive supply (SEUcarbon) and added low-carbon supply (SEUcarbon+lowcarbon). A similar distinction applies to the Rest of the World (RoW), with separate supply curves for carbon-intensive (SRoWcarbon) and added low-carbon production (SRoWcarbon+lowcarbon). Within the EU, this differentiation is driven by the ETS, which imposes a carbon cost on emissions. For foreign producers, CBAM creates a comparable distinction by increasing the cost of importing carbon-intensive goods while leaving low-carbon products largely unaffected. As a consequence, imports of carbon-intensive goods to the EU decline due to the additional cost imposed by CBAM, whereas low-carbon exports are not subject to this charge. For simplicity, the analysis distinguishes only between "carbon-intensive" and "low-carbon" goods, although in reality there is a continuum of products with varying levels of embedded emissions. If sufficient low-carbon production capacity exists globally, exporters may maintain or even expand their access to the EU market by supplying low-carbon products. This is one of the intended aims of CBAM: to encourage a shift toward low-carbon sourcing.

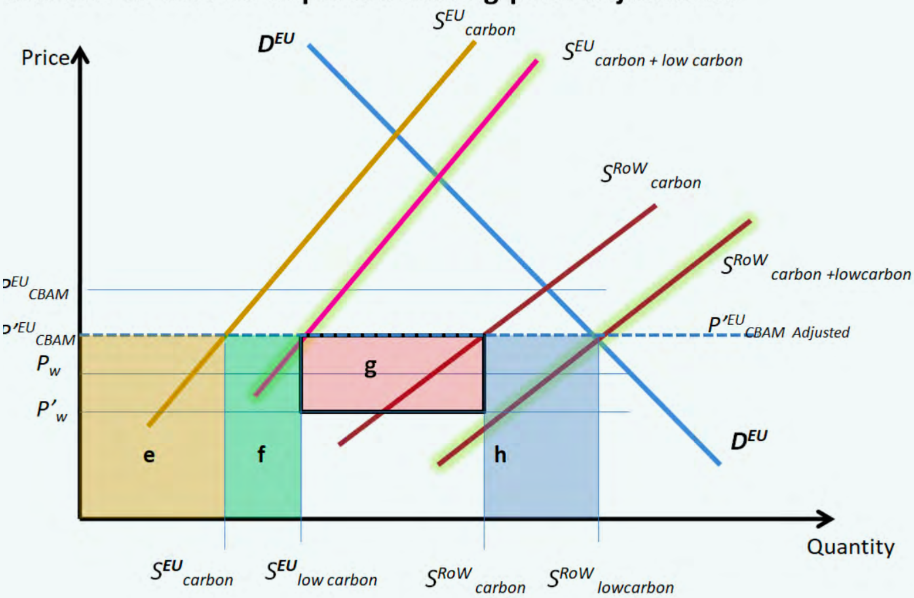
The area - **a -** represents gains for EU producers of carbon-intensive good, as they benefit from higher prices. It illustrates the phenomena of "reverse carbon leakage". The area - a' -represents additional yield of these European producers.

The area - **b**- reflects the additional low carbon production in Europe thanks to CBAM. And area - b'- illustrates additional profits of the low-carbon producers within the EU.

The area - **c**- represents the CBAM revenue for the EU public budget derived from certificates acquired by importers of carbon intensive products only.

The area -**d**- captures the scale of the Rest of the World low carbon exports to the EU incentivized by CBAM. And the area - **d'**- symbolizes additional profits of low-carbon producers located outside of the EU who benefit from increase of prices at the EU market and also the scope of trade deflection toward low-carbon products,

Graph 3: Separating impact of CBAM on carbon-intensive and low-carbon EU imports including price adjustment



Recognising that suppliers of low-carbon CBAM goods are encouraged by CBAM, the price of their products may rise moderately above the initial world price (Pw), and remain below the full CBAM-inclusive price (PEUCBAM). This is reflected in the graph by the position of the adjusted EU CBAM adjusted price line (P'EUCBAM)." To -> Recognising that suppliers of low-carbon CBAM goods are encouraged by CBAM, the price of their products may rise moderately above the initial world price (***Pw***), and remain below the full CBAM-inclusive price (P^{EU}_{CBAM}). This is reflected in the graph by the position of the adjusted EU CBAM adjusted price line (P'^{EU}_{CBAM}).

The graph indicates that EU domestic production increases (both carbon-intensive and low-carbon), but to a lesser extent, because imports increasingly consist of low-carbon goods, not charged by CBAM, rather than being displaced by augmented domestic output. Similarly, the overall price increase in the EU market is more moderate, reflecting the greater availability of low-carbon imports that are not subject to the full

CBAM cost.

The area - **e** - represents gains for EU producers of carbon-intensive good, as they benefit from higher prices. It illustrates, as in the earlier graph, the phenomena of "reverse carbon leakage".

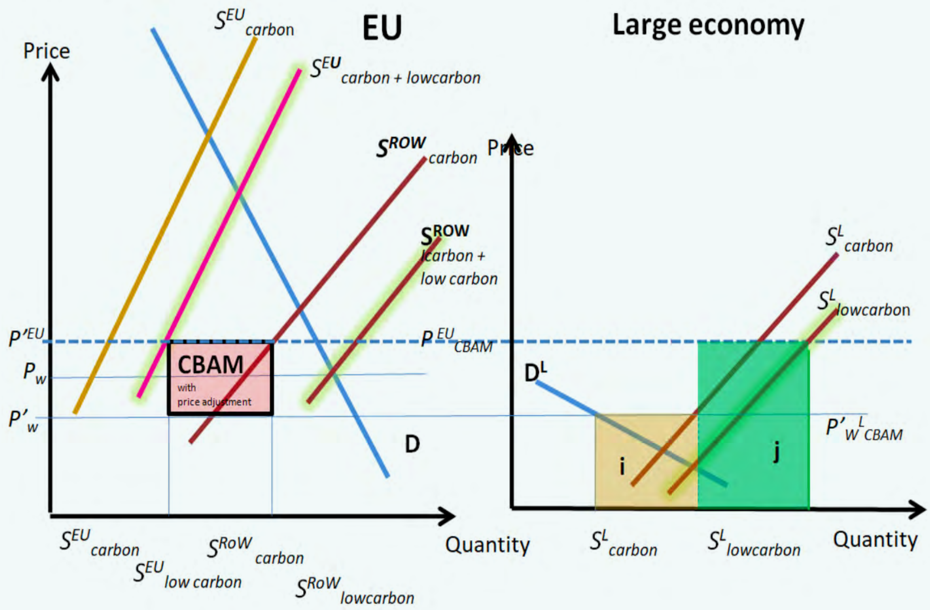
The area - **f** - reflects the additional low carbon production in Europe thanks to CBAM. Because internal EU prices have not increased by full CBAM charge it results in smaller boost for low-carbon production.

The area - **g - re**presents the CBAM revenue for the EU public budget derived from certificates acquired by importers of carbon intensive products only, and it shrinks along with the increase of low-carbon imports.

The area - **h -** presents the scale of the Rest of the World low carbon exports to the EU incentivized by CBAM.

In the extreme case where global supply of low-carbon products is sufficient, EU imports could become predominantly low-carbon. This could occur either through genuine decarbonisation of foreign production or through **trade deflection or resource shuffling,** whereby low-carbon goods are rerouted toward the EU market. In such a case, the prices of imported goods may increase less than would be expected if all imports are shifting towards low carbon goods, because this part of the foreign supply is not subject to CBAM charges.

Graph 4: CBAM and EU trade with large economies capable of resource reshuffling



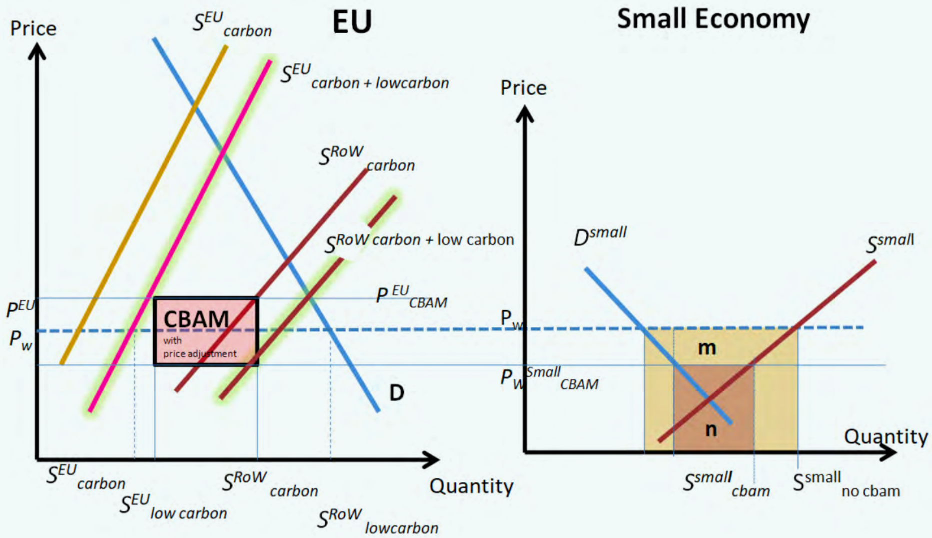
The graph above shows clearly that CBAM will privilege foreign suppliers having facilities with low-carbon production used for export to the EU and discriminate against suppliers with fixed carbon-intensive technologies and facilities or limited capacity to convert existing production into low-carbon.

The area - **i -** represents shrinking exports to the EU of foreign producers of carbon-intensive goods, as they face CBAM charges. It illustrates the scale of intended CBAM effect of preventing risk of carbon leakage.

The area – **j** - reflects the amplified low-carbon exports of large EU trade partners thanks to CBAM. This increase might be achieved by genuine new capacities of low-carbon production, or by resource shuffling.

The next graph therefore illustrates the details of such a situation taking as a point of reference the trade between unequal partners.

Graph 5: CBAM and EU trade with small economies without resource reshuffling capacity.



What matters in the case of CBAM is not only the size of the market but the capacity and the composition of adjustments. Bigger, more developed economies, with differentiated productive capacity have possibility to adjust volumes, prices but also by deflecting sources of export from carbon-intensive to low-carbon installations. Smaller, less developed exporters can only adjust exported volumes and prices.

In such a small economy without resource reshuffling capacity the export price has to go down in order that together with the CBAM charge it will be no higher than internal EU price P^{EU}.

The area - **m -** represents size of carbon intensive exports to the EU market of a small country before implementation of CBAM.

The area - **n -** reflects reduced amounts of carbon intensive exports to the EU market by a small country after implementation of CBAM. CBAM provides significant encouragement to decarbonise EU imports. However, impact of CBAM incentive is mostly manifested in composition of products imported from countries which are able to invest in carbon efficient technologies or they already have sufficient industrial base for low-carbon production, which could be widely exploited for exports to the EU. Whereas for small economies, short of capital with undiversified industrial base CBAM might simply limit the export potential.

Author's own graphical illustration of CBAM effects on international trade on the basis of standard graphs used to explain effects of tariffs.

The Developmental Dimension

The developmental implications of the CBAM follow directly from a fundamental design choice: **the mechanism applies uniformly to imports irrespective of the exporting country's level of development**[153]. This universality distinguishes CBAM sharply from the European Union's longstanding trade-and-development instruments, such as the Generalised Scheme of Preferences (GSP) and the Everything But Arms (EBA) initiative, which explicitly operationalise differentiated market access as a development policy tool[154]. In climate governance terms, CBAM's non-differentiation also contradicts the equity logic embedded in the principle of **common but differentiated responsibilities and respective capabilities (CBDR-RC)** under the UN Framework Convention on Climate Change[155].

The EU has articulated several reasons for this design. First, from the perspective of environmental integrity, the risk of carbon leakage is defined by emissions intensity and trade exposure rather than by income level. Second, exemptions based on development status are viewed as creating incentives for **trans-shipment and rerouting**, undermining the effectiveness of the mechanism. Third, it is also to prevent perverse incentives in the case of LMICs to replicate the development path of industrialised countries based on carbon intensive technologies. If LMICs are not subject to CBAM discipline they could, more likely, adopt carbon intensive technologies and it would be more difficult for them to decarbonise in the future. They could also become the destination for second hand carbon intensive installations: technologically obsolete, but operationally and economically useful when costs of carbon are not included. Fourth, universal application is considered more defensible under WTO non-discrimination disciplines[156]. These

153 Venzke, Ingo, and Geraldo Vidigal. "Are trade measures to tackle the climate crisis the end of differentiated responsibilities? The case of the EU carbon border adjustment mechanism (CBAM)." *Amsterdam Law School Legal Studies Research Paper* 2022-02 (2022).

154 European Commission, *Generalised Scheme of Preferences (GSP): Regulation (EU) No 978/2012*

155 UNFCCC, *United Nations Framework Convention on Climate Change*, Article 3.

156 Mehling, M. et al. (2019). "Designing Border Carbon Adjustments for Enhanced Climate Action." *American Journal of International Law*, 113(3), 433–481.

rationales are coherent from a regulatory standpoint. They do not, however, neutralise the **distributional consequences** of CBAM for least developed countries and many lower-middle-income economies[157].

The Commission frames CBAM as compatible with the EU's broader development agenda and emphasises that the EU is committed to supporting developing countries and least developed countries (LDCs) in adjusting to the mechanism. In particular, it presents EU assistance as covering both implementation readiness (including compliance capacity) and longer-term structural transformation, notably the greening of industrial production and the transition to renewable energy. It also highlights support for countries that wish to introduce or strengthen domestic carbon pricing, aligning CBAM with the EU's broader objective of encouraging stronger climate policy instruments internationally. In addition, the Commission notes that given the current sectoral scope of CBAM, developing countries and LDCs in particular are not expected to be among the most affected exporters, and it refers to the World Bank's Relative CBAM Exposure Index[158] as a tool to assess third-country exposure based on export structure and emissions intensity.

On implementation support, the EU focuses on technical guidance and capacity-building. The Commission has produced detailed CBAM guidance for non-EU installation operators and made it available in multiple languages, supplemented by webinars and targeted technical support adapted to country-specific needs. The broader EU external financing frameworks, especially Global Gateway and related regional packages have to be taken into account, as the principal channels through which the EU's decarbonisation support can be delivered. Such initiatives as the Africa–EU Green Energy Initiative and Just Energy Transition Partnerships (JETPs), as well as neighbourhood-focused instruments and programmes (including NDICI–Global Europe, TAIEX and twinning projects, and region-specific initiatives such as Clima-Med, EU4Green, EU4Energy, and the Energy Community) could be mentioned. These instruments are expected to reduce the emissions intensity of production abroad and thereby lower the embedded emissions of exports to the EU, indirectly easing CBAM burdens over time.

For many LMICs, CBAM functions not only as a carbon-pricing instrument, but as a **market-access condition** imposed on precisely those basic materials sectors; cement, steel, aluminium, fertilisers, that are often associated with early stages of industrialisation and export diversification. Empirical and modelling work consistently suggests that the introduction of CBAM-like measures tends to reduce exports from less developed and small countries[159] while reallocating trade shares toward larger and more developed economies including those from the Global South with lower

157 Perdana, Sigit, and Marc Vielle. "Making the EU Carbon Border Adjustment Mechanism acceptable and climate friendly for least developed countries." *Energy Policy* 170 (2022): 113245.

158 https://www.worldbank.org/en/data/interactive/2023/06/15/relative-cbam-exposure-index

159 Implication for African Countries of a Carbon Border Adjusment Mechanism in the EU; African Climate Foundation and The London School of Economics and Political Science, (2023). https://www.lse.ac.uk/africa/assets/Documents/AFC-and-LSE-Report-Implications-for-Africa-of-a-CBAM-in-the-EU.pdf

average emissions intensity and stronger compliance capacity[160]. The binding constraint for LMICs exporters is frequently not the carbon price alone, but the combination of **fixed monitoring, reporting and verification (MRV) costs**, limited access to low-carbon electricity, and a high cost of capital for process upgrades[161]. The Commission assessment suggests rather negligible, albeit negative, impact of CBAM on least developed countries[162]. This is an aggregate figure covering all LDCs which does not expose the particular situation of some of them.

The possible strategies that could be undertaken by companies and governments in these countries, which are most often cited in EU policy discourse, are **resource shuffling** and **adoption of domestic carbon pricing**[163]. The situation across the developing countries differs in this respect. It might be much easier to implement such strategies for more developed and larger economies of the Global South as the resource shuffling presupposes a diversified industrial base with multiple installations of differing carbon intensities, allowing firms to allocate cleaner output to the EU market while continuing higher-carbon production elsewhere. This option is realistically not available to many LMICs, where production is often concentrated in single plants or narrow clusters[164]. For these countries, there are no "cleaner" domestic alternatives to reshuffle. Similarly, the adoption of a domestic carbon price can, in principle, reduce CBAM liability if the price is recognised and credited. The World Bank Carbon Pricing Dashboard confirms gradual expansion of carbon pricing system globally. Different mechanisms are present in about 115 jurisdictions (this includes quite significant number of sub-national systems) which cover about 28% of total emissions. However, there is a concentration of these instruments in highly developed countries (27% of their emissions are covered) and medium developed countries (30% of emissions covered) whereas the LDCs practically do not have such systems and in their case, 0% of emissions is covered[165]. It means that the opportunity provided by CBAM to deduct charges for carbon paid in the country of origin is de facto out of reach for LDCs. In practice, meaningful carbon pricing should be economy-wide and requires substantial administrative capacity, fiscal space for compensation, and domestic political consensus. Carbon prices approaching EU levels may be economically and politically difficult in contexts where households and firms already face binding development

160 UNCTAD (2021). *A European Union Carbon Border Adjustment Mechanism: Implications for Developing Countries.*

161 Byiers, B. et al. (2024). *EU Carbon Border Adjustment Mechanism and Developing Countries*. ECDPM Discussion Paper 380.

162 "The modelling results presented in this report show that the impact of CBAM on least developed countries (LDCs), developing countries and neighbourhood countries is relatively minor. Notably, the change (relative to a no-CBAM scenario) in the GDP of LDCs in aggregate is modelled as less than 0.01% by 2035." p.4, Report on the application of the Regulation on the Carbon Border Adjustment Mechanism; COM(2025) 783 final; https://eur-lex.europa.eu/resource.html?uri=cellar:05f0b7f5-da86-11f0-8da2-01aa75ed71a1.0001.02/DOC_1&format=PDF

163 Assous A., Vanegas-Hernandez M., Woods D., Barre C., Sandbag, Konrad Adenauer Stiftung (2025), The EU CBAM: A Two-Way Street to Climate Integrity.

164 Cosbey, A. et al. (2019). *Developing Guidance for Implementing Border Carbon Adjustments*. IISD.

165 See World Bank State and Trends of Carbon Pricing Dashboard; https://carbonpricingdashboard.worldbank.org/compliance/coverage

constraints[166]. Partial carbon pricing limited to exports risks being viewed by the CBAM regulation as circumvention rather than as a genuine development of climate policy[167]. As a result, LDCs exporters face a narrow adjustment menu: **absorb CBAM costs, lower export prices, reduce export volumes, and/or divert trade toward markets without border carbon charges.** While such reorientation may preserve export volumes, the impact on carbon emissions might not be positive. Additionally, it often involves lower prices and weaker learning effects, as the EU market has historically offered higher standards, greater stability, and stronger incentives for upgrading[168].

A further developmental challenge arises from CBAM's **administrative architecture**. Embedded-emissions reporting must follow EU ETS methodologies and be verified by accredited third parties. For exporters in jurisdictions with weak public administration, limited MRV institutions, the cost and complexity of compliance can be prohibitive. Where verified data cannot be provided, conservative default values could apply, often overstating actual emissions and inflating CBAM liability[169]. In effect, CBAM can operate as a **barrier based on administrative capacity**, differentiating between countries' ability to cope with regulatory sophistication as much as for emissions performance.

The destination of CBAM revenues amplifies legitimacy concerns. During the legislative process, numerous stakeholders and Members of the European Parliament argued that CBAM revenues should be recycled to support decarbonisation and MRV capacity-building in vulnerable exporting countries. In the final framework, however, CBAM revenues accrue primarily to the EU budget and are not earmarked for development assistance. Moreover, contrary to earlier notions, now the Commission is proposing to use – temporarily - part of the CBAM revenue to support EU companies in their decarbonisation effort. While this choice may be fiscally rational within the EU, it reinforces small less developed countries perceptions that CBAM imposes costs without providing sufficient assistance to transition pathways, strengthening narratives of "green protectionism".

The resulting tension is central to CBAM's developmental assessment[170]. On the one hand, CBAM may create opportunities for countries with abundant low-carbon electricity or access to green finance to position themselves as competitive suppliers of cleaner basic materials. On the other hand, for many LMICs, the mechanism risks **stunting industrial upgrading** by raising barriers precisely in sectors that historically served as entry points into manufacturing

166 ECDPM. (2024). The EU's Carbon Border Adjustment Mechanism and developing countries: Threats, opportunities and strategic responses (Discussion Paper 380).https://ecdpm.org/application/files/4817/3210/5775/EU-Carbon-Border-Adjustment-Mechanism-Developing-Countries-Threats-Opportunities-Strategic-Responses-ECDPM-Discussion-Paper-380-2024.pdf.

167 IMF (2025). *Macroeconomic Exposure to the EU's Carbon Border Adjustment Mechanism*. IMF Working Paper.

168 UNCTAD (2023). *Trade and Development Report.*

169 European Commission (2021). *Impact Assessment Accompanying the CBAM Regulation*, SWD(2021) 643 final.

170 Böhringer, Christoph, Jared C. Carbone, and Thomas F. Rutherford. "Embodied carbon tariffs." *The Scandinavian Journal of Economics* 120.1 (2018): 183-210.

value chains[171]. Whether CBAM functions as an incentive for cleaner growth or as a constraint on development thus depends critically on complementary policies beyond the mechanism itself. The literature increasingly emphasises that CBAM's developmental effects are **not predetermined**, but contingent on flanking measures[172]. These include technical assistance for MRV, concessional finance for industrial decarbonisation, and broader recognition of policy equivalence beyond explicit carbon pricing[173]. Without such complements, CBAM is likely to operate primarily as a regressive trade constraint, redistributing adjustment burdens toward poorer economies while delivering only modest global emissions benefits.

* * *

In sum, CBAM's developmental dimension reflects a trade-off between regulatory uniformity and distributive equity. By prioritising environmental integrity and legal correctness, the EU has chosen a design that imposes uneven adjustment costs across trading partners. Addressing this imbalance does not require abandoning CBAM's core logic, but it does require integrating development-aware support mechanisms to align climate ambition with inclusive global transition pathways.

Opportunities exist where LMICs have renewable endowments and can attract transition finance - CBAM can create demand for low-carbon materials and potentially accelerate cleaner industrialisation. **The central challenges** are capacity and finance: MRV systems, verifiers, clean electricity, and affordable capital. **The risks** are regressive trade re-sorting and export reorientation to less regulated markets, which may trim down EU emissions while leaving global emissions reductions uncertain. Geopolitical risks are also important as many among LMICs countries may consider the EU climate policy as disproportionally affecting their development chances.

Administrative Dimension: Compliance Costs and Enforcement

The CBAM is not merely a pricing instrument designed to align carbon costs between domestic and foreign producers; it is also a comprehensive **administrative and information regime**. Its effectiveness depends as much on reporting, monitoring and verification, as on the level of the carbon price itself. From this perspective, CBAM represents a significant extension of EU regulatory reach into global supply chains, transforming border administration into an exercise in environmental governance and obligating producers all over the globe to understand and apply the EU's formal

171 Rodrik, D. (2018). "New Technologies, Global Value Chains, and Developing Economies." *NBER Working Paper.*

172 André, P., & Pirlot, A. (2024). When Are Carbon Border Adjustment Measures Just? *Political Studies*, *73*(1), 305-325. https://doi.org/10.1177/00323217241238125 (Original work published 2025)

173 Center for Global Development (2024). *Transforming EU Climate Leadership through CBAM Reform.*

administrative requirements[174].

At the core of CBAM's administrative architecture is the requirement that EU importers of covered goods register as **authorised CBAM declarants**. This status is conditional upon demonstrating the capacity to comply with extensive reporting, record-keeping and financial obligations linked to the EU ETS[175]. Unlike traditional customs registrations, which are largely procedural and transaction-specific, CBAM declarant status embeds importers in an ongoing regulatory relationship with climate authorities. Importers must collect detailed emissions data, manage the purchase and surrender of CBAM certificates, and submit annual declarations subject to ex post verification and penalties. Initially, these obligations applied even to very small importers, including shipments valued at as little as €150. The threshold was later revised to a higher, weight-based exemption, covering only imports exceeding 50 tonnes[176]. This adjustment is expected to exclude around 90% of importers who would otherwise have been required to comply with CBAM declarant obligations. To alleviate part of the administrative burden, the EU Commission has prepared and laid down rules for the permanent CBAM Registry[177]. It aims to standardise and simplify access for authorised declarants and their users, ensure access for customs authorities and verifiers, and support information exchange between the Commission and national competent authorities. Since December 2024, third-country producers can upload emissions data once to this Registry, avoiding repeated submissions to multiple declarants. This will reduce administrative duplication. The Commission also plans to use Registry data to pre-fill reporting templates, helping declarants report embedded emissions more accurately while reducing errors and compliance time.

These reporting and monitoring obligations introduce **fixed compliance costs** that do not scale proportionally with import volumes. For large multinational firms with established compliance departments and experience in carbon markets, CBAM may represent an incremental administrative extension. For small and medium-sized enterprises (SMEs) or occasional importers, however, the need to establish internal systems, train staff, or rely on external consultants can be prohibitive. The European Commission's impact assessment explicitly recognises that CBAM's administrative costs are largely fixed and therefore regressive in relative terms, disproportionately affecting smaller operators[178].

The annual nature of CBAM reporting further amplifies compliance risks.

174 Mehling, M. et al. (2019). "Designing Border Carbon Adjustments for Enhanced Climate Action." *American Journal of International Law*, 113(3), 433–481

175 Regulation (EU) 2023/956 establishing a Carbon Border Adjustment Mechanism, Articles 5–7.

176 Regulation (EU) 2025/2083 of 8 October 2025 amending Regulation (EU) 2023/956 as regards simplifying and strengthening the carbon border adjustment mechanism; https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:L_202502083

177 Implementing Regulation (EU) 2025/2550 of 10 December 2025 amending and correcting Implementing Regulation (EU) 2024/3210 as regards the CBAM registry, https://eur-lex.europa.eu/eli/reg_impl/2024/3210/oj

178 European Commission (2021). *Impact Assessment Accompanying the CBAM Regulation*, SWD(2021) 643 final, Section 6.3

Authorised declarants must submit a comprehensive CBAM declaration each year, covering all imports made during the previous calendar year[179]. This declaration must specify quantities imported, total embedded emissions, the number of CBAM certificates to be surrendered, and any carbon price paid in the country of origin that may be credited, plus many other administrative details. Errors or omissions can lead to financial penalties, retroactive obligations, or suspension of declarant status[180]. Concentrating compliance into a single annual reporting moment does not reduce administrative effort; rather, it increases the stakes associated with accurate data management throughout the year. It also excessively burdens occasional importers, who have to continue acting according to legally enforced procedure, even if it was just one import contract with limited scope. In this sense, CBAM is overly difficult for occasional importers and small companies. Contrary to some other sustainability related legislation, like CSRD or deforestation where obligations are triggered only for large companies, the CBAM requires all importers to follow procedures when import crosses a relatively low benchmark.

A distinctive feature of CBAM is that importer compliance depends critically on **documentation produced by foreign producers**. Although legal responsibility rests with the EU importer, emissions data must be generated at the level of the producing installation outside the EU. Foreign producers are required to calculate embedded emissions in accordance with EU-defined methodologies aligned with the ETS and to have these data verified by accredited third-party verifiers[181]. The Commission has clarified requirements in the delegated regulation[182] which sets out the requirements for accrediting CBAM verifiers, including the documentation and technical capacity applicants must demonstrate to national accreditation bodies. It also defines how accredited verifiers are supervised by national competent authorities and the Commission, covering verification practices, possible administrative measures, and information-sharing arrangements to ensure consistent oversight. These requirements are not in full sync with many existing international reporting frameworks, such as ISO or GRI (Global Reporting Initiative) standards[183] and may exceed the regulatory capacities of producers in jurisdictions with limited environmental monitoring institutions[184].

179 Regulation (EU) 2023/956, Article 6.

180 Ibid., Articles 26–27.

181 Regulation (EU) 2023/956, Annexes III–V

182 Commission delegated regulation (EU) 2025/2551 of 20 November 2025 supplementing Regulation (EU) 2023/956 of the European Parliament and of the Council by specifying the conditions for granting accreditation to verifiers, for the control and oversight of accredited verifiers, for the withdrawal of accreditation and for mutual recognition and peer evaluation of accreditation bodies, https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:L_202502551

183 For example main relevant ISO standards: Environmental Management Systems (Broad Scope) - ISO 14001; Corporate Carbon Footprint (GHG Accounting at the Organization Level) - ISO 14064; Product Carbon Footprint (GHG Accounting for Products) - ISO 14067; Environmental Declarations & Communication - ISO 14025 and the major GRI standard - GRI 305: Emissions – Details how companies should measure and report their GHG emissions, categorized by Scopes 1, 2, and 3

184 Weko, S., Eicke, L., Marian, A., and Apergi, M.: The Global Impacts of an EU Carbon Border Adjustment Mechanism, IASS Policy Brief, November 2020, Potsdam, DOI: 10.2312/iass.2020.055

Administrative complexity is further increased by CBAM's treatment of **precursor materials**. For certain products, importers must document emissions embedded not only in the final good but also in specified upstream inputs[185]. This extends emissions accounting across multiple tiers of production, potentially spanning several firms and countries. Each tier must comply with EU methodologies and verification standards. Where data are unavailable or unreliable, importers have to rely on default values, but these are intentionally conservative and typically set at the upper end of emissions distributions[186]. The resulting incentive structure favours verified reporting, but at the cost of substantial administrative and financial burdens to be borne by foreign producers and European importers.

These requirements could become increasingly challenging if CBAM scope expands to more processed products. As value chains lengthen, the number of installations and jurisdictions involved in emissions accounting multiplies. The administrative burden grows non-linearly, particularly for producers and exporters in less developed regions, where MRV systems are often rudimentary. International organisations have noted that the cost of establishing facility-level emissions monitoring and verification can reach tens of thousands of Euros per installation per year, excluding capital investments in measurement equipment[187].

The administrative design of CBAM also has implications for **circumvention incentives**. As ETS prices rise, the financial value of misreporting embedded emissions, misclassifying products, or restructuring supply chains to minimise reported carbon content increases[188]. The EU has responded by signalling stricter enforcement, the use of default values, and enhanced cooperation between customs and climate authorities. However, effective enforcement requires significant administrative capacity across all Member States, as well as coordination with foreign verifiers and data providers. Scaling this enforcement across thousands of importers and complex global supply chains will entail non-trivial costs for public administrations[189].

Compared with standard international trade documentation, CBAM represents a qualitative escalation in regulatory demands. Traditional customs procedures focus on product characteristics, origin, and compliance with tariff schedules or safety standards. By contrast, CBAM requires **process-based documentation**, annual ex post reporting, and interaction with a volatile financial market (the ETS). In this sense, CBAM resembles environmental and financial regulation more than classical customs regulation. For many firms, particularly SMEs, this represents a significant expansion of regulatory exposure associated with international trade[190].

185 Regulation (EU) 2023/956, Annex IV.

186 European Commission (2021), SWD(2021) 643 final, Section 5.4.

187 Cosbey, A. et al. (2019). *Developing Guidance for Implementing Border Carbon Adjustments*. IISD

188 Böhringer, C., Carbone, J. C., & Rutherford, T. F. (2016). "The Strategic Value of Carbon Tariffs." *American Economic Journal: Economic Policy*, 8(1), 28–51

189 European Court of Auditors (2023). *EU Climate and Energy Governance.*

190 World Trade Organization (2022). *World Trade Report*

Being aware of these aspects of CBAM, the Commission developed a product-based method for calculating embedded emissions[191]. Under this CBAM methodology, (i) each covered product is assigned clear system boundaries depending on its production route (for example, steel made in a blast furnace or cement made from clinker), (ii) default emission values are provided where facility-level data are not available, (iii) importers may use actual measured emissions data when robust monitoring systems exist (with default values remaining as a fallback), and (iv) reported emissions must be verified by an independent third party, with requirements progressively aligned to EU ETS monitoring, reporting and verification (MRV) standards over time. The Regulation requires that embedded emissions reported on the basis of actual data be verified by an accredited verifier. In the first verification year, the verifier must carry out an on-site inspection of the installation producing the CBAM goods. In the second consecutive year, the on-site visit may be replaced by a virtual inspection, or waived, provided that a physical visit took place in the previous year and all conditions for remote verification are met. In any case, a physical inspection is required at least once every two years. Verification must follow a risk-based approach, ensuring reasonable assurance that declared emissions are accurate and not materially misstated. In essence, this change to CBAM reporting produces a comparable, product-level carbon metric. It is still demanding in terms of collection of documentation and processing, however, it provides more similar treatment of EU and non-EU producers, improves traceability of embedded emissions, and may contribute to longer-term convergence in carbon accounting practices.

* * *

In sum, CBAM's administrative and information regime is a defining element of the mechanism. It underpins environmental effectiveness but also generates significant compliance costs and distributional effects. Understanding CBAM as an administrative system, rather than solely as a carbon pricing tool, is therefore essential for assessing its trade, development and political economy implications. While administrative stringency is essential for ensuring environmental integrity and preventing evasion, it raises questions of proportionality and inclusiveness. The current CBAM design prioritises accuracy and robustness over simplicity, accepting higher compliance costs as the price of credibility[192]. Whether this balance is sustainable remains uncertain. Without targeted mitigation measures, such as simplified regimes for small importers, technical assistance for producers in developing countries, or streamlined verification procedures, CBAM risks adding **administrative barriers to trade**, particularly for actors with limited capacity to absorb fixed compliance costs.

Opportunities lie in the creation of a global MRV ecosystem: CBAM can

191 Report on the application of the Regulation on the Carbon Border Adjustment Mechanism, p.7; COM(2025) 783 final; https://eur-lex.europa.eu/resource.html?uri=cellar:05f0b7f5-da86-11f0-8da2-01aa75ed71a1.0001.02/DOC_1&format=PDF

192 Mehling, M. & Ritz, R. (2020). "Carbon Border Adjustments and International Trade." *Energy Policy*, 144.

professionalise emissions reporting and encourage digitalisation and standardisation. **The challenges** are scaling verification and keeping the system workable for smaller economic actors**. The risks** are that documentation burdens and verifier scarcity become the binding constraint, effectively excluding small shipments and poorer exporters, and that higher carbon prices make fraud and dispute resolution increasingly salient.

End-Game and CBAM: ETS Scarcity, Price Uncertainty and Long-Horizon Investment

The long-run effectiveness and stability of the CBAM are inseparable from the evolution of the EU Emissions Trading System as the European Union approaches climate neutrality. Under the revised ETS framework, the emissions cap is set on a steeply declining trajectory, implying a progressive reduction in the volume of allowances available to the market. As the cap tightens, allowance scarcity can exert upward pressure on carbon prices, particularly if low-cost abatement options remain limited in the short to medium term. At the same time, successful decarbonisation, achieved through for example technology deployment, electrification, and structural change, reduces emissions and therefore demand for allowances, potentially stabilising or even moderating prices depending on expectations and market design[193].

This dual dynamic creates inherent uncertainty. Carbon prices in a cap-and-trade system are not determined by the cap alone but by the interaction between the cap, residual emissions, abatement costs, and expectations about future policy interventions. As allowance volumes approach very low levels, price formation may become increasingly sensitive to small shocks, expectations about future reforms, and the credibility of long-term climate commitments. This phenomenon has been described in the literature as the "ETS end-game" problem: a situation in which market liquidity declines, volatility increases, and conventional price signals become harder to interpret as indicators of marginal abatement costs[194].

Because CBAM certificate prices are explicitly indexed to the ETS allowance price, CBAM **inherits this uncertainty**. Any volatility or discontinuity in ETS prices is transmitted directly to importers of CBAM-covered goods. Unlike the ETS, however, CBAM does not impose a quantitative cap on import volumes. Imports can continue without physical restriction, subject only to payment of the prevailing carbon price. This asymmetry between a **quantity-constrained domestic system** and a **price-indexed but uncapped border**

193 Ellerman, A. D., Marcantonini, C., & Zaklan, A. (2016). "The EU ETS: Eight Years and Counting." *Review of Environmental Economics and Policy*, 10(1), 89–107

194 Burtraw, D., Palmer, K., Paul, A., & Woerman, M. (2019). "Secular Trends, Environmental Regulations, and Electricity Markets." *Energy Journal*, 40(2).

mechanism creates a structural governance challenge in the long run.

The implications of this uncertainty are particularly relevant for industrial investment. Sectors covered by CBAM, such as steel, cement, aluminium, fertilisers, and energy-intensive chemicals, are characterised by **long-lived capital assets** and high upfront investment costs. Investment decisions in these sectors are made over horizons of several decades and depend critically on expectations about future carbon costs, market access, and policy stability[195]. If ETS and CBAM prices are perceived as highly volatile, or if firms anticipate political interventions to suppress prices or alter rules, the risk-adjusted cost of capital rises. This can lead firms to **delay or scale back investments** in low-carbon technologies, even when such technologies are technically available. The literature on climate policy design therefore emphasises the importance of **predictable policy trajectories**, credible long-term targets, and complementary support instruments, such as carbon contracts for difference, infrastructure investment, and innovation funding to stabilise expectations[196].

This dynamic of risks could become self-reinforcing. Delayed investment slows the diffusion of low-carbon processes, keeping marginal abatement costs high. High abatement costs, in turn, sustain elevated carbon prices, intensifying political resistance from affected sectors and consumers. In such a context, uncertainty itself becomes a barrier to decarbonisation, undermining the effectiveness of both the ETS and CBAM[197].

From a trade perspective, the ETS end-game also interacts with CBAM in potentially destabilising ways. If domestic emissions fall sharply while imports of carbon-intensive goods persist, CBAM may become the primary channel through which carbon pricing is applied to emissions embodied in EU consumption. In such a scenario, high and volatile ETS prices could translate into **very high and volatile CBAM charges**, affecting import-dependent downstream sectors and potentially triggering political backlash. The absence of a quantitative ceiling on CBAM obligations means that, unlike in the ETS, it is not possible to rely on declining volumes alone to moderate the total economic burden.

Moreover, the international context matters. If carbon-intensive production remains relatively cheap in jurisdictions with weaker climate policies, high ETS and CBAM prices could place sustained pressure on EU industrial competitiveness, particularly in hard-to-abate sectors. CBAM mitigates this pressure on the EU internal market, but it does not address export competitiveness and may encourage greater reliance on imports including the carbon charge rather than domestic production[198]. This raises the

195 Acemoglu, D., Aghion, P., Bursztyn, L., & Hemous, D. (2012). "The Environment and Directed Technical Change." *American Economic Review*, 102(1), 131–166

196 Neuhoff, K. et al. (2019). "Building Blocks for a Climate-Neutral European Industrial Sector." *Climate Policy*, 19(sup1), S1–S15.

197 Aghion, P., Dechezleprêtre, A., Hémous, D., Martin, R., & Van Reenen, J. (2016). "Carbon Taxes, Path Dependency, and Directed Technical Change." *Journal of Political Economy*, 124(1), 1–51.

198 Böhringer, C., Carbone, J. C., & Rutherford, T. F. (2016). "The Strategic Value of Carbon Tariffs." *American Economic Journal: Economic Policy*, 8(1), 28–51.

possibility that, in the absence of complementary measures, the CBAM could coexist with a gradual weakening of certain European low-carbon industrial capacities.

These challenges suggest that the ETS - CBAM architecture may require **institutional adaptation** as the cap approaches very low levels. The literature discusses several possible avenues, including adjustments to market stability mechanisms to manage illiquidity, the introduction of price-containment features, or a gradual shift toward standards-based or hybrid regulatory approaches for residual emissions[199]. In parallel, CBAM itself may evolve through scope expansion, anti-circumvention measures, or greater reliance on equivalence arrangements with trading partners that adopt comparable climate policies.

* * *

In sum, the "end-game" problem underscores that CBAM cannot be assessed in isolation from the long-term evolution of the ETS. As allowance volumes shrink and climate neutrality approaches, price uncertainty and market design issues become central to both domestic decarbonisation and trade relations. For investment-intensive sectors, the credibility and predictability of the ETS - CBAM framework will be as important as the level of the carbon price itself. Addressing these challenges requires not only technical adjustments to market design but also a coherent long-term strategy that aligns climate ambition with industrial transformation and international trade realities.

Opportunities include the potential for CBAM to provide a long-term, stable competitiveness framework during the transition away from free allocation, supporting high ETS ambition**. Challenges** involve designing credible end-game rules for both ETS and CBAM, including how to treat residual emissions and how to prevent the border mechanism from becoming a perpetual trade conflict as the ETS cap approaches very low levels and CBAM remains uncapped. **Risks** include amplified volatility, intensified circumvention incentives, and increased international tensions if CBAM liabilities become very large while global policy convergence remains limited.

199 Hepburn, C., et al. (2020). "Will COVID-19 Fiscal Recovery Packages Accelerate or Retard Progress on Climate Change?" *Oxford Review of Economic Policy*, 36(S1), S359–S381

World of Multiple Carbon Border Adjustment Mechanisms

The European Union's Carbon Border Adjustment Mechanism (CBAM) is widely regarded as the first comprehensive attempt to operationalise a carbon border instrument at scale. However, it is unlikely to remain unique for long. As carbon pricing and climate-related regulation expand beyond the EU, other jurisdictions are increasingly exploring their own forms of carbon border adjustment. The gradual emergence of multiple CBAM-like instruments raises fundamental questions about the future of international trade governance, the interaction of overlapping border measures, and the risk of regulatory fragmentation.

The United Kingdom has already announced its intention to introduce a carbon border adjustment mechanism from January 2027, closely aligned with its domestic emissions trading scheme but institutionally separate from the EU ETS[200]. Canada has repeatedly examined the possibility of a border carbon adjustment as a complement to its federal carbon pricing framework, particularly to protect emissions-intensive, trade-exposed sectors[201]. Australia has considered a frontier "green tariff"[202]. In addition to Canada and Australia, Brazil and Taiwan have announced that they are considering similar instruments[203]. Even in jurisdictions without an explicit economy-wide carbon price, the idea of border adjustments has gained traction. In the United States, policy proposals[204] such as the *Clean Competition Act*[205] and analytical work by the Center for Strategic and International Studies (CSIS) suggest a model based on **relative carbon intensity** between domestic and foreign producers rather than on an explicit carbon price[206]. This demonstrates that carbon border adjustments need not necessarily replicate the EU's price-based design to pursue similar objectives.

If multiple countries adopt CBAM-type instruments, the structure of international trade could become significantly more complex. One immediate

200 UK Government, *Introduction of a UK Carbon Border Adjustment Mechanism from January 2027* (2024).

201 Government of Canada, *Carbon Border Adjustment: Policy Discussion Papers* (2023).

202 Zhan C., (2023) Australia's Green Tariff on Carbon – A New Dumping Ground, Moulislegal https://moulislegal.com/knowledge-centre/australia-s-green-tariff-on-carbon-a-new-dumping-ground/

203 European Commission Report on the application of the Regulation on the Carbon Border Adjustment Mechanism; Brussels, p.12; 16.12.2025 COM(2025) 783 final; https://eur-lex.europa.eu/resource.html?uri=cellar:05f0b7f5-da86-11f0-8da2-01aa75ed71a1.0001.02/DOC_1&format=PDF

204 See citation from The 2021 Trade Policy Agenda and 2020 Annual Report of the President of the United States on the Trade Agreements Program - "The Biden Administration will work with allies and partners that are committed to fighting climate change. This will include exploring and developing market and regulatory approaches to address greenhouse gas emissions in the global trading system. As appropriate, and consistent with domestic approaches to reduce U.S. greenhouse gas emissions, **this includes consideration of carbon border adjustments**." https://ustr.gov/sites/default/files/files/reports/2021/2021%20Trade%20Agenda/Online%20PDF%202021%20Trade%20Policy%20Agenda%20and%202020%20Annual%20Report.pdf

205 See proposal of S.4355 - Clean Competition Act - To amend the Internal Revenue Code of 1986 to create a carbon border adjustment based on carbon intensity, and for other purposes.; Introduced by Sen. Whitehouse Sheldon (D-RI) on June 7, 2022; https://www.congress.gov/bill/117th-congress/senate-bill/4355/text

206 Rasool, S., Reinsch, W. A., & Denamiel, T. (2024). *Crafting a Robust US Carbon Border Adjustment Mechanism*. CSIS.

question concerns **trade between jurisdictions that both apply carbon border measures**. In principle, if two countries impose CBAMs on imports, goods traded between them could be subject to dual border adjustments unless explicit exemptions or mutual recognition mechanisms are established. The EU CBAM currently exempts only countries whose emissions trading systems are formally linked to the EU ETS, such as Switzerland and Norway[207]. In these cases, imports are treated as if they had already borne an equivalent carbon constraint. However, even for linked systems, complications arise when goods from these territories contain embedded emissions originating in third countries.

This issue highlights the interaction between CBAM and **rules of origin**, which currently play a central role in determining the treatment of imports under trade law. CBAM relies on standard customs rules of origin, which are based on criteria such as substantial transformation or value-added thresholds[208]. These standard (as well as preferential) rules of origin are not designed to track carbon content. As a result, a carbon-intensive input produced in a third country could be imported into a country linked to the EU ETS, processed sufficiently to acquire origin there, and then exported to the EU without triggering CBAM charges[209]. This creates a potential **bypass channel** that undermines the environmental integrity of the mechanism. Awareness of this risk has led some ETS-linked countries, notably Switzerland, to consider introducing their own carbon border adjustments in a context of their linkage to the EU ETS[210]. This problem becomes more acute as CBAM coverage expands to more processed products, increasing the complexity of tracing emissions through supply chains. Moreover, the coexistence of multiple carbon border adjustment mechanisms with differing rules, coverage, and implied carbon costs could create incentives for **trade deflection**, whereby exporters reroute goods through jurisdictions with the lowest effective border charge to minimize compliance costs, a phenomenon documented in the literature on preferential rules of origin and overlapping border measures[211].

The proliferation of CBAMs could also generate **regulatory collisions** where instruments differ in scope, methodology, and compliance requirements. The EU CBAM is anchored in EU ETS methodologies for calculating embedded emissions, while potential US proposals emphasise benchmarking against domestic carbon intensity rather than pricing. The UK mechanism is expected to follow EU logic closely but will remain legally distinct. In such a situation, the UK faces a “border carbon leakage trilemma” between preserving environmental integrity, maintaining compliance with international trade

207 Regulation (EU) 2023/956 establishing a Carbon Border Adjustment Mechanism.

208 Inama, S. (2009). *Rules of Origin in International Trade*. Cambridge University Press.

209 Holzer, Kateryna, *The Pending EU CBAM: Quo Vadis Switzerland?* (May 23, 2021). Global Trade and Customs Journal Volume 16, Issue 11/12 (2021) pp. 633 – 643, Available at SSRN: https://ssrn.com/abstract=3859504 or http://dx.doi.org/10.2139/ssrn.3859504

210 Swiss Federal Council, *Carbon Border Adjustment and ETS Linkage* (2024).

211 Fink, C., & Lomfinger, T. (2018). *Trade deflection and rules of origin: evidence from the EU–Morocco free trade agreement and implications for preferential trade agreements*, CESifo Working Paper Series No. 6929, which discusses how heterogeneous border regulations and origin criteria can lead to trade rerouting to exploit lower compliance costs.

rules, and limiting adverse impacts on developing-country exporters[212]. This trilemma closely mirrors the tensions already visible in the EU CBAM. While the UK proposal is expected to align technically with the UK ETS and resemble the EU approach in sectoral coverage, it must navigate similar dilemmas regarding non-discrimination, recognition of foreign climate policies, and administrative feasibility. The border measures risk shifting adjustment burdens onto trading partners with limited capacity to decarbonise, a concern that is magnified when multiple jurisdictions introduce parallel CBAM-type instruments. The proliferation of border adjustments by the EU, UK and potentially others, may intensify coordination challenges and increase the likelihood of trade friction unless common principles on comparability, flexibility and development-sensitive implementation are established.

These differences raise questions about comparability: should a carbon cost paid under one system be fully credited under another, partially recognised, or ignored? Absent coordination, exporters may face overlapping reporting obligations, inconsistent verification standards, and cumulative border charges. The Northern Ireland context illustrates the risks of such overlap. As part of the EU customs territory for goods while remaining within the UK's regulatory framework, Northern Ireland could become subject to intersecting CBAM regimes, highlighting the administrative and legal complexity that arises when multiple border measures coexist[213]. While this is a specific case, it foreshadows broader systemic challenges if CBAM-like instruments multiply globally.

* * *

The EU's position as the first mover provides an opportunity. By implementing CBAM ahead of others, the EU has effectively set a reference model that may influence subsequent designs[214]. The EU is therefore uniquely positioned to promote **cooperation frameworks**, including common principles for emissions accounting, mutual recognition of climate policies, and coordination on origin rules to prevent circumvention. Such efforts could mitigate fragmentation and reduce the legal and administrative burden on traders.

However, leadership also entails risk. If the EU CBAM is perceived as rigid, unilateral, or insufficiently sensitive to different development levels, it may harden opposition and encourage other jurisdictions to design deliberately distinct mechanisms. This would increase compliance costs for firms, intensify WTO contestability, and undermine the prospect of convergence[215]. Conversely, a flexible and cooperative EU approach could support gradual alignment and enhance the legitimacy of border carbon measures.

In conclusion, a future in which multiple CBAMs operate simultaneously is increasingly plausible. This scenario presents **opportunities** for policy

212 Lydgate, E., & Winters, L. A. (2025). *The UK's border carbon leakage trilemma*. Energy Policy, 198, 114393. https://www.sciencedirect.com/science/article/pii/S0301421524004130.

213 Chartered Institute of Taxation (CITP), *Complexity of the EU CBAM in Northern Ireland* (2024).

214 Ozai, Ivan. "Designing an Equitable Border Carbon Adjustment Mechanism." *Can. Tax J.* 70 (2022): 1.

215 Pauwelyn, J. (2021). "Carbon Border Measures and WTO Law." *RECIEL*, 30(1)

convergence and strengthened global climate action, but also **challenges** related to coordination, origin rules, and administrative complexity, and **risks** of trade fragmentation, duplication of barriers, and trade conflicts. The EU CBAM's success will therefore depend not only on its internal design but also on the EU's ability to engage proactively in shaping a multilateral framework for carbon border measures. As the first mover, the EU is effectively predestined to lead this process.

Opportunities which can arise from a world with multiple CBAMs include the potential for gradual convergence toward shared principles of carbon pricing, emissions accounting, and climate-related border measures, especially if leading economies coordinate their approaches. A plurality of CBAMs could reinforce the signal that carbon intensity is becoming a central parameter of international competitiveness and could strengthen incentives for decarbonisation in globally traded sectors. **The challenges** are linked to overlapping CBAM regimes with differing scopes, methodologies, price levels, and rules of origin, which risk creating a dense and fragmented regulatory landscape, increasing compliance costs for firms and administrative burdens for authorities, while complicating enforcement and mutual recognition. **The risks** are related to uncoordinated proliferation of CBAMs, which may result in trade fragmentation, trade deflection, and legal disputes, particularly if mechanisms are perceived as unilateral, protectionist, or insensitive to development constraints.

What Could Have Been Done Differently and What Still Can Be Considered

CBAM can be understood as a **second-best response** to the absence of effective international cooperation on carbon pricing and emissions regulation. Ideally, global or plurilateral carbon markets, or at least mutually recognised carbon-pricing regimes, would internalise carbon costs without recourse to border measures. In their absence, the EU has chosen to extend its domestic carbon price outward via trade. The question is therefore not whether CBAM is justified, because it is, but whether **different design choices and greater emphasis on international cooperation could have reduced its unilateral character, geopolitical implications and improved its legitimacy and increase its effectiveness**[216].

For more than two decades, the EU has been a leading proponent of carbon pricing and emissions trading as the cornerstone of climate mitigation policy. The EU Emissions Trading System has served as both a domestic instrument and a model promoted internationally through technical assistance,

216 Bhagwati, J. (2002). *Free trade today*. Princeton University Press.

diplomatic engagement, and policy dialogue[217]. Several jurisdictions, including Switzerland, parts of China, and subnational systems in North America, have adopted trading mechanisms inspired by the EU ETS. Despite these efforts, however, **carbon pricing has not converged globally**, nor has a sufficiently large coalition of jurisdictions emerged to establish a de facto global carbon price[218]. Carbon markets remain fragmented, heterogeneous in design, and often limited in scope or stringency. In this context, CBAM can be seen as an attempt to compensate for the failure of cooperative approaches to deliver convergence.

Yet the choice to move directly from limited cooperation to unilateral border adjustment arguably bypassed intermediate options[219]. The EU might have intensified efforts toward **plurilateral sectoral agreements**, particularly in hard-to-abate, trade-exposed industries. Sectoral climate clubs with agreed benchmarks, emissions-intensity standards, or minimum carbon-price equivalents could have reduced leakage risks while preserving a cooperative framework[220]. Such approaches have been discussed in academic and policy literature but were not pursued systematically and effectively at the international fora prior to CBAM's adoption[221].

One of the most contentious aspects of CBAM lies not in the carbon price itself, but in the **methodology used to calculate embedded emissions**. CBAM relies almost exclusively on EU ETS accounting rules, including system boundaries, treatment of indirect emissions, and verification procedures. While internally coherent, this approach effectively **privileges EU methodologies as a de facto global standard**. An alternative pathway would have been to prioritise **international agreement on embedded-emissions methodologies** before introducing border charges. Existing work under ISO standards, life-cycle assessment (LCA) frameworks, and sector-specific benchmarks provides a foundation for such convergence[222]. Although these approaches differ in scope and complexity, a multilateral process, possibly under the auspices of ISO, the UNFCCC, or a joint WTO-UNFCCC initiative, could have identified minimum common principles for product-level emissions accounting.

Such technical convergence would not have required agreement on carbon prices themselves. Instead, it would have focused on **comparability, transparency, and mutual recognition**, reducing the perception that CBAM

217 Ellerman, A. D., Marcantonini, C., & Zaklan, A. (2016). The EU ETS: Eight years and counting. *Review of Environmental Economics and Policy*, 10(1), 89–107.

218 CEPR, 2023. *Trade Policies, Non-Economic Objectives, and Multilateral Cooperation in a Globalized World*, Centre for Economic Policy Research. United Kingdom. Retrieved from https://coilink.org/20.500.12592/jgfks5 on 31 Jan 2026. COI: 20.500.12592/jgfks5.

219 Holmes, Peter, Tom Reilly, and Jim Rollo. "Border carbon adjustments and the potential for protectionism." *Climate Policy*, vol. 11, no. 2, 2011, pp. 883-900. Taylor & Francis Online; "Therefore the priority must remain some form of overall global agreement on emissions reductions which, even if it is not an agreement on uniform emissions taxes at source or detailed targets, still creates a framework within which mutual recognition and equivalence can be established." p. 900

220 Nordhaus, W. (2015). Climate clubs: Overcoming free-riding in international climate policy. *American Economic Review*, 105(4), 1339–1370

221 Mehling, M., van Asselt, H., Das, K., Droege, S., & Verkuijl, C. (2019). Designing border carbon adjustments for enhanced climate action. *American Journal of International Law*, 113(3), 433–481

222 ISO. (2018). *ISO 14067: Carbon footprint of products*. International Organization for Standardization.

exports EU regulatory preferences rather than climate ambition. Had CBAM been introduced after, or conditional upon, progress in this area, its acceptance among trading partners would likely have been higher, and disputes over non-product-related process and production methods less acute.

Another design choice concerns the **granularity of CBAM coverage**. CBAM applies at the level of imported goods, regardless of shipment size, subject only to very limited de minimis thresholds (above 50 tonnes of yearly imports). This contrasts with the EU ETS itself, which focuses on large installations responsible for the bulk of emissions. An alternative approach would have been to **concentrate on emissions from major production facilities worldwide**, rather than on all shipments of covered products. A globally agreed roster of large steel mills, cement kilns, aluminium smelters, and fertiliser plants, analogous to the ETS installation registry, could have been established. Their emissions intensity could be assessed using agreed methodologies, with data verified periodically. Advances in **remote sensing, satellite monitoring, and digital MRV systems** make such an approach increasingly feasible[223]. And all the data could be placed in one the dedicated international registry. While not eliminating the need for firm-level reporting, this strategy could have reduced administrative burdens for small exporters and marginal shipments, while targeting the core sources of global industrial emissions. To a certain extent changes in the CBAM are directed towards this approach. For example, since December 2024, third-country producers can upload emissions data once to the CBAM Registry, avoiding repeated submissions to multiple declarants. This reduces administrative duplication. The Commission also plans to use Registry data to pre-fill reporting templates, helping declarants report embedded emissions more accurately while reducing errors and compliance time.

Perhaps the most profound criticism of CBAM concerns its **lack of differentiation for developing countries**, particularly least and lower-middle income countries (LMICs)[224]. CBAM applies uniformly, notwithstanding vast differences in historical responsibility, capacity, and development pathways[225]. From a leakage-prevention perspective, this uniformity is also questionable. **Traditional exports from LMICs do not generally constitute carbon leakage**, especially where production predates the EU ETS and has not resulted from relocation induced by carbon pricing. Leakage arises primarily when production shifts from jurisdictions with stringent climate policies to those with laxer regimes in response to cost differentials. And CBAM is addressing the risk of leakage which is by definition future-oriented phenomena. A more differentiated CBAM could therefore have **exempted existing production capacity in LMICs**, while applying the mechanism

223 Haya, B., et al. (2020). Managing uncertainty in carbon offsets. *Energy Policy*, 141, 111427.

224 Brandi, Clara. "Priorities for a development-friendly EU Carbon Border Adjustment (CBAM)." Briefing Paper 20/2021, German Institute of Development and Sustainability (IDOS), 2021.

225 Marcu, A., Mehling, M., & Cosbey, A. (2020). *Border Carbon Adjustments in the EU: Issues and Options*. Brussels: ERCST - Roundtable on Climate Change and Sustainable Transition. https://ssrn.com/abstract=3703387 "Still, while political or environmental considerations may favour exempting one or another group of countries, the safest design choice under international trade law is to apply the BCA to all trade partners without exceptions." p.27

only to **new installations** established after a defined baseline date. Such a grandfathering approach would have preserved incentives against relocation-driven leakage while avoiding the penalisation of long-standing development-linked exports. No similar differentiation should be applied for large and rapidly industrialising economies, such as China, India, or Vietnam and many others, where distinguishing between legacy capacity and expansion driven by carbon costs is more complex but also more relevant[226].

Another area where CBAM could have been designed differently concerns **the use of revenues**. There were many suggestions to earmark CBAM revenues for climate finance, technology transfer, or MRV capacity-building in developing countries[227]. In the final regulation, however, CBAM revenues accrue to the general EU budget, with no binding international allocation. Moreover, the latest Commission proposal to establish **Temporary Decarbonisation Fund** [228] **on the basis of part of the CBAM receipts reinforces the perception that achieving decarbonisation in the EU is at the expense of its partners.** This choice inevitably weakens CBAM's developmental legitimacy[229]. Revenue recycling toward LMICs decarbonisation would not have eliminated concerns about the negative impact of CBAM, but it could have **demonstrated good faith**, aligning it more clearly with global mitigation goals, and mitigating perceptions of green protectionism[230].

CBAM's WTO compatibility remains contested, even if carefully engineered to fall within GATT Article XX exceptions. At the same time, the WTO itself faces a legitimacy and purpose crisis[231]. Climate change offers an opportunity to **redefine the role of trade rules** in supporting global public goods[232]. Rather than designing CBAM largely outside the WTO framework, the EU could have pursued a more explicit strategy of **embedding climate considerations within WTO reform discussions**, including clarification of NPR-PPM treatment, environmental exceptions, and the relationship between trade and climate agreements[233]. While politically difficult, such an approach could have strengthened both CBAM's legal footing and the WTO's relevance even if initiated in plurilateral format.

CBAM is not an inevitable outcome of global climate ambition; it is the product of specific sequencing and design choices made under conditions

226 Cosbey, A., et al. (2019). Developing guidance for border carbon adjustments. IISD.

227 Grubb, Michael. "International Climate Finance from Border Carbon Cost Levelling." *Climate Policy*, vol. 11, no. 3, 2011, pp. 1050-1057. Taylor & Francis Online, https://doi.org/10.1080/14693062.2011.582285.

228 Proposal for a Regulation of the European Parliament and of the Council establishing the Temporary Decarbonisation Fund , Brussels, 17.12.2025, COM(2025) 990 final, https://eur-lex.europa.eu/resource.html?uri=cellar:95ee45d7-db37-11f0-8da2-01aa75ed71a1.0001.02/DOC_1&format=PDF

229 Eckersley, Robyn. "The Politics of Carbon Leakage and the Fairness of Border Measures." *Ethics & International Affairs*, vol. 24, no. 4, 2010, pp. 367-393. "Recycling the revenue from border measures back to the developing countries from which the imports arose is one means of preventing perverse outcomes in terms of climate justice by avoiding a direct conflict with CBDR". p. 390

230 Dafermos. Y., The climate crisis meets the ECB: tinkering around the edges or paradigm shift?. *New Political Economy*, pages 1-21.

231 Pauwelyn J., 2008. "New Trade Politics for the 21st Century," *Journal of International Economic Law*, Oxford University Press, vol. 11(3), pages 559-573, September.

232 Rafael Leal-Arcas, *Unilateral Trade-Related Climate Change Measures*, 13(6) J. World Investment & Trade 875 (2012).

233 Bacchus, J. (2018). *Trade and freedom*. Cambridge University Press.

of limited international cooperation. Many of its controversial features, unilateralism, methodological rigidity, developmental insensitivity, are not intrinsic to border adjustment as such, but reflect **what was prioritised and what was postponed**. Greater emphasis on methodological convergence, sectoral cooperation, differentiated treatment of LMICs, targeted coverage of major emitters, and revenue recycling could have reduced friction without abandoning environmental objectives[234]. CBAM may still evolve in these directions. If it does, its long-term success will depend less on enforcement strength than on its capacity to reconnect unilateral climate ambition with cooperative global governance.

CBAM is now in its definitive stage of implementation, and the relevant question is how to reduce risks that implementing of CBAM in the current format will deliver expected outcomes, and to which extent CBAM can still be modified or supplemented by accompanied instruments while preserving environmental integrity and legal defensibility. Several design options and sequencing alternatives can still be considered as reaction to the concerns analysed above.

First, sequencing. A stronger prior push for internationally interoperable embedded-emissions accounting could have reduced the perception that CBAM exports EU methodologies unilaterally. Achieving global agreement is difficult, but the EU can still invest in interoperability through mutual recognition initiatives, participation in international standard-setting, and transparent methodological justification.

Second, targeting and proportionality. Rather than expanding CBAM rapidly to additional processed goods, scope extensions can be guided by a risk-based approach focused on the most leakage-prone and circumvention-prone segments, combined with simplification for low-risk actors. This should be taken into account when, in 2027 the Commission will assess whether to propose extending the CBAM further by including additional EU ETS sectors at risk of carbon leakage, more downstream goods or indirect emissions from additional CBAM sectors.

Third: the overall design of CBAM makes it heavily tilted in favour of big European importers, transnational companies and large and relatively well or medium developed countries. It is more difficult to exercise for small EU importers and for least developed countries. European big companies or multinational corporations can relatively quickly adapt to the new system and even benefit from requirements of this mechanism. The same can be said about larger and more advanced countries in the developing world. They already have differentiated industrial base allowing them to make

234 Espa, I, J Francois and H van Asselt (2022), 'DP17629 The EU Proposal for a Carbon Border Adjustment Mechanism (CBAM): An Analysis under WTO and Climate Change Law', CEPR Discussion Paper No. 17629. CEPR Press, Paris & London. https://cepr.org/publications/dp17629. Authors rightly indicate: "By finding solutions (including reduced administrative burdens) that would at once strengthen an 'environmental' defence under WTO law and ensure compatibility with the Paris Agreement, a carefully designed CBAM could arguably constitute a prime example of how trade instruments could be used to support climate change policies. Or, lacking these solutions, a badly designed CBAM may fail to achieve its stated goals."

additional progress in decarbonisation of production destined for exports to the EU. In many cases, exporters to the EU are large multinational companies, sometimes having an industrial base in many countries and even in Europe and they could juggling sources of traded goods. However, more efforts should be undertaken to assist European small importers and exporters originating in LDCs and even in middle income developing countries.

Fourth, development and capacity-building. Broad exemptions for least developed countries raise circumvention and MFN concerns, but it could be a well delineated exemption or grandfathering based on differentiation between existing production and new installations. Additionally, targeted assistance can address the administrative constraints that make CBAM regressive in practice: MRV capacity, verifier training, digital reporting systems, and access to transition finance for cleaner production and clean electricity and access to clean technology.

Fifth, exports. The export-side gap will likely intensify as free allocation declines; policymakers should explore options that preserve incentives and legal defensibility, including support for decarbonisation investments, sectoral agreements and climate-club approaches, rather than mechanically replicating border rebates that may trigger subsidy disputes[235].

Sixth, administrative proportionality. Simplification and facilitation measures - digitalisation, standard templates, and thresholds calibrated to fixed verification costs - can reduce the risk that CBAM becomes an accidental barrier to small trade flows. And reinforced facilitation should be provided for small and medium sized importers, and also for occasional and opportunity imports.

Finally, revenue legitimacy. Partial recycling of CBAM-related revenues toward international MRV and transition support could improve geopolitical acceptance and align CBAM's climate narrative with distributive fairness, even if full earmarking remains politically contentious[236].

Taken together, these adjustments treat CBAM not as a finished instrument but as an evolving governance system. The success of the definitive phase will be judged by whether CBAM delivers its primary function - preventing the risk of carbon leakage while maintaining ETS integrity - without generating disproportionate trade conflicts, regressive development impacts, or downstream competitiveness distortions that undermine political support for climate ambition.

235 Byiers, B., & Medinilla, A. (2024). *The EU's Carbon Border Adjustment Mechanism and developing countries: Threats, opportunities and strategic responses* (Discussion Paper No. 380). Maastricht: European Centre for Development Policy Management (ECDPM)

236 Clausing, K., Elkerbout, M., Nehrkorn, K., & Wolfram, C. (2024). *Transforming EU Climate Leadership through CBAM Reform*. Washington, DC: Center for Global Development (CGD).https://www.cgdev.org/publication/transforming-eu-climate-leadership-through-cbam-reform

Conclusions

CBAM entered its definitive phase at the beginning of 2026 as a high-stakes experiment in aligning trade with ambitious internal carbon pricing. Its core purpose is preventive: to reduce the risk that tightening ETS constraints shift emissions abroad or undermine political feasibility for higher ambition. CBAM also serves a distributive and legitimacy role by claiming to level competitive conditions in the EU market and to enable the gradual withdrawal of ETS free allocation. Yet these opportunities are paired with significant challenges and risks: integrity depends on MRV and verification capacity; the instrument remains incomplete on exports and downstream products; it is vulnerable to contestability under WTO rules, especially under the chapeau logic that demands non-arbitrary, flexible application; and it can have regressive effects for least and lower-middle developed exporters with limited capacity to decarbonise or comply[237].

CBAM should be understood not merely as a technical addition to the EU Emissions Trading System, but as an experiment in climate, competitiveness and trade governance. Its design and implementation generate a complex constellation of opportunities, challenges, and risks that extend well beyond the prevention of carbon leakage narrowly defined.

The CBAM helps to maintain climate ambitions and strengthen incentives on the path towards a carbon-free global economy.

At its core, CBAM creates an opportunity to preserve and reinforce the integrity of the EU's climate policy architecture. By replacing free allocation with a border adjustment, CBAM strengthens the ETS price signal and aligns more closely with the polluter-pays principle. This shift addresses long-standing critiques of free allocation that muted marginal abatement incentives, generated windfall profits, and complicated the legitimacy of carbon pricing. In this respect, CBAM offers a pathway to maintain high internal ambition while reducing reliance on internal compensation mechanisms.

CBAM also provides an opportunity to reshape competitive conditions in favour of lower-carbon production. By differentiating among physically similar products based on embedded emissions, it creates explicit price differentiation between high- and low-carbon goods. Within the EU market, this favours cleaner imports and strengthens incentives for investment in low-carbon production technologies, both domestically and among foreign suppliers with sufficient adjustment capacity. Over time, such differentiation can contribute to the emergence of segmented markets in which carbon intensity becomes a core parameter of competitiveness.

A further opportunity lies in CBAM's potential contribution to transparency. The mechanism requires systematic monitoring, reporting, and verification

237 Marín Durán, Gracia. "Carbon Border Adjustments: Securing Compatibility with the Multilateral Climate and Trade Regimes." *International & Comparative Law Quarterly*, vol. 72, no. 1, 2023, pp. 73-103.

(MRV) of embedded emissions along global supply chains. Even if CBAM's incentive effects on global decarbonisation remain uneven, the creation of facility-level emissions data for internationally traded basic materials represents a significant governance advance in sectors where comparable data have historically been scarce. In this sense, CBAM may deliver a durable informational legacy by professionalising emissions accounting and creating reference points for future cooperation.

Finally, as a first mover, the EU has an opportunity to shape the global conversation on climate-related border measures. In a world where additional jurisdictions (such as the UK, Canada, or even potentially the United States) are considering similar instruments, the EU CBAM can serve as a benchmark for design choices, methodological standards, and enforcement practices. If coupled with proactive diplomacy, this leadership position could support gradual convergence toward shared principles and reduce fragmentation over time.

CBAM comes with significant challenges, which mostly relate to coordination, redistributive effects, and governance complexity

A central challenge concerns international coordination. CBAM is introduced in a context where multilateral climate cooperation under the UNFCCC is based on voluntary commitments and differentiation, while the WTO legal framework disciplines trade measures through non-discrimination principles and clearly legally defined exceptions. Reconciling a unilateral border instrument with these two regimes is institutionally demanding. Even if CBAM can be defended under GATT Article XX, its political legitimacy depends on whether trading partners perceive it as flexible, procedurally fair, and attentive to different national circumstances.

Distributional challenges are equally significant. CBAM operates between highly unequal partners: a large, wealthy importer - the EU, and a diverse set of exporters with widely differing capacities to adjust. The burden of a border charge imposed by a large economy can be shifted backward onto foreign exporters through lower export prices and reduced volumes. This effect is likely to be most pronounced for small and least-developed economies that are price takers in commodity markets and lack access to capital, technology, and have uneasy access to alternative markets. While CBAM is formally non-discriminatory, its de facto effects may therefore be regressive at the international level.

Another major challenge lies in downstream effects. By pricing carbon-intensive basic materials at the border while initially excluding many downstream products, CBAM risks raising input costs for EU manufacturers and disadvantaging them relative to imports of finished goods. This creates pressure either to expand CBAM scope or to introduce complementary measures. Both options raise further challenges: scope expansion increases administrative complexity and WTO contestability, while partial coverage risks downstream carbon leakage and negative effective carbon protection for more processed goods.

Administrative complexity itself constitutes a distinct challenge. CBAM is as much an information and documentation regime as a pricing instrument. Its effectiveness depends on the availability of credible MRV systems, accredited verifiers, and enforcement capacity across Member States and supply chains. Fixed and large compliance costs are proportionally more burdensome for small importers in the European Union and exporters, and particularly for firms in developing countries with limited institutional capacity. Scaling the system without turning administrative requirements into a de facto trade barrier remains a delicate balancing act.

CBAM entails risks that could undermine its long-term effectiveness if not carefully managed; in particular, circumvention, redistribution and erosion of multilateral trust

The most important risk is circumvention and avoidance. While outright fraud can be addressed through enforcement, many forms of adaptation, such as resource shuffling, trade diversion, or further processing that changes product classification are legitimate market responses to differential carbon pricing. These actions may improve the emissions content of EU imports without reducing global emissions, resulting in carbon diversion rather than carbon abatement. As carbon prices rise, incentives for such strategies increase, complicating enforcement and raising the stakes of anti-circumvention measures.

A related risk is reverse carbon leakage. By shielding domestic producers from foreign competition, CBAM may, under certain conditions, prolong the operation of carbon-intensive installations within the EU if domestic decarbonisation pathways remain costly or delayed. This risk underscores the importance of aligning border measures with a credibly tightening ETS cap and robust support for innovation and infrastructure, ensuring that protection at the border does not substitute for transformation at home.

Geopolitical and systemic risks are also prominent. If CBAM is widely perceived as green protectionism or regulatory coercion, it may provoke political backlash, WTO disputes, and retaliatory measures. Such reactions could erode trust not only in the EU's trade relations but also in multilateral climate cooperation. This tension is particularly acute in relation to developing countries, where CBAM is often framed as inconsistent with the principle of common but differentiated responsibilities and with long-standing development-oriented trade preferences.

Finally, the proliferation of multiple, uncoordinated CBAMs poses a risk of global trade fragmentation. Differing methodologies, price levels, scopes, and origin rules could generate a dense patchwork of overlapping obligations, raising compliance costs and increasing legal uncertainty. Without coordination, border carbon measures could multiply trade frictions rather than foster convergence.

In sum

Taken together, CBAM should be understood neither as a silver bullet for global decarbonisation nor as a purely EU defensive instrument protecting climate policy. The ultimate test of CBAM will therefore not be whether it eliminates all forms of leakage or avoidance, but whether it can align trade incentives with genuine emissions reductions while remaining politically legitimate and internationally defensible. Achieving this balance requires complementing CBAM with broader international cooperation on emissions accounting, targeted support for developing countries, credible domestic decarbonisation policies, and sustained engagement at the trade and climate interface. As an unprecedented governance experiment, the success of the CBAM will depend as much on its initial design as on its ability to adapt to external conditions and the desired direction of its evolution. CBAM is the product of careful design and strong theoretical foundations, reflecting a normative vision of how climate and trade policy should interact[238]. At the same time, its architecture also reflects pragmatic compromises with real-world constraints that diverge from the idealised theoretical model.

The appropriate policy response is therefore not to treat CBAM as a static border charge, but as an evolving governance regime that must be continuously adjusted. Strengthening anti-circumvention, improving methodological interoperability, investing in MRV capacity, addressing downstream leakage in a risk-based manner, and developing credible solutions to export-side competitiveness are all likely to be necessary for CBAM to achieve its aims while maintaining effectiveness and international legitimacy. In the end, the durability of CBAM will hinge on whether it supports real decarbonisation - inside and outside the EU - rather than merely reshuffling trade flows.

238 The ideal theory not ideal one is well described by Volacu, Alexandru. “Bridging ideal and non-ideal theory.” *Political Studies* 66.4 (2018): 887-902.

Bibliography

Acemoglu, D., Aghion, P., Bursztyn, L., Hemous, D. (2012). "The Environment and Directed Technical Change." *American Economic Review*, 102(1), 131–166

Aghion, P., Dechezleprêtre, A., Hémous, D., Martin, R., & Van Reenen, J. (2016). *Carbon taxes, path dependency, and directed technical change*. Journal of Political Economy, 124(1), 1–51

Ambec, S. (2022). *The European Union's Carbon Border Adjustment Mechanism: Challenges and Perspectives* (TSE Working Paper No. 22-1365). Toulouse School of Economics (TSE). https://www.tse-fr.eu/publications/european-unions-carbon-border-adjustment-mechanism-challenges-and-perspectives

Ambec, S., Esposito, F., Pacelli, A. (2024). The economics of carbon leakage mitigation policies. *Journal of Environmental Economics and Management*, 125, 102973. https://doi.org/10.1016/j.jeem.2024.102973

Amendola, M. "Winners and losers of the EU carbon border adjustment mechanism. An intra-EU issue?." *Energy Economics*, vol. 142, 2025, p. 108139. *ScienceDirect*, doi:10.1016/j.eneco.2024.108139.

André, P., Pirlot, A. (2024). When Are Carbon Border Adjustment Measures Just? *Political Studies*, *73*(1), 305-325. https://doi.org/10.1177/00323217241238125

Assous A., Vanegas-Hernandez M., Woods D., Barre C., Sandbag/KAS (2025)., *The EU CBAM: Two-way Street to Climate Integrity*.

Bacchus, J. (2018). *Trade and freedom*. Cambridge University Press.

Bacchus, J.. When Two Global Agendas Collide: How the EU's Climate Change Mechanism Could Fall Afoul of International Trade Rules. Washington, DC: Cato Institute, 2021.

Bairoch, P. "Free Trade and European Economic Development in the 19th Century." European Economic Review 3, no. 3 (1972): 211–245.

Barber, C. L., & Corden, W. M. (1966). *The Structure of a Tariff System and the Effective Protective Rate*. Journal of Political Economy.

Bhagwati, J. (1988). *Protectionism*, MIT Press,

Bhagwati, J. (2002). *Free trade today*. Princeton University Press.

Böhringer, C., Carbone J.C., Rutherford T.F., "Embodied carbon tariffs." *The Scandinavian Journal of Economics* 120.1 (2018): 183-210.

Böhringer, C., Carbone, J. C. & Rutherford, T. F. (2016). *The Strategic Value of Carbon Tariffs*. American Economic Journal: Economic Policy**,** 8(1), 28–51

Böhringer, Christoph, Jared C. Carbone, and Thomas F. Rutherford. "Unilateral Climate Policy Design: Efficiency and Equity Implications of Alternative Instruments to Reduce Carbon Leakage." Energy Economics 34 (2012): S208–S217. https://doi.org/10.1016/j.eneco.2012.09.011.

Boratyński, J. et al., *CBAM and Budgetary Revenue: Prospects for the EU and Poland*, Institute of Environmental Protection – National Research Institute / KOBiZE, Warsaw (2025).

Brandi, C., "Priorities for a development-friendly EU Carbon Border Adjustment (CBAM)." Briefing Paper 20/2021, German Institute of Development and Sustainability (IDOS), 2021.

Brandi, C., Helble, M. (2011). Climate change and trade. *World Economy*, 34(11), 1837–1862.

Branger F., Quirion P., "Climate policy and the 'carbon haven' effect," *Energy Policy* 38(6) (2014).

Brenton, P., Edwards-Jones, G., Jensen, M. F. (2009). Carbon Labelling and Low-income Country Exports: A Review of the Development Issues. *Development Policy Review*, *27*(3), 243-267. https://doi.org/10.1111/j.1467-7679.2009.00445.x

Brunel, C., Levinson, A., Taylor, M. S. (2016). *Pollution offshoring and emission reductions in developed countries*. Journal of Environmental Economics and Management, 77, 85–103

Bueb, J., Hanania L.R., Le Clézio A., 'Border Adjustment Mechanisms: Elements for Economic, Legal, and Political Analysis', in Douglas Arent, and others (eds), *The Political Economy of Clean Energy Transitions* (Oxford, 2017; p. 67 online edn, Oxford Academic, 18 May 2017), https://doi.org/10.1093/oso/9780198802242.003.0004, accessed 30 Jan. 2026.

Burniaux, J. M., Chateau, J., & Duval, R. (2013). Is there a case for carbon-based border tax adjustment? An applied general equilibrium analysis. *Applied Economics*, *45*(16), 2231–2240. https://doi.org/10.1080/00036846.2012.659346

Burtraw, D., Palmer, K., Paul, A., Woerman, M. (2019). "Secular Trends, Environmental Regulations, and Electricity Markets." *Energy Journal*, 40(2).

Byiers, B., & Medinilla, A. (2024). *The EU's Carbon Border Adjustment Mechanism and developing countries: Threats, opportunities and strategic responses* (Discussion Paper No. 380). Maastricht: European Centre for Development Policy Management (ECDPM)

Caves R.E., Frankel J.A., Jones, R.W., *World Trade and Payments* (Pearson, 2007).

Center for Global Development (2024). *Transforming EU Climate Leadership through CBAM Reform.*

CEPR, 2023. *Trade Policies, Non-Economic Objectives, and Multilateral Cooperation in a Globalized World*, Centre for Economic Policy Research. United Kingdom. Retrieved from https://coilink.org/20.500.12592/jgfks5 on 31 Jan 2026. COI: 20.500.12592/jgfks5.

Charnovitz S., "*Border tax equalization*" The World Trade System, January 2016 DOI:10.7551/mitpress/9780262035231.003.0002 (pp.25-53).

Charnovitz, S. (2002). *Trade and the Environment*. Washington, DC: American University Press.

Charnovitz, S. (2017). "The Law of Environmental PPMs in the WTO." *Yale Journal of International Law*, 42, 137–170

Chartered Institute of Taxation (CITP), *Complexity of the EU CBAM in Northern Ireland* (2024).

Chepeliev, M. (2021). Possible Implications of the European Carbon Border Adjustment Mechanism for Ukraine and Other EU Trading Partners. *Energy RESEARCH LETTERS*, *2*(1). https://doi.org/10.46557/001c.21527

Clausing, K. A., Wolfram, C. (2023). Carbon border adjustments, climate clubs, and subsidy races when climate policies vary. *Journal of Economic Perspectives*, 37(3), 137-162. https://doi.org/10.1257/jep.37.3.137

Clausing, K., Elkerbout, M., Nehrkorn, K., Wolfram, C., (2024). *Transforming EU Climate Leadership through CBAM Reform*. Washington, DC: Center for Global Development (CGD). https://www.cgdev.org/publication/transforming-eu-climate-leadership-through-cbam-reform

Colombier, M., Voituriez, T., Levaï, D., (2021). *Europe's Carbon Border Adjustment Mechanism: the need for an improved dialogue prior to project finalization* (Policy Brief No. 01/21). IDDRI. https://www.iddri.org/en/publications-and-events/other-publication/europes-carbon-border-adjustment-mechanism-need-improved; p.4

Cosbey, A., Droege, S., Fischer, C., Munnings, C. (2019). Developing Guidance for Implementing Border Carbon Adjustments: Lessons, Cautions, and Research Needs from the Literature. *Review of Environmental Economics and Policy*, *13*(1), 3-22. https://doi.org/10.1093/reep/rey020

Craig, P., and de Búrca G., EU Law: Text, Cases, and Materials. 7th ed. Oxford: Oxford University Press, 2020.

Dafermos. Y., The climate crisis meets the ECB: tinkering around the edges or paradigm shift?. *New Political Economy*, pages 1-21.

Dechezleprêtre, A., et al. "Searching for carbon leaks in multinational companies." *Journal of Environmental Economics and Management*, vol. 112, 2022, p. 102601. *ScienceDirect*, https://doi.org/10.1016/j.jeem.2021.102601

Dechezleprêtre, A. et al. (2025), "Carbon Border Adjustments: The potential effects of the EU CBAM along the supply chain", *OECD Science, Technology and Industry Working Papers*, No. 2025/02, OECD Publishing, Paris, https://doi.org/10.1787/e8c3d060-en.

Dolphin G., Ferrucci G..; (2025) *The EU's CBAM: Implications for Member States and Trading Partners*; IMF Working Paper; WP/25/125;

Dong, Y., Whalley, J. (2010). Carbon, Trade Policy and Carbon Free Trade Areas. *The World Economy*, *33*(9), 1073-1094. https://doi.org/10.1111/j.1467-9701.2010.01272.x .

Dornbusch, R., Fischer, S., Samuelson, P. A. (1977). "Comparative Advantage, Trade, and Payments," *American Economic Review*, 67(5), 823–839.

Durán, G.M., "Securing compatibility of carbon border adjustments with the multilateral climate and trade regimes." *International & Comparative Law Quarterly* 72.1 (2023): 73-103.

Durán, M.G., "Carbon Border Adjustments: Securing Compatibility with the Multilateral Climate and Trade Regimes." *International & Comparative Law Quarterly*, vol. 72, no. 1, 2023, pp. 73-103.

E3G & Sandbag. *The geopolitics of the European Union's carbon border adjustment mechanism* (2021).

ECDPM. (2024). The EU's Carbon Border Adjustment Mechanism and developing countries: Threats, opportunities and strategic responses (Discussion Paper 380). https://ecdpm.org/application/files/4817/3210/5775/EU-Carbon-Border-Adjustment-Mechanism-Developing-Countries-Threats-Opportunities-Strategic-Responses-ECDPM-Discussion-Paper-380-2024.pdf.

Eckersley, R., "The Politics of Carbon Leakage and the Fairness of Border Measures." *Ethics & International Affairs*, vol. 24, no. 4, 2010, pp. 367-393.

Ellerman, A. D., Marcantonini, C., & Zaklan, A. (2016). "The EU ETS: Eight Years and Counting." *Review of Environmental Economics and Policy*, 10(1), 89–107

Espa, I, Francois J., van Asselt H.'(2022), 'DP17629 The EU Proposal for a Carbon Border Adjustment Mechanism (CBAM): An Analysis under WTO and Climate Change Law', CEPR Discussion Paper No. 17629. CEPR Press, Paris & London. https://cepr.org/publications/dp17629.

European Court of Auditors (2023). *EU Climate and Energy Governance.*

European Parliament Research Service. *Carbon Border Adjustment Mechanism: gradual replacement of free allocation under the EU ETS and phase-in of CBAM obligations (2026–2034)* (EPRS ATA(2023)754626, November 2023),

European Parliament, *Resolution of 10 March 2021 towards a WTO-compatible CBAM*, P9_TA(2021)0071

European Parliamentary Research Service, *Expected revenues*, Epthinktank (Feb 2025).

Evans, S., Mehling, M. A., Ritz, R. A., & Sammon, P. (2021). Border carbon adjustments and industrial competitiveness in a European Green Deal. *Climate Policy*, *21*(3), 307–317. https://doi.org/10.1080/14693062.2020.1856637

Feenstra, R., (2016). *Advanced International Trade: Theory and Evidence*, Princeton University Press, ch. 7.

Ferguson, S., Sanctuary, M. (2019). *Why is carbon leakage for energy-intensive industry hard to find?* Environmental Economics and Policy Studies; and Dechezleprêtre, A. & Gennaioli, C. & Martin, R. & Muûls, M. & Stoerk, T., 2022. "*Searching for carbon leaks in multinational companies*," Journal of Environmental Economics and Management, Elsevier, vol. 112(C).

Fink, C., & Lomfinger, T. (2018). *Trade deflection and rules of origin: evidence from the EU–Morocco free trade agreement and implications for preferential trade agreements*, CESifo Working Paper Series No. 6929.

Fischer, C., Fox A.K., "Comparing Policies to Combat Emissions Leakage: Border Carbon Adjustments versus Rebates." Journal of Environmental Economics and Management 64, no. 2 (2012): 199–216. https://doi.org/10.1016/j.jeem.2012.01.005.

Fournier-Gabela, J.G., Freund, F., Potential carbon leakage risk: a cross-sector cross-country assessment in the OECD area. *Climatic Change* 176, 65 (2023). https://doi.org/10.1007/s10584-023-03544-x

Fowlie, M., Reguant, M., Ryan, S. P., (2016). *Market-based emissions regulation and industry dynamics*. Journal of Political Economy, 124(1), 249–302.

Fuest, C. (2025, October 1)., *Climate policy, carbon border adjustment, and the competitiveness of European industry*. ifo Institut; https://www.ifo.de/en/econpol/opinion/2025-10-01/climate-policy-carbon-border-adjustment-and-competitiveness-european-industry

Government of Canada, *Carbon Border Adjustment: Policy Discussion Papers* (2023).

Grubb, M., "International Climate Finance from Border Carbon Cost Levelling." *Climate Policy*, vol. 11, no. 3, 2011, pp. 1050-1057. Taylor & Francis Online, https://doi.org/10.1080/14693062.2011.582285.

Haya, B., et al. (2020). Managing uncertainty in carbon offsets. *Energy Policy*, 141, 111427.

Hepburn, C., et al. (2020). "Will COVID-19 Fiscal Recovery Packages Accelerate or Retard Progress on Climate Change?" *Oxford Review of Economic Policy*, 36(S1), S359–S381

Holmes, P., Reilly T., and Rollo J., "Border carbon adjustments and the potential for protectionism." *Climate Policy*, vol. 11, no. 2, 2011, pp. 883-900. Taylor & Francis Online;

Holzer, K., *The Pending EU CBAM: Quo Vadis Switzerland?* (May 23, 2021). Global Trade and Customs Journal Volume 16, Issue 11/12 (2021) pp. 633 – 643, Available at SSRN: https://ssrn.com/abstract=3859504 or http://dx.doi.org/10.2139/ssrn.3859504

Horlick, G., Clarke, P., (2017). Rethinking Subsidy Disciplines for the Future: Policy Options for Reform. Journal of International Economic Law. 20. 673-703. 10.1093/jiel/jgx022.

Horn, H., Mavroidis, P.C., (2011) : To B(TA) or not to B(TA)? On the Legality and Desirability of Border Tax Adjustments from a Trade Perspective, FERDI Working Paper, No. P21,

Houser, T. et al., Levelling the Carbon Playing Field: International Competition and US Climate Policy Design (PIIE/WRI, 2008).

Howse, R., "Border-Adjusted Taxes and Regulatory Measures as WTO-Compliant Climate Mitigation Strategies." In European Yearbook of International Economic Law 2015, edited by Marc Bungenberg et al. Heidelberg: Springer, 2015.

IISD, *COP30 Outcome: What It Means and What's Next*, 2025.

IMF (2025). *Macroeconomic Exposure to the EU's Carbon Border Adjustment Mechanism*. IMF Working Paper.

Implication for African Countries of a Carbon Border Adjusment Mechanism in the EU; African Climate Foundation and The London School of Economics and Political Science, (2023). https://www.lse.ac.uk/africa/assets/Documents/AFC-and-LSE-Report-Implications-for-Africa-of-a-CBAM-in-the-EU.pdf

Inama, S. (2009). *Rules of Origin in International Trade*. Cambridge University Press.

International Legal Expert Group on Trade-Related Climate Measures and Policies (TrCM Expert Group). (2023). *Principles of international law relevant for consideration in the design and implementation of trade-related climate measures and policies* Report of an International Legal Expert Group. Forum on Trade, Environment, & the SDGs (TESS).

International Monetary Fund (IMF). *The EU's Carbon Border Adjustment Mechanism: Implications for Member States and Trading Partners*. IMF Working Paper No. WP/25/125, European Department, prepared by Geoffroy Dolphin and Gianluigi Ferrucci (Washington, DC: International Monetary Fund, 2025), available at: https://www.imf.org/-/media/files/publications/wp/2025/english/wpiea2025125-print-pdf.pdf.

IPCC. Climate Change 2022: Mitigation of Climate Change. Working Group III Contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge: Cambridge University Press, 2022.

Javorcik, B. S., Wei, S.-J. "*Pollution Havens and Foreign Direct Investment*." (2004);

Keohane, R. O., Victor, D. G. (2016). Cooperation and discord in global climate policy. *Nature Climate Change*, 6(6), 570–575.

Kortum S., Weisbach D., 2017. "The Design of Border Adjustments for Carbon Prices," National Tax Journal, National Tax Association;National Tax Journal, vol. 70(2), pages 421-446, June DOI: 10.17310/ntj.2017.2.07

Krenek, A., Sommer, M., Schratzenstaller, M. (2019). *Sustainability-oriented Future EU Funding: A European Border Carbon Adjustment* (WIFO Working Papers, No. 587). Austrian Institute for Economic Research (WIFO).

Krugman, P. R., Obstfeld, M., Melitz, M. J. (2018). *International Economics: Theory and Policy*, 10th ed., Pearson, chs. 5–6

Leal-Arcas, R. (2022). Green bills for green earth: How the international trade and climate regimes work together to save the planet. *European Energy and Environmental Law Review*, *31*(1), 19–40. SSRN.

Leal-Arcas, R., Climate Clubs for a Sustainable Future: The Role of International Trade and Investment Law. Alphen aan den Rijn: Kluwer Law International, 2021.

Leal-Arcas, R., Faktaufon M., Kyprianou A., "A Legal Exploration of the European Union's Carbon Border Adjustment Mechanism." European Energy and Environmental Law Review 31 (2022): 223–240.

Leal-Arcas, Rafael. Climate Change and International Trade., Edward Elgar, 2013.

Leal-Arcas, R., *Unilateral Trade-Related Climate Change Measures*, 13(6) J. World Investment & Trade 875 (2012).

Lydgate, E., & Winters, L. A. (2025). *The UK's border carbon leakage trilemma*. Energy Policy, 198, 114393. https://doi.org/10.1016/j.enpol.2025.114393.

Marcu, A., Mehling, M., Cosbey, A. (2020). *Border Carbon Adjustments in the EU: Issues and Options*. Brussels: ERCST - Roundtable on Climate Change and Sustainable Transition. https://ssrn.com/abstract=3703387

Maria, C.D., van der Werf, E., Carbon leakage revisited: unilateral climate policy with directed technical change. *Environ Resource Econ* 39, 55–74 (2008). https://doi.org/10.1007/s10640-007-9091-x

Márquez Thibaut S., (2025), "Carbon border adjustment mechanism : a trade-off between climate goals and competitiveness?: a quantitative study of downstream exposure in the German automotive industry", College of Europe, dissertation.

McLure, C.E.Jr., *The GATT-Legality of Border Adjustments for Carbon Taxes and the Cost of Emissions Permits: A Riddle, Wrapped in a Mystery, Inside an Enigma*, 11 Florida Tax Review 225 (2011).

Mehling MA., van Asselt H., Das K, Droege S., Verkuijl C., Designing Border Carbon Adjustments for Enhanced Climate Action. *American Journal of International Law*. 2019;113(3):433-481. doi:10.1017/ajil.2019.22

Mehling, M., Ritz, R., (2020). "Carbon Border Adjustments and International Trade." *Energy Policy*, 144.

Monjon, S., Quirion, P., (2011). "A Border Adjustment for the EU ETS." *Climate Policy*, 11(3), 1075–1102

Muhua Li, Yan Sun, Yan Xia, Zhaofu Yang, Chuxin Chen, Yongna Yuan, Pu Wang, (2026) The impacts of Carbon Border Adjustment Mechanism (CBAM) on international trade and policy responses: from an economic and environmental equity perspective, Energy Policy Volume 210, https://doi.org/10.1016/j.enpol.2025.115014

Naegele, H., Zaklan, A. (2019). *Does the EU ETS cause carbon leakage in European manufacturing?* Journal of Environmental Economics and Management.

Neuhoff K., Ritz R.A., 2019. "*Carbon cost pass-through in industrial sectors*," Working Papers EPRG1935, Energy Policy Research Group, Cambridge Judge Business School, University of Cambridge.

Neuhoff, K. et al. (2019). "Building Blocks for a Climate-Neutral European Industrial Sector." *Climate Policy*, 19(sup1), S1–S15.

Nordhaus, W. (2015). Climate clubs: Overcoming free-riding in international climate policy. *American Economic Review*, 105(4), 1339–1370 https://doi.org/10.1257/aer.15000001.

OECD (2025), "*What to expect from the EU Carbon Border Adjustment Mechanism?*", *OECD Policy Briefs*, No. 15, OECD Publishing, Paris, https://doi.org/10.1787/719d2ff9-en.

OECD. Greening Regional Trade Agreements: Subsidies Related to Energy and Environmental Goods. OECD Trade and Environment Working Papers No. 2020/01. Paris: OECD Publishing, 2020. https://doi.org/10.1787/7e1fe8ed-en.

Ozai, Ivan. "Designing an Equitable Border Carbon Adjustment Mechanism." *Can. Tax J.* 70 (2022): 1.

Pauwelyn J., 2008. "New Trade Politics for the 21st Century," *Journal of International Economic Law*, Oxford University Press, vol. 11(3), pages 559-573, September.

Pauwelyn, J. (2021). "Carbon Border Measures and WTO Law." *Review of European, Comparative & International Environmental Law*, 30(1), 17–25.

Perdana, S., Vielle M., "Making the EU Carbon Border Adjustment Mechanism acceptable and climate friendly for least developed countries." *Energy Policy* 170 (2022): 113245.

Pietras J. (2024), Carbon Border Adjustment Mechanism as a Trade Policy instrument to Achieve Global Climate Neutrality, in: A Green Deal for the Globe, College of Europe Natolin, Warsaw, pp. 60-79

Pietras, J., *Navigating CBAM Between Non-Compliance and Circumvention*, Wilfried Martens Centre for European Studies, Brussels (2023).

Pirlot A. (2022) Carbon Border Adjustment Measures: A Straightforward Multi-Purpose Climate Change Instrument? *Journal of Environmental Law*, Volume 34, Issue 1, March 2022, Pages 25–52, https://doi.org/10.1093/jel/eqab028

Rasool, S., Reinsch, W.A., Denamiel, T. (2024). *Crafting a Robust US Carbon Border Adjustment Mechanism*. CSIS.

Rodrik, D. (2018). "New Technologies, Global Value Chains, and Developing Economies." *NBER Working Paper.*

Rolf Weber, (2015); "*Border Tax adjustment – legal perspective*," Climatic Change, Springer, vol. 133(3), pages 407-417, December.

Roser, D., Tomlinson L., "Trade Policies and Climate Change: Border Carbon Adjustments as a Tool for a Just Global Climate Regime." *Ancilla Iuris*, 2014, pp. 223–233. https://www.anci.ch/articles/ancilla2014_223_roser-tomlinson.pdf

S&P Global Energy, *CBAM revenue projections* (2023). https://www.spglobal.com/sustainable1/en/insights/special-editorial/eu-carbon-border-adjustment-mechanism-to-raise-80b-per-year-by-2040

Selicato, G., (2022). The EU proposal for a Carbon Border Adjustment Mechanism: an advanced tool to combat 'carbon leakage' , a new EU own resource of 'moral suasion' for third Countries?. *Review of European and Comparative Law*, *50*(3), 25–37. https://doi.org/10.31743/recl.13920

Sijm, J., Neuhoff, K., Chen, Y. (2006). "CO_2 Cost Pass-Through and Windfall Profits in the Power Sector." *Climate Policy*, 6(1), 49–72

Swiss Federal Council, *Carbon Border Adjustment and ETS Linkage* (2024).

Tarr, D. G., Kuznetsov, D., Overland, I., & Vakulchuk, R. (2023). Why carbon border adjustment mechanisms will not save the planet but a climate club and subsidies for transformative green technologies may. *Energy Economics*, *122*,

The 2021 Trade Policy Agenda and 2020 Annual Report of the President of the United States on the Trade Agreements Program https://ustr.gov/sites/default/files/files/reports/2021/2021%20Trade%20Agenda/Online%20PDF%202021%20Trade%20Policy%20Agenda%20and%202020%20Annual%20Report.pdf

U.S. Congressional Research Service (2023). *Carbon Border Adjustment Mechanisms: Considerations for Congress.*

UK Government, *Introduction of a UK Carbon Border Adjustment Mechanism from January 2027* (2024).

UNCTAD (2021). *A European Union Carbon Border Adjustment Mechanism: Implications for Developing Countries.*

Venzke, I., Vidigal G., "Are trade measures to tackle the climate crisis the end of differentiated responsibilities? The case of the EU carbon border adjustment mechanism (CBAM)." *Amsterdam Law School Legal Studies Research Paper* 2022-02 (2022).http://dx.doi.org/10.2139/ssrn.4013767

Viner, J. (1950). *The Customs Union Issue*. Carnegie Endowment for International Peace.

Volacu, A., "Bridging ideal and non-ideal theory." *Political Studies* 66.4 (2018): 887-902.

Vriz, G.L., Cojoianu, T., Fischer, C., Taschini, L., Early Signs the EU Carbon Border Adjustment Mechanism Is Reshaping EU-India Steel Trade (September 24, 2025)., SSRN: https://ssrn.com/abstract=5524624 or http://dx.doi.org/10.2139/ssrn.5524624

Weko, S., Eicke, L., Marian, A., & Apergi, M. (2020). The Global Impacts of an EU Carbon Border Adjustment Mechanism. IASS Policy Brief, 2020(6). DOI: 10.2312/iass.2020.055.

Weko, S., Eicke, L., Marian, A., and Apergi, M.: The Global Impacts of an EU Carbon Border Adjustment Mechanism, IASS Policy Brief, November 2020, Potsdam, DOI:10.2312/iass.2020.055

World Bank. (2015) *Carbon Leakage: Theory, Evidence and Policy Design.* Technical Note 11 (Partnership for Market Readiness series).

Yamaguchi S., *Greening Regional Trade Agreements: Subsidies Related to Energy and Environmental Goods*, OECD Trade and Environment Working Papers No. 2020/01 (Paris: OECD Publishing, 2020), https://doi.org/10.1787/7e1fe8ed-en

Young, T, Xue, M, Tang, W. (2026). When carrots meet sticks: Reverse carbon leakage driven by carbon regulation conflicts in Journal of Management Science and Engineering 11/2 275-287 https://doi.org/10.1016/j.jmse.2026.03.002

Zachmann, G., McWilliams, B., *A European Carbon Border Tax: Much Pain, Little Gain*, Bruegel (2020).

Zhan C., (2023) Australia's Green Tariff on Carbon – A New Dumping Ground, Moulislegal https://moulislegal.com/knowledge-centre/australia-s-green-tariff-on-carbon-a-new-dumping-ground/

Impress

Cover : Adobe Stock

Design and typesetting: OBJECTIF SRL

ISBN 9789083536798

MULTINATIONAL
DEVELOPMENT
POLICY DIALOGUE
KAS BRUSSELS

Multinational Development Policy Dialogue (MDPD)
Konrad-Adenauer-Stiftung
European Office Brussels
Avenue de l'Yser / Ijserlaan 11 - 1040 Brussels
www.kas.de

Contact:
Dr. Olaf Wientzek
Programme Director Multinational Development Policy Dialogue (MDPD)
Konrad-Adenauer-Stiftung e.V.
Avenue de l'Yser 11/ IJzerlaan 11
1040 Brussels

Edited by:
Nicole Linsenbold
Programme Manager
Multinational Development Policy Dialogue (MDPD)
Konrad-Adenauer-Stiftung e.V.
Avenue de l'Yser 11/ Ijzerlaan 11
1040 Brussels

Caro Verbruggen
Project Assistant
Multinational Development Policy Dialogue (MDPD)
Konrad-Adenauer-Stiftung e.V.
Avenue de l'Yser 11/ Ijzerlaan 11
1040 Brussels

MULTINATIONAL DEVELOPMENT POLICY DIALOGUE
KAS BRUSSELS

9 789083 536798