

Designing Border Carbon Adjustments and Alternative Measures: An Overview

Aaron Cosbey (Small World Sustainability), Kasturi Das (Institute of Management Technology, Ghaziabad), Susanne Droege (German Institute for International and Security Affairs), Carolyn Fischer (Vrije Universiteit Amsterdam), Timo Gerres (Universidad Pontificia Comillas), Roland Ismer (FAU Erlangen-Nürnberg), Pedro Linares (Universidad Pontificia Comillas), Michael Mehling (Massachusetts Institute of Technology), Karsten Neuhoff (DIW Berlin), Alice Pirlot (Oxford University), Misato Sato (London School of Economics), Aleksander Śniegocki (WiseEuropa)

Introduction

In March 2020, the European Commission released its Inception Impact Assessment for a European Union carbon border adjustment mechanism (CBAM)¹. This was an invitation to discuss elements of a border carbon adjustment (BCA) and policy alternatives to support more ambitious EU climate policies under the Paris Agreement. Different ambition levels across Parties to the Paris Agreement, in particular the different carbon costs incurred for producers, can trigger carbon leakage – the outsourcing of emissions. Leakage is driven by trade and the international division of labour, such that imports whose carbon content is not subject to a carbon price can undermine domestic carbon-pricing efforts, and exports can lose market share in international markets. Consideration of a BCA is not exclusive to the EU. Major past and current federal carbon pricing proposals in the United States, for example, include BCA mechanisms. Emerging economies have also considered BCA: Mexico, for one, mentions them as an option in its nationally determined contribution – the regularly updated national climate policy pledges under the Paris Agreement submitted to the United Nations Framework Convention on Climate Change (UNFCCC).

The European Commission's Green Deal will lead to more ambitious emissions reduction targets for 2030. Meeting the long-term goal of climate neutrality by 2050 will entail a profound decarbonisation across all sectors of the economy. The carbon price will have to increase significantly, likely well beyond what we have seen in the past, raising concerns about carbon leakage. The European Commission is thus reviewing all its policy approaches, including the Emissions Trading Directive, the Energy Tax Directive and the anti-leakage approaches taken so far, predominantly in the form of free allocation of emissions allowances. The Green Deal is supposed to unlock investments to achieve climate targets, broadening the policy approach beyond climate action to enable deeper decarbonisation. The COVID-19 pandemic and the subsequent economic downturn will likely result in surplus production capacities and may potentially exacerbate carbon leakage concerns.

In the following sections, we discuss the design options for a BCA and alternative measures that may be implemented behind the border. As part of this discussion we analyse the general policy objectives of BCAs and alternative measures, present an overview of different basic types of policy design,

¹ We will refer to the general tool as a BCA in this brief, because the term is widespread in the literature and policy debates.

highlight various implications of design choices and shortly address further issues, such as the use of potential revenues, and practical implementation of BCA.

This overview of BCA and policy design consideration is based on the expertise of the authors and relevant literature. In particular, the work of Ismer et. al. (2020), Mehling et. al. (2019) and Cosbey et. al. (2019) and Neuhoff et. al. (2016) provides the framework of the subsequent discussion^{2,3,4,5}.

Policy Objectives of a BCA and Alternative Measures

As the EU proceeds to elaborate a legislative proposal for the design and implementation of its BCA, it will be guided by several policy objectives. Clarity and transparency of policy objectives are critical for engaging with stakeholders within and outside the EU, for fostering broader understanding and acceptance of the measure and, importantly, for evaluating its performance and effectiveness following implementation. The tensions and trade-offs between competing objectives must be identified and balanced. Understanding the objectives of a BCA also allows policy makers to determine whether alternatives might be as effective but have lower economic or political cost or lower legal risk.

Statements by decision makers and documents issued by the European Commission, including the Inception Impact Assessment roadmap, have variously mentioned the policy objectives of a future EU BCA or alternative measures. Whereas published documents have focused on strengthening climate action by avoiding carbon leakage⁶, statements by the EU and Member State officials – including European Commission President Ursula von der Leyen – have also highlighted the need to avoid ‘unfair competition’⁷ and ensure a level playing field for EU industry. Below we discuss these and additional aims that should guide the design and rollout of an EU BCA.

Strengthening Climate Action

First and foremost, the chosen policy should strengthen climate action. As will be elaborated below, focusing on this objective is vital for reducing the risk of legal challenges by trade partners. A BCA can potentially strengthen climate action in several ways, such as:

- by limiting emissions leakage from the relocation of production and investment to non-EU countries with no or less restrictive carbon constraints, which may then supply the EU and global markets with higher carbon-content products;
- by ensuring full internalisation of carbon costs along the value chain to incentivise efficient material use and substitution with less carbon-intensive materials, and to create a business case for climate-neutral but likely higher-cost production processes;
- by creating incentives to reduce the carbon content of imported products by subjecting the emissions associated with their production to the EU carbon price;
- by enabling the EU to sustain greater climate ambition by alleviating domestic pressure from stakeholders concerned about the economic consequences of carbon leakage;

² R. Ismer, K. Neuhoff, and A. Pirlot, ‘Border Carbon Adjustments and Alternative Measures for the EU ETS An Evaluation’, vol. 1855, 2020.

³ M. A. Mehling, H. van Asselt, K. Das, S. Droege, and C. Verkuil, ‘Designing Border Carbon Adjustments for Enhanced Climate Action’, *Am. j. int. law*, vol. 113, no. 03, pp. 433–481, Jul. 2019, doi: 10.1017/ajil.2019.22.

⁴ A. Cosbey, S. Droege, C. Fischer, and C. Munnings, ‘Developing Guidance for Implementing Border Carbon Adjustments: Lessons, Cautions, and Research Needs from the Literature’, *Review of Environmental Economics and Policy*, vol. 13, no. 1, pp. 3–22, Feb. 2019, doi: 10.1093/reep/rey020.

⁵ Karsten Neuhoff et al., ‘Inclusion of Consumption of carbon intensive materials in emissions trading—An option for carbon pricing post-2020’, *Climate Strategies*, 2016

⁶ See, e.g., European Commission, Communication from the Commission: The European Green Deal, COM(2019) 640 final, 11 December 2019, p. 5; European Commission, DG TAXUD, Inception Impact Assessment: Carbon Border Adjustment Mechanism, 4 March 2020, p. 2.

⁷ Ursula von der Leyen, Keynote Speech at the World Economic Forum, 22 January 2020.

- by incentivising foreign trade partners to increase their climate efforts in order to help their exporters avoid having to comply with a European BCA, along with the commercial and fiscal implications; and
- by generating revenue that can be used to fund investments in clean technology innovations and infrastructure modernisation or international climate finance to developing countries.

Averting Social and Economic Impacts of Climate Action

Although the primary objective of a BCA or alternative should be to strengthen climate action, policy makers and stakeholders will invariably also invoke social and economic considerations. That risks portraying the BCA as an economic rather than an environmental measure, potentially rendering it more vulnerable to challenges under international trade law (see also below). Nevertheless, these social and economic concerns are legitimate and play an outsized role in domestic policy debates. Where it occurs, emissions leakage also threatens economic opportunity. Affected companies worry about losing market share to foreign competitors,⁸ while citizens worry about offshoring of jobs. Vulnerable industries are often concentrated in structurally disadvantaged regions, where industry relocation due to climate constraints can result in further loss of social cohesion.

Limiting Legal and Political Risks

As the EU considers the design of a BCA, it needs to consider the policy's legal basis, which in turn depends on the chosen mechanism. If it is designed as a fiscal measure, the BCA would most likely require a unanimous vote in the European Council, rendering its passage less likely. Implementation through an extension of the EU Emissions Trading System (ETS), on the other hand, would allow passage by a qualified majority vote. What is more, because a BCA will be imposed on imports and/or exports, it risks infringing on the EU's commitments under the World Trade Organization (WTO) and some regional trade agreements. In particular, restrictions on imports based on the carbon intensity of products may violate provisions on non-discrimination, and policy relief or exemptions for European producers could be seen as a prohibited subsidy under the WTO's Agreement on Subsidies and Countervailing Measures. Careful design and emphasis on the environmental objectives of the BCA can minimize these risks. Finally, the BCA is likely to incite heated political controversy by the EU's trade partners. Past proposals to adjust for uneven climate policies have been followed by quick and ardent criticism from other countries, and the announcement of a BCA as part of the European Green Deal has likewise evinced censure from other countries. Such diplomatic fallout has the potential to undermine multilateral cooperation, including under the climate regime, and makes a case for both the design and rollout of a BCA to engage the trade partners in a fair, transparent, and inclusive process.

Minimizing Administrative Complexity and Cost

Depending on its design, the implementation of a BCA can incur considerable technical challenges and necessitate data that may not be available across the EU. Using default values for entire sectors rather than requiring calculation of emissions for each individual product, for instance, can reduce some complexities but also reduces the accuracy of the BCA as a tool to internalise the carbon cost of covered products. Likewise, a BCA that seeks to maximise its climate benefit would have the broadest possible scope, including basic materials as well as intermediate and final goods, yet their inclusion dramatically increases technical complexity, potentially raising the cost of implementation beyond the

⁸ In this context, it is worth noting that a BCA on imports only will not, by itself, safeguard the competitiveness of EU products sold in foreign markets.

climate benefits. Navigating such trade-offs between objectives is an important consideration for the policy's designers.

Basic Types of BCAs and Alternative Measures

Policy measures to reduce or eliminate carbon price differences between domestic producers and their international competitors can take several forms. Each type of arrangement is characterised by a different combination of domestic production and consumption coverage, as well as the extent to which the adjustment covers import and exports.

The most straightforward option to reduce carbon price differences between domestic and international producers is to introduce instruments directly targeting trade flows – that is, border carbon adjustments, which can cover either imports only or both imports and exports. Import adjustments can take the form of a charge, or alternatively imports could be included in the EU ETS. Both policies have similar effects: domestic consumption of a given type of good is fully covered by carbon pricing and therefore also covers imports. The extent of BCA coverage (raw materials, intermediate goods, final goods) is a specific design choice discussed in the following section. An import BCA can be complemented by export adjustment, although this arrangement may be challenging from the WTO law perspective. It can take the form of direct costs refunds associated with the EU ETS (purchase of allowances) for the exported goods. In that case, full export adjustment will be achieved without any penalties or benefits associated with emissions intensity of the EU exports.

Alternative mechanisms can limit carbon cost differentials for domestic and international producers without the introduction of border instruments. The current solution in the EU ETS is to provide free allocation of emissions allowances for domestic producers, with the number of allowances declining over time. It is at best a temporary measure and not a permanent solution to mitigate carbon price differentials between domestic and international producers. Instead, providing continuous free allocation that is linked to actual production volume ensures that the carbon price differential between domestic and international producers is limited over the longer term. If this so-called dynamic free allocation is based on product benchmarks, domestic producers are charged for emissions above the benchmark and rewarded for outperforming it. This means that: a) the carbon price signal is maintained for all domestic production; b) the cost burden for domestic producers associated with climate policy is reduced in both domestic and international markets; c) producers that outperform the benchmark receive a net benefit; and d) the carbon price signal for domestic consumption is largely muted. This last feature of dynamic free allocation is problematic from the perspective of overall cost-efficiency of climate mitigation, but it can be addressed by introducing an additional consumption charge based on product benchmarks for domestic consumers.

The final way to equalise the carbon prices faced by domestic and international producers is to completely switch from a production-based to a consumption-based carbon pricing scheme. This would involve excluding domestic producers from the EU ETS and instead introducing consumption charges based on the product's carbon footprint. The approach is economically equivalent to introducing BCA for both exports and imports, but in practice tracing emissions from consumption is more technically and legally demanding than from production.

Table 1 summarises the trade-offs associated with measures to address cross-border carbon price differentials.

Table 1. Features of measures to reduce carbon price differences between domestic and international producers

		Border carbon adjustment		Alternative measures	
		Full auctioning + BCA for imports	Full auctioning + BCA for imports and exports	Declining free allocation (current solution)	Dynamic free allocation + benchmark-based consumption charge
Carbon cost internalisation	Domestic production	Yes	Only domestic sales	Yes	Yes
	Domestic material use and choice	For products directly covered by BCA	For products directly covered by BCA	No	Yes
Limiting carbon cost differences between domestic and foreign producers	Domestic market (domestic production vs imports)	Largely based on default values (risks from product shuffling)	Largely based on default values (risks from product shuffling)	No	Largely based on product benchmarks
	International market (export of domestic production)	No	Complete elimination of differences, based on refund	No	Largely based on product benchmarks

Notes: 1) for BCA, temporary combination with declining free allocation is possible during phase in period,

2) product shuffling refers to the risk that allocation of (low-carbon) electricity to electricity based processes and trade-flows of (low-carbon) materials are adjusted to benefit from reductions on EU import charges

Design implications

The implementation of any policy targeting border carbon adjustments or alternative measures require a thorough consideration of the different policy design elements. In the following, we briefly discuss the implication of design elements such as product coverage, default carbon intensity values, exemption and credits and continued free allocation.

Product Coverage

The coverage of a BCA must be evaluated across production chains and across material choices. Carbon-intensive basic materials serve as primary feedstock to the production chains of most manufacturing processes. In our globalized economy, production chains are heavily integrated with markets outside the EU, and manufacturers of intermediate products are often in direct competition with companies based abroad. Flaws in the BCA policy design might have disruptive effects on the domestic manufacturing sector while not achieving the goal of reducing the carbon footprint of imports. If only raw material imports are covered, end-product manufacturers may choose to procure intermediate products from non-EU manufacturers that are not affected by the BCA in their raw materials choice. A BCA that applies to a wide range of intermediate products with carbon-intensive material content, however, might impose a heavy administrative burden. Policy design should also address the dynamics of material substitutions. A static definition of raw materials covered by the legislation could favour the use of carbon-intensive alternatives that were not envisioned when the regulation was drafted. Although such material substitution may play a minor role for capital goods, the policy design needs to prevent unsustainable substitutional effects for intermediate and final goods.

Default Carbon Intensity Values

Obtaining actual carbon emissions data for every imported or exported product is infeasible.⁹ A practical approach is to set a default emissions intensity value to calculate the level of adjustment at the border. These defaults may be uniform by product (such as the domestic sector's average emissions intensity or an average of the top performers, or the best available technology) or differentiated according to the country or origin (such as for indirect emissions), production technology category, or a facility's actual emissions. Table 2 summarizes the many trade-offs amongst accuracy, incentives, political, legal and administrative issues that are involved when choosing default values; notably, these trade-offs can be different for import adjustments than for export or production rebates.

Basing the default value on a uniform measure can reduce legal and political risks, but such values may not accurately reflect the actual emissions intensity – especially when domestic intensity targets are ambitiously low. Uniform sector defaults for imports are thus less effective at transmitting carbon price signals. However, for export rebates, uniform defaults are less distorting than firm- or technology-specific rebates, which either exempt a portion of a firm's actual emissions from carbon pricing or give larger de facto subsidies to dirtier producers. On the other hand, from a legal perspective, any rebates in excess of a firm's actual carbon payments may be viewed as illegal subsidies, so uniform rebates cannot be too generous.

For imported goods, accurate transmission of carbon price signals requires appropriate differentiation, and foreign firms will have incentives to reduce their footprint only if such action translates into a smaller border adjustment. However, such differentiation increases complexity, requires extraterritorial information and risks legal challenges and trade conflicts. One solution is to combine uniform default values with an option for importers to reduce their border adjustments if they can demonstrate that their specific production process is more carbon efficient, such as by third-party certification in accordance with internationally recognised standards. As domestic emissions fall, a movement from default values based on domestic intensity towards defaults reflecting a global average emissions intensity will enhance effectiveness of the BCA and may aid in linking different systems internationally.

In the case of consumption charges, default carbon intensity values should be consistent with the benchmarks used for determining free allocation to domestic producers, which are in effect uniform standards.

⁹ To maximise leakage prevention and incentivise mitigation incentives, the scope of emissions used for emissions intensity values should include total emissions – that is, both direct and indirect emissions from electricity. However, including indirect emissions would increase feasibility, by reducing complexity and data requirements, as well as political and legal issues e.g. due to existing compensation mechanisms for indirect emissions in some member states.

Table 2. Options and trade-offs for default emissions intensity values

				Uniform default values		Differentiated default values		
				based on sector average	based on best available technology	by country	by technology	by facility
Strengthen mitigation incentives	Full carbon cost internalisation	For imports	✓✓	✓	✓✓✓	✓✓✓	✓✓✓	
		For domestic producers with export rebates	✓✓	✓✓	N/A	X	XX	
	Leakage protection	Level playing field for exporters	✓✓	✓	N/A	✓✓	✓✓	
		Support global climate action	Avoids foreign production reshuffling	✓✓	✓✓	X	X	XX
	Incentives for foreign producers to improve		(with option to certify)		(with option to certify)	✓	✓✓	
	Incentives for foreign governments to regulate				✓			
	Legal and political risk	Avoids over-charging clean importers	(with option to certify)	✓✓	(with option to certify)	✓	✓✓	
		Avoids over-compensating exporters		✓✓		✓✓	✓✓	
		Complexity and cost	Avoids discriminating by country of origin	✓✓	✓✓		?	?
	Uses domestically available data		✓✓	✓✓	✓			

Note: The default value is two ticks. Cross indicates adverse effects.

Exemptions and Credits

Exemptions and credits are features unique to a BCA regime: neither would feature in a regime based on consumption charges.

Exemptions are country-based carve-outs from the application of a BCA. Such a feature presents two challenges. First, it would violate the General Agreement on Tariffs and Trade (GATT)'s Article I (Most-Favoured Nation) and could be implemented only by invoking GATT's Article XX (General Exceptions). Second, it is not clear what criteria would be appropriate for exemptions. Some have proposed that least-developed countries be exempted, and this may align with the UNFCCC principle of common but differentiated responsibilities and respective capabilities (CBDR-RC). Other possibilities:

- Exempt countries that are on track to meet their Paris Agreement commitments. However, those are voluntary commitments of widely varying ambition, and they are hard to verify.
- Exempt countries that have an emissions trading system with a hard cap, since no leakage can occur if the cap is adequate.

Any such exemptions would be best specified in terms of objective criteria, and not left to executive discretion.

Credits are adjustments to the amount owed for an imported product, based on an assessment that the product was subject to carbon pricing in the country of export. Absent such crediting, BCA and consumption-based charges both tilt the playing field to the detriment of the imported product, effectively double-charging for its carbon content. If the credit is for a carbon price-based policy in the country of export, the adjustment is more or less straightforward: a reduction in the amount payable, equal to the calculated carbon price already paid, whether that was in the form of a carbon tax or a mandated purchase of allowances. It is more challenging to grant credit for policies not based on price, such as automobile efficiency standards, because it is difficult (but not impossible) to calculate the price-equivalent effect of any policy and to keep abreast of changing standards. More fundamental is the challenge of deciding which policies to consider; many climate policies are not explicitly aimed at mitigation.

Continued Free Allocation

Allowances are allocated for free to industrial installations in the EU ETS. This limits carbon cost increases that could trigger relocation of production or investment to countries with lower carbon costs. In the EU, allocation is based largely on product benchmarks, thereby creating incentives for producers to improve production efficiencies.

Four types of distortions from free allocation of allowances persist:

- Incentives to innovate and invest in breakthrough low-carbon technologies and processes may be limited, since their deployment will lower the benchmark level (which is based on the best performers) and thus decrease the firm's ability to recover incremental costs associated with climate-friendly new processes and receive carbon leakage protection for existing assets.
- Today's production volumes will be the basis of the calculation of free allowance allocation in future years (production volume times benchmark level). This creates incentives to increase production and sales volumes and thus reduces carbon cost pass-through.
- With uncertainty about the level of carbon cost that can be passed through in product prices, a politically negotiated free allowance allocation could exceed the carbon costs left with producers, which would result in windfall profits.
- With limited carbon cost pass-through, the incentives for substitution with less carbon-intensive materials and efficient material use are limited. Furthermore, the business case for investments in (near) climate-neutral production processes is undermined if final consumers will not pay carbon costs and or the incremental costs of low-carbon alternatives.

BCAs may offer, from an environmental and fiscal perspective, an opportunity to abandon free allocation of allowances, thus avoiding the first three distortions mentioned above and limiting the fourth. It has also been proposed to combine a BCA for an (unlimited) transition period with free allowance allocation. In that case, the level of the adjustment charge would need to be reduced by the level of free allocation to avoid discrimination. To the extent that a share of free allocation would be retained, all four environmental and fiscal concerns persist.

If, as an alternative, the EU ETS were complemented with a consumption charge at the benchmark level, then free allowance allocation would be reformed to be directly proportional to current (or the previous year's) production volumes and the benchmark level for conventional processes. This would mute carbon cost pass-through from the EU ETS, other than for inefficiencies above the benchmark level. The full carbon cost pass-through would, however, be reinstated with the consumption charge.

Thus, all four distortions would be avoided, and the environmental and fiscal objectives would be achieved.

Other issues

The practicality of a BCA or alternative measures depends on the other policy design aspects that must be considered thoroughly before their implementation. The use of potential revenues and the mechanism of implementation for a BCA are briefly discussed in this section.

Use of Revenues

Both a BCA and consumption-based charges will generate revenues that may be used for various purposes. We envisage four major potential uses: a) substituting for other taxes (in the framework of a green fiscal reform); b) compensating households with direct financial transfers; c) financing low-carbon technologies or projects within the EU; and d) extending these financing options to developing countries. The allocation will need to be determined based on a political economy rationale, which may include efficiency, distributional fairness and equity (domestic or global) and overall emissions reduction aspects. This rationale may also vary depending on the policy option chosen.

An important issue here is that, depending on the policy option chosen, the revenues may be collected by the EU directly, or by the Member States, hence affecting how they are used. Also note that the chances that any BCA is 'saved' by the GATT's General Exceptions are greatly increased if the revenues are directed to environmental purposes, and even more so if they are directed to international climate-related efforts that might benefit affected trade partners.

Mechanism of Implementation

Different policy mechanisms can be drawn on to implement a BCA, and the Inception Impact Assessment roadmap highlights three options: a carbon tax on imported and domestic goods, a customs duty and the inclusion of imports in the EU ETS. Each mechanism faces different legal requirements for its adoption and implementation, including voting requirements under the EU law, implications for revenue use and likelihood of violating international trade disciplines.

Conceptually and administratively, implementation by way of a tax or duty may be the most straightforward yet difficult to adopt politically: measures that are primarily fiscal – such as a tax – require unanimity in the European Council and are thus easier for individual Member States to block, whereas customs duties may require the renegotiation of existing tariff arrangements under the WTO or regional and bilateral trade agreements. Implementation by way of an extension of the EU ETS would require only a qualified majority vote in the European Council but raises complex administrative challenges, from aligning with the EU ETS cap or creating a separate pool of virtual allowances to correlating the adjustment level to the variable market price of the EU ETS allowances.

Generally, the mechanism of implementation should adhere as closely to the mechanism faced by domestic producers, to reduce the risk of challenges based on GATT's national treatment provisions. Because the EU producers are subject to the EU ETS as the main decarbonisation policy, BCA implementation should require importers or foreign producers to either purchase allowances to cover their emissions or pay a levy based on the market price of allowances. Alternatively, importers or foreign producers could be allowed to purchase international carbon offsets or emissions allowances from other established markets with clear emission caps up to the determined value of the adjustment. To avoid problems of unpredictable swings in prices, importers should be afforded the same compliance timeframe as domestic firms.

Conclusion

The design and implementation of a border carbon adjustment or alternative policy should be guided by policy objectives in light of the potential trade-offs. We believe, strengthening of climate action by reducing carbon leakage is the overarching goal, given that the European Green Deal aims to achieve the climate targets of the Paris Agreement. We also see other important objectives, including the avoidance of adverse social and economic implications of such action, the limitation of legal and political risks, and minimisation of the administrative complexity and costs of addressing carbon leakage.

In sum, the following trade-offs and challenges exist for the design options of a BCA or its alternatives.

To tackle leakage, a BCA could target imports only, or both exports and imports. It could be added to the existing or future free allocation of emissions allowances to sectors at risk of carbon leakage, or it could become a stand-alone anti-leakage measure for sectors at risk. Export rebates or (even more so) a combination of free allowances with export rebates could raise red flags, given that they do not serve climate protection and could qualify as prohibited subsidies under WTO rules. As long as there is no single global carbon price, there is no uniform incentive to reduce emissions caused both by domestic consumption and production. An export rebate would necessitate a decision to either create a level playing field for all EU exporters on the international market or support low-carbon EU exports only. Import adjustments, on the contrary, could be designed in a way that is potentially WTO compatible.

If a BCA is chosen, how to calculate the carbon intensity of goods entering or leaving the EU becomes an issue. This could be resolved in part by choosing default values for a sectoral average. The default values, while avoiding trade discrimination, would not be fully accurate, thus leaving room for leakage. Full calculations can avoid leakage to a large extent but are administratively very difficult to implement and may face legal risks under WTO law. Default values would help in operating a BCA, in cases where the BCA applied only to a few sectors (instead of all traded goods), provided the data on production technologies across the EU exist. Third-party certification could be a solution for producers abroad to get credit if they perform better than the EU average. A clear trade-off exists regarding the scope of producers covered. If it is broad, it avoids competitiveness impacts on downstream producers and material substitution effects. However, a broad scope comes with high burdens for administration and also methodological clarity.

The different treatment of products with a carbon-intensity value higher than the EU's average could be at odds with the EU's WTO obligations, in particular the national treatment principle. But the details of the scheme clearly matter. The trade-off here is between environmental effectiveness, which can be achieved by stringent and ambitious forms of discrimination under a BCA, and WTO legality, which is more easily achieved by less environmentally effective formulations.

The exemptions from a BCA for countries based on their climate policy actions would need a clear agreement on criteria. Country-based exemptions are difficult to reconcile with the WTO principle of Most-Favoured Nation. The country-specific settings of the BCA thus would require scrutiny. Allowing for a credit if there is carbon pricing in the country of export, however, is a key element of a BCA design. Granting credits for non-price-based policies poses difficult challenges as to how to calculate them.

An alternative to taking measures at the border exists. By combining an emissions trading system with a consumption charge on carbon intensive materials, the EU ETS would continue to provide incentives for climate-friendly production of materials. The combination of free allocation of emissions

allowances with a consumption charge levied on carbon-intensive materials sold in the EU (for both imported and domestic materials) allows for a carbon price signal along the value chain and addresses leakage. It also avoids the complexities of trade-related measures.

The European Commission will need to review options for a BCA and alternatives keeping in view other climate policy instruments, as it seeks to develop a consistent and robust policy framework that can guide the Member States to climate neutrality.