POSITION PAPER

# Closing the Green Deal for Industry

## What design of the carbon border adjustment mechanism ensures an inclusive transition to climate neutrality?

CLIMATE Strategies

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## About

The Climate Friendly Materials Platform analyses the transformation of basic material production and use to achieve carbon neutrality by 2050. Our collective aim is to aid progress toward nationally-led industrial decarbonisation policy frameworks compatible with long-term EU strategy, and for the EU to capture the potential of a just and inclusive transformation of the basic materials sector to net climate neutrality by 2050. We achieve this through a process of shared learning and creative exchange with key stakeholders. We bring together leading think tanks and university research groups in Belgium, France, Germany, Hungary, the Netherlands, Poland, Spain and Sweden to enhance Europe's analytic understanding of how individual instruments can be brought together into a coherent policy package.


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# Executive Summary

**The EU Green Deal requires an effective Carbon Border Adjustment Mechanism (CBAM) for an inclusive transition to climate neutrality in the basic materials sectors. Otherwise:**

- Controversy about the free allowance allocation will persist together with debates on carbon leakage risks, creating uncertainty and delaying low-carbon industrial investments.
- The $CO_2$ price signal of the EU ETS will be largely muted for investments in a transition to climate neutral production and use of materials due to the international tradability of materials.
- Member States would need to fund the transition to climate neutrality from their national resources, which will likely lead to further fragmentation of industrial potential in the EU.

**A CBAM design based on adjustments of trade for incurred carbon emissions faces WTO, administrative and economic limitations.** Controversy on free allocation, carbon leakage, and insufficient EU level incentives for climate neutral investments will persist. Investments will only be viable in Member States that can afford national support schemes, creating the risk that some industrial regions will be left behind.

**A CBAM design based on established, uncontroversial and WTO-compatible excise adjustments mechanisms can support an inclusive industrial transition to climate neutrality for all industrial regions. This requires three elements.**

1. **The climate contribution ensures effective carbon price incentives along the value chain.** Producers of basic materials are liable for the climate contribution per weight of the material. The level of the liability for a material like steel is set by a benchmark for carbon intensity of material production multiplied with the EU ETS carbon price from the allowance auctions in the preceding year. The established border adjustment mechanisms for excises apply: The liability is not due, if materials or products containing the materials are exported. Importers incur a liability for imported materials or materials as part of products with significant shares of carbon intensive materials.

The climate contribution ensures that carbon costs are reflected in material prices as these are currently largely muted due to international tradability of materials. This creates carbon price incentives for efficient material use and choice as well as recycling. By ensuring that material prices reflect carbon costs, the climate contribution also creates the required revenue stream to fund carbon contracts for difference at a sufficient scale to support the transition to climate neutrality in all European industrial regions.

2. **The EU ETS with dynamic free allowance allocation incentivises carbon efficiency of conventional material production. It also ensures the integrity of the emission cap** as installations can only emit if they obtain allowances. The resulting carbon price is reflected in the climate contribution and thus incentivises efficient material use, choice and recycling.

   To avoid double charging through EU ETS and climate contribution, free allocation of EU ETS emission allowances is granted for each tonne of material production with conventional production processes. It is provided at a benchmark rate directly linked to the weight of materials produced to avoid risks of windfall profits while ensuring material producers retain full incentives to improve carbon efficiency. To avoid the risk that firms limit their efforts to shift to clean production processes, free allowance allocation would be conditional on the pursuit of transition plans in which basic material producers outline how they intend to shift their production to climate neutrality.

3. **Carbon contracts for difference (CCfDs) introduce incentives for clean material production and recycling.** Currently carbon costs are only very partially reflected in material prices, and hence climate neutral production processes cannot financially benefit from the carbon savings they offer. Hence many Member States and the European Commission envisage to learn from the success of Contracts for Difference for renewable investment and offer CCfDs to support investments in clean production and innovative recycling processes.

   CCfDs pay for the carbon savings of new production processes and new recycling processes compatible with the transition to climate neutrality. The reference price for CCfDs would be set through a competitive discovery process at the level of their incremental costs relative to conventional process. This ensures payments to clean production processes are limited to incremental costs of clean processes and thus avoid WTO concerns.

CCfDs thus create markets for climate neutral material production until international cooperative approaches ensure carbon costs are reflected in the price of traded basic materials or conventional material production and use is banned. The payments under the CCfDs will then be reduced automatically by the level of carbon costs reflected in basic material prices.

**No element can function on its own.** For example, an EU ETS with free allowance allocation alone fails to incentivise investments in material efficiency and recycling and to create resources at European scale to support an inclusive transition to climate neutrality for all industrial regions. A climate contribution on its own does not create incentives for improved carbon efficiency or climate neutrality. Next to these instruments, public investments in infrastructure, meaningful engagement and information processes and instruments, and green procurement are needed.

**Together these elements re-establish the integrity of the EU ETS carbon pricing mechanism.** The market equilibrium between EU ETS emission cap and emissions from EU ETS installations determine the carbon price. If the EU ETS price changes, it not only affects incentives for conventional material production but also for material efficiency, substitution and recycling. Thus, all mitigation opportunities benefit from carbon pricing incentives while carbon leakage risks are avoided. The combination of elements:

- avoids disputes on the level of free allowance allocation to balance incentives and carbon leakage concerns.
- limits complexity and administrative efforts for public and private actors.
- can be implemented as part of the EU Environmental Regulation.
- avoids international trade conflicts and associated uncertainties.
- offers a foundation for the further development of international cooperation on climate policy.

The mandate of the EU Commission to propose a CBAM in combination with the ambition of the EU Green Deal to support an inclusive transition to climate neutrality offers a unique window of opportunity to implement the reform. This reform will allow industry to realise projects and for existing EU instruments like the EU Innovation Fund, NextGenerationEU, Just Transition Mechanism and Horizon Europe to catalyse these investments across the EU. To contribute to global investments towards climate neutrality, Europe needs to make the right policy choice.

# 1 Background

Production of basic materials like steel, cement clinker, plastic (HVC), fertilizer (ammonia) and aluminium contributes to 25% of global and 16% of EU emissions. Three types of greenhouse gas mitigation options need to be jointly realized to achieve climate neutrality while securing local jobs and enhancing the resilience of supply chains: (i) the shift to climate neutral production processes, (ii) the efficient choice and use of materials and (iii) enhanced recycling and reuse.

**What is the current policy response?** In Europe, the EU Emission Trading System (EU ETS) is widely recognised as the key policy instrument to deliver the carbon price incentives to support these mitigation options. However, as basic materials are globally tradable, producers are only able to pass a share of carbon costs to material prices. Furthermore, as material production is the most carbon intensive industrial activity, the inability of passing carbon costs to material prices could trigger carbon leakage from the relocation of production and associated emissions to other regions without carbon costs at corresponding levels. Governments are committed to avoid unintended environmental, economic and social effects of such carbon leakage risk. In the European context, carbon leakage has been addressed by granting free allowances to basic material producers.[i]

**Why is a reform needed?** As carbon prices are only very partially reflected in material prices,[ii] they do not incentivise investments and new business models for climate neutral production processes, efficient material use and choice, and reuse and recycling.[iii] The EU ETS only creates effective incentives for marginal improvements of carbon efficiency of existing carbon intensive production facilities and thus does not support the transition to climate neutrality.

**What is the objective of the CBAM file?** The EU Green Deal envisages the reform of the EU ETS, including the announced carbon border adjustment mechanism (CBAM) and other complementary measures to create effective incentives for the transition to climate neutrality while avoiding carbon leakage risks. Supporting international climate action is also mentioned as a consideration in policy design.

Two main technical implementation options are under discussion to achieve these objectives:

- **The first option is to combine the EU ETS with a border carbon adjustment for incurred emissions** of carbon intensive production. This would aim to address carbon leakage concerns and create international incentives for emission reductions, while allowing a transition to full auctioning of allowances to ensure effective incentives for domestic production.
- **The second option is a design based on excise adjustment mechanisms to complement EU ETS and free allowance allocation.** The climate contribution makes basic material producers liable for a charge per tonne of material at a benchmark level multiplied by EU ETS price. This creates effective carbon pricing incentives along the value chain. Established border adjustment mechanisms from excise charges apply and avoids carbon leakage risks. To avoid double charging, free allowance allocation is provided to conventional installations at benchmark level for firms with transition plans to climate neutrality.

In the following, we discuss the limitations of a border carbon adjustment mechanism based on incurred emissions, and how a refined design based on a climate contribution offers the opportunity to address these limitations.

# 2 Limitations of border carbon adjustment for incurred emissions

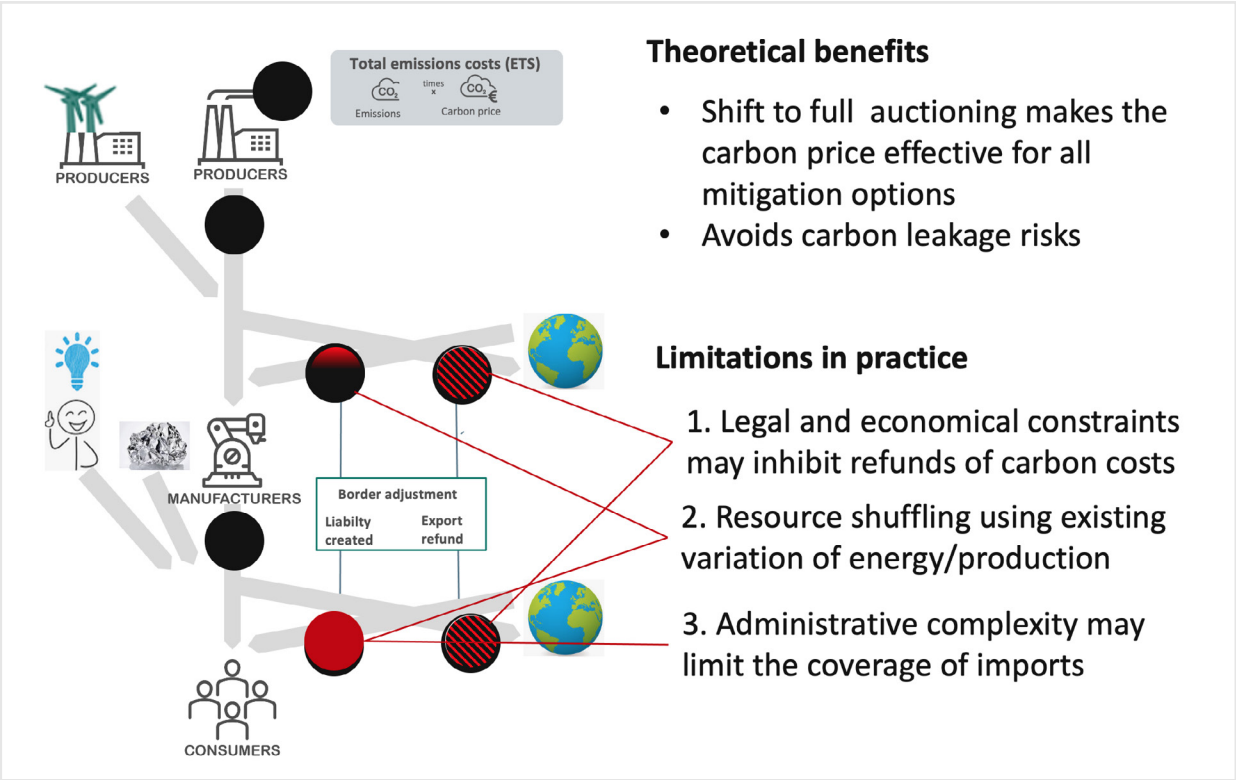
For a long time, economists around the globe have argued for using a border carbon adjustment instead of free allowance allocation to address carbon leakage concerns. The intuitive idea is that domestic producers should face the full carbon costs while an adjustment mechanism should ensure that carbon costs are also reflected in import prices and that carbon costs are reimbursed if products are exported.

Much of the current policy debate is focused on the question of whether a CBAM can contribute to global action by encouraging more ambitious climate policy by third countries, or whether it will rather trigger conflicts and undermine a positive atmosphere of international climate cooperation.[iv]

What has been discussed less extensively so far is to what extent a border adjustment mechanism can support the domestic policy objectives. Detailed legal, economic, and administrative analysis points, however, to three fundamental concerns (Figure 1).[v]

**FIGURE 1**

## Limitations for implementation of CBAM for incurred emissions



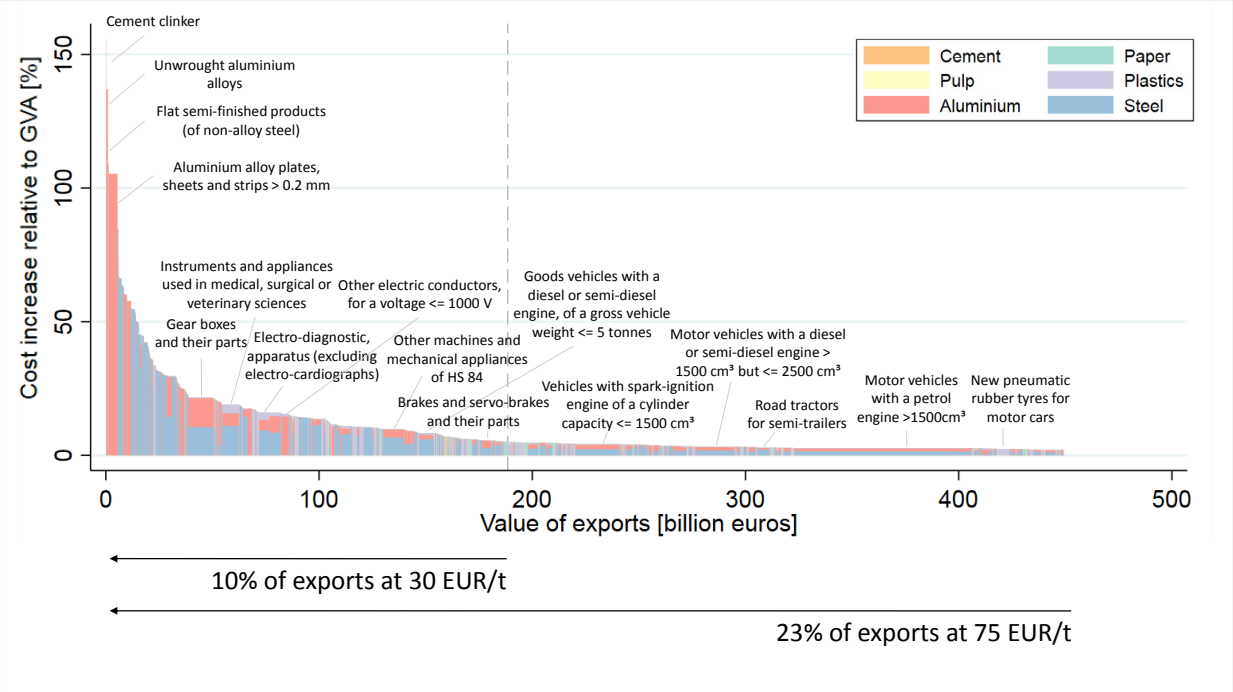

**First challenge: Legal and economic constraints may inhibit refunds of carbon costs for exports and thus create carbon leakage risks.** The refunds might be challenged under WTO law. This creates regulatory uncertainty which undermines the investment framework for low-carbon options. Also, if carbon costs were reimbursed for exports, this would mute the incentives for export-oriented producers to pursue climate neutral production processes, material efficiency and substitution.

However, if carbon costs are not refunded for exports, then the domestic industry bears higher carbon costs than international competitors. This creates the risk of carbon leakage in the global market, with exports and emissions from domestic production simply being replaced by production and emissions in third countries. The primary criterion in the EU ETS Directive for trade-intensive products potentially at risk of carbon leakage has been whether carbon costs increase by more than 5% relative to gross value added.[vi]

Prior to the discussions on a CBAM, the carbon leakage concerns focused on basic material production. Exports of roughly 25 billion Euro were considered at risk of carbon leakage at carbon prices of 30 Euro/t. These risks were addressed with free allowance allocation.

**FIGURE 2**

## Products in export markets potentially at risk of carbon leakage under a CBAM without reimbursement for exports, based on EU-27 PRODCOM manufacturing data from 2019[vii]




If the implementation of a CBAM, however, ensures that basic material prices include full carbon costs, then material intensive products along the value chain also incur potentially significant cost increases compared to competitors in export markets. If carbon costs are not refunded for exports, then the traditional criterion identifies potential carbon leakage risk for EU-27 exports at the scale of 64 billion Euro basic material products, 33 billion Euro of components of products, and 67 billion Euro of final products, together amounting to 10% of European exports (Figure 2).

**Second challenge: Variation of energy systems and production processes within countries allow for resource shuffling that can trigger carbon leakage risks in a CBAM design with adjustments for incurred carbon emissions.** If imports bear significant carbon costs according to their carbon footprint, then this creates strong incentives for firms in third countries to re-allocate and attribute existing less carbon intensive production to exports to the EU. This can involve attribution of existing low-carbon electricity to material production or attribution of more efficient installations or installations using higher shares of recycled materials to exports.

Resource shuffling will likely result in increased volumes of imports replacing domestic production and emissions without any real reduction in emissions. In fact, while nominally the specific imports may cause lower carbon emissions, the increased exports of third countries will trigger an increase of their material production from existing facilities and associated emissions in the country of origin. Enhanced monitoring and verification may avoid mere attribution of low-carbon material production to exports but will not address the above described channels of physical resource shuffling.

Resource shuffling could only be avoided if import charges are based on an irrefutable default value based on the conventional production process. However, this is difficult to justify under WTO rules, because it could imply discrimination against carbon efficient international producers that would be liable for the higher default value, while domestic producers would only be charged according to realised carbon emissions. Hence the economic effect of resource shuffling is difficult to tackle in a BCA design due to legal constraints under WTO rules.

**Third challenge: Administrative complexity may limit the coverage of imports under a BCA mechanism, leaving the risk of carbon leakage in value chains unaddressed.** For imported products, the carbon emissions caused by all basic materials embodied in the product would need to be monitored, reported, and verified to determine the import charge. This could imply high administrative and verification costs, as the EU would have to trace the complex value chains outside its territory. If, however, only imports of basic materials and basic material products are liable for import charges, then this could create incentives to import more refined products not covered by a BCA. In such a situation, domestic manufacturers face material prices that include a carbon costs premium, but importers from third countries do not face this premium. This could exacerbate the reduction of domestic market shares and a relocation of production and associated emissions to third countries.

Analogous to the analysis for export markets mentioned before and its results presented in Figure 2, a major share of domestic sales would be at risk of carbon leakage according to the traditional EU ETS Directive indicators on carbon cost increase and trade intensity. If a BCA applies only to basic materials and basic material products, then at a carbon price level of 30 Euro/t $CO_2$, 243 billion Euro of domestic sales would meet the carbon leakage risk criteria.

**In response to these challenges, significant shares of free allowance allocation might be retained for an indefinite time even after implementation of a border carbon adjustment mechanism.** The border adjustment would then need to be scaled down accordingly, covering only emissions above the free allocation benchmark to avoid double protection. As a result, the policy objective to create effective incentives for the transition to climate neutrality would not be achieved.

The carbon price incentives for efficient material use and choice as well as for recycling would remain largely muted. With free allowances granted to conventional installations they are also not available to support climate neutral processes or for auctioning to fund climate action. Furthermore, concerns and associated uncertainties on the WTO viability of increased levels of free allowance allocation to specific sectors would persist.[viii]

As a result, the political debate would remain focused on what is the appropriate level of free allowance allocation to balance interests to avoid carbon leakage (high level of free allocation) and effective incentives and public revenues (phasing out free allocation). This debate has caused uncertainties for investors and undermined constructive policy dialogues since the start of the EU ETS.

**For these three reasons, a CBAM design based on adjustments for incurred emissions may not be a helpful solution in the short-term**, e.g. this decade. In a longer-term perspective an increasing number of countries may have implemented similar carbon pricing levels and WTO rules can be reformed. This would allow the use of a CBAM to address trade with a few remaining countries. Then the scale of the three challenges of resource shuffling and leakage concerns in value chains and export markets will be limited, and a CBAM with adjustments for incurred emissions or a direct shift to carbon neutrality standards for materials and products may be more viable. In the latter case, the necessary monitoring and verification system may be built already with a focus on determining whether the materials were produced using low-carbon processes or not, without the need to establish a more complex methodology for determining the exact carbon footprint for conventional processes which is required for the border adjustment.

# 3 Border carbon adjustment using proven elements

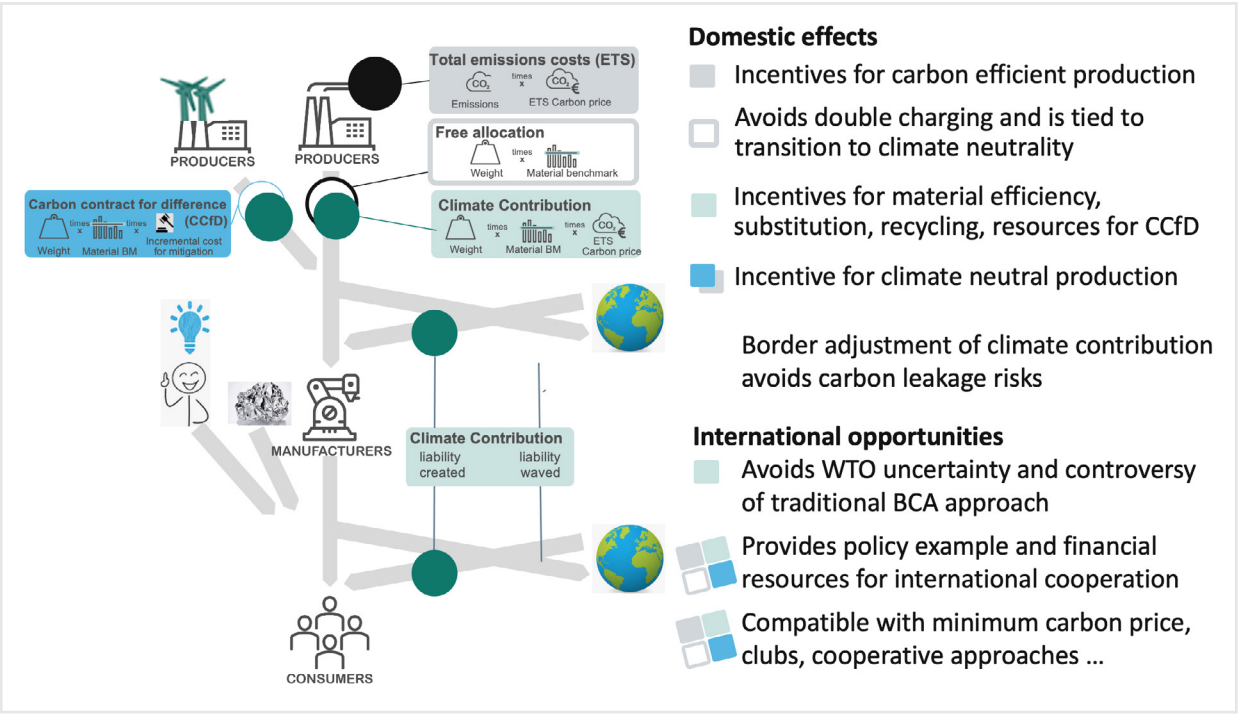
With the combination of three elements, the objectives of the CBAM file in the EU Green Deal can be achieved.[ix] First, the climate contribution is levied on production of carbon intensive materials and subject to proven border adjustments common to excise charges.[x] Second, carbon contracts for difference (CCfD described below) funded by revenues from the climate contribution cover incremental costs of investments in climate neutral material production. Third, free allowances are granted to conventional basic material producers to avoid double charging from climate contribution and EU ETS to all material producers that provide plans for the transition to climate neutrality (Figure 3).

**The climate contribution ensures effective carbon price incentives along the value chain.**[xi] Producers of basic materials are liable for the climate contribution per weight of the material at a benchmark for carbon intensity of material production multiplied with the EU ETS carbon price from the allowance auctions in the preceding year.[xii] They can choose to either directly pay the charge or pass the liability for the charge with the sale of materials or products to the next stage of the value chain. The established border adjustment mechanisms for excises apply: the liability is not due if materials or materials as part of products are exported. Importers incur a liability for imported materials or materials as part of products with significant shares of carbon intensive materials.[xiii]

The climate contribution ensures that carbon costs are reflected in material prices. This creates carbon price incentives for efficient material use and choice as well as recycling. By ensuring that material prices reflect carbon costs, the climate contribution also creates the required revenue stream to fund carbon contracts for difference at a sufficient scale to support the transition to climate neutrality in all industrial regions.

**FIGURE 3**

## Adding a climate contribution to the EU ETS with free allocation creates incentives to reduce emissions for the entire value chain and avoids carbon leakage risks




**EU ETS with free allowance allocation incentivises carbon efficiency of material production. It also ensures the integrity of the emission cap**, because installations can only emit if they obtain allowances. The resulting market price for allowances is directly incentivising carbon efficiency of emitters. As the market price is reflected in the climate contribution, it also incentivises all other mitigation options along the value chain. This ensures effectiveness and efficiency of EU ETS.

To avoid double charging through EU ETS and climate contribution, free allocation of EU ETS emission allowances is granted for each tonne of material production based on the current market design.[xiv] Free allocation is granted at a benchmark rate per tonne of material production to ensure material producers retain full incentives to improve carbon efficiency. Every efficiency improvement reduces the need to purchase allowances to cover emissions exceeding the benchmark rate.[xv] The cost of acquiring these additional carbon allowances would remain moderate and thus carbon leakage risks also for carbon prices above 50 Euro/t could be avoided, if allowances would be granted at the full benchmark level for conventional production processes. This could however create risks that firms limit their efforts to shift to clean production processes. Hence the free allocation would be conditional on the provision of transition plans in which basic material producers outline how they transit their production to climate neutrality.[xvi]

**Carbon contracts for difference (CCfd) introduce incentives for clean production processes.** [xvii] Currently the carbon price does not incentivise clean production processes, because due to free allocation to conventional production processes the costs of the competing process barely increase. At the same time, clean production processes do not benefit from free allocation of allowances. Hence many member states and EU Commission already plan to apply contracts for difference, that have proven their success with renewable investors, to industry.

CCfDs pay for the carbon savings of new production processes compatible with the transition to climate neutrality. The reference price for CCfDs would be set through a competitive discovery process at the level of incremental costs of clean process relative to conventional process. This ensures payments to clean production processes are limited to incremental costs of clean processes and thus avoid WTO concerns.

CCfDs create markets for climate neutral material production until international cooperative approaches ensure carbon costs are reflected in the price of traded basic materials or conventional material production and use is banned.[xviii] The payments under the CCfDs will then be reduced by the level of carbon costs reflected in globally traded materials. The climate contribution provides the required scale of resources for CCfDs to be backed at the European level. This is essential for an inclusive transition to climate neutrality, to ensure that across EU industrial regions, production processes are shifted to climate neutrality to ensure their long-term viability.

**No element can function on its own.**[xix] EU ETS with free allowance allocation alone fails to incentivise investments in material efficiency and recycling and to create resources at European scale to support an inclusive transition to climate neutrality for all industrial regions. A climate contribution on its own does not create incentives for improved carbon efficiency and needs the EU ETS cap and reference price.

**Together the instruments re-establish the integrity of the EU ETS carbon pricing mechanism.** The market equilibrium between EU ETS emission cap and emissions from EU ETS installations determine the carbon price. If the EU ETS price changes, this is not only reflected in incentives for carbon efficiency of material production but also in incentives for material efficiency, substitution and recycling. Thus, all mitigation opportunities benefit from carbon pricing incentives while carbon leakage risks are avoided.

# 4
# A refined CBAM file for a successful European Green Deal

**Avoids disputes on the level of free allowance allocation.** As the climate contribution ensures carbon price incentives along the value chains, it allows for a continued free allowance allocation to firms that pursue a transition to climate neutrality (see also section 5). This provides increased certainty for firms willing to engage in the transition and puts an end to the long-standing debates on the appropriate level of free allowance allocation to balance effective carbon prices and government revenues versus effectively addressing carbon leakage risks. These debates are difficult to resolve based on very diverse empirical evidence and analytic perspectives that point to a variety of factors that will influence future carbon cost pass through, and hence have been inherently political. They have undermined and delayed policy processes, and triggered opposition to all elements of EU ETS design in attempts to limit the stringency of the mechanism in order to limit the risks for industry from potential policy outcomes with perceived insufficient free allowance allocation to adequately address carbon leakage risks.

**Minimises costs to society.** First, the combination of elements enhances the efficiency of EU ETS by creating incentives for all mitigation options. All mitigation options compete for their contribution to emission reductions, thus enhancing incentives for innovation and effective technology choice and limiting costs to consumers. Second, the climate contribution in combination with dynamic free allowance allocation also avoids costs to consumers from windfall profits from free allowance allocation linked to more historic production volumes,[xx] and from increases in prices paid for materials from existing domestic and international clean production facilities (resource shuffling).

Third, the climate contribution in combination with carbon contracts for difference furthermore reduces regulatory risks for new investments and thus the carbon price at which clean technologies are viable, and hence the carbon costs to consumers.

On the other hand, the financial impact for consumers will be moderate. This is also because the costs of basic materials play a very minor role in the prices of most final products. Household expenditure would only increase by around 0.2 percent at a carbon price of 30 euros, and even less if manufacturing industry enhances material efficiency. The effect is slightly progressive, as higher-income households spend a greater share of their income on material-intensive end products such as cars.[xxi] If desired, the financial impact could be addressed with a per head reimbursement of a share of the revenue. The financial impact for consumers would also be similar to a shift to full auctioning under EU ETS in the context of a carbon border adjustment mechanism for incurred emissions not subject to legal, economic and administrative constraints.

**Limits complexity and administrative efforts.** The combination of elements reduces the complexity of carbon pricing for private sector decision makers. They would only need to consider the EU ETS carbon price that would apply to all mitigation options along the value chain, because carbon leakage concerns are addressed in a way that does no longer distort this price signal.

The administrative effort on EU ETS does not change and the implementation of the climate contribution is aligned with existing practices and procedures from excise charges.[xxii] The liability for importers can be calculated and verified easily as it is based on the weight of covered materials either as such or contained in product, while a *de minimis* rule can define product categories for which importers incur liability.

**Can be implemented as environmental legislation.** The primary objective of the climate contribution is to strengthen the integrity of EU ETS by ensuring all mitigation options can respond to the carbon price incentive. Together with the close link to EU ETS carbon prices, benchmarks and earmarking of revenue for the climate action that otherwise would have been funded from EU ETS auction revenue, this provides the basis for the implementation of the climate contribution as environmental legislation with qualified majority under the EU ETS Directive.[xxiii]

**Avoids international trade conflicts and associated uncertainties.** The climate contribution builds on well-established WTO principles for excise charges and can thus be robustly implemented. It also provides a WTO justification for continued free allowance allocation to ensure internal consistency of the pricing mechanism by avoiding double charging. Thus, legal disputes and political repercussion can be avoided, for the benefit of regulatory stability and international cooperation.[xxiv]

The policy combination could offer a viable policy option for any country to deliver carbon pricing incentives while avoiding carbon leakage risks. In principle many countries and regions could implement such a combination of instruments in parallel. Once price levels have then converged, it would be politically uncontroversial to jointly abandon climate contributions and free allowance allocations, and carbon contracts for differences would automatically adjust. By avoiding carbon leakage risks, the approach also avoids the risk that third countries attempt to delay climate policy implementation to benefit from carbon leakage in terms of attracting relocation of production facilities.

Instead, the approach ensures that revenues from carbon pricing primarily reside with the country where carbon costs result in product price increases. The approach thus reflects the destination principle from taxation in the domain of carbon pricing. This is attractive for developing countries that tend to be net importers of basic materials. It is also in line with the recent G7 agreement on reforms of corporate taxation in the context of digitalization to allocate tax revenue of multi-nationals to countries according to the sales volumes of the companies.

**A refined CBAM file as foundation for the international cooperation on climate policy.**

First, it facilitates effective domestic carbon pricing without carbon leakage risks, and thus offers the opportunity for initial international cooperation to avoid the controversial topic of carbon pricing and focus on further aspects like standardization, mutual policy learning, and technology cooperation. This is in line with the increasing global momentum for a transition to climate neutrality that currently is based on discussions on very different combinations of policy instruments in each country.

Second, it provides a basis and flexibility for further developments of international carbon pricing cooperation, for example based on an agreed minimum carbon price or a carbon club with border adjustment.[xxv] The carbon contracts for difference are already structured to accommodate for any potential reflection of carbon costs in contract prices.

Third, it contributes to resources that support an inclusive transition to climate neutrality in developing countries in line with the Paris agreements' objective to dedicate globally 100 billion Euro annually for international climate action.

Finally, the credible framework for large-scale investments into low-carbon industrial production processes can contribute to a global momentum on technology development and use. On this basis there will be global interest in cooperation on new standards and norms. Rather than attempting to incentivise the policy agenda of third countries through border levies which ultimately may or may not be introduced, the experience of wind- and solar power has demonstrated that a successful precedent can encourage other countries to also pursue strategies and policies to adopt clean technologies.
Governments and companies can only jointly realise the investments for a successful

# 5 Coordination using public and private transition plans

transition to climate neutrality. Governments will only succeed to retain industrial structures if companies invest in transitioning existing production sites to clean processes. Companies in turn can only realize such projects if the regulatory framework provides a business case, if governments ensure the provision of infrastructure for hydrogen, renewable electricity or $CO_2$, and if the society supports the use of new technology and associated permitting.

Hence at the core of the Green Deal rests a mutual commitment by governments and companies to enable and pursue the necessary investments towards climate neutrality. The starting point are the sector road maps for production of basic materials like steel, cement clinker, plastic, fertilizer (ammonia) and aluminium with their contribution to 25% of global and 16% of EU emissions.

Governments already provide emission pathways at the sector level, including for industry, as part of the EU 2030 Governance framework and in many countries national climate laws. However, from emission targets it is neither directly possible to deduce what specific infrastructure developments are required nor to identify ex-post who is to praise if the target is achieved or to blame if the target is not met. Emission targets on their own are insufficient to catalyse the transition to climate neutrality. Hence governments and firms need to define how the share of climate neutral production processes should evolve over the coming years in Europe.

This could involve the following elements:

**Governments outline as part of the 2030 governance structure in their revised national energy and climate plans**, what minimum share of basic material production they aim to transition to climate neutral production processes. To create an attractive investment framework, governments will then have to identify and address the needs and barriers for the realisation of climate neutral projects, and continuously track and manage progress including on provision of clean energy, infrastructure, innovation funding and carbon contracts for difference. Governments can use the established EU economic governance structures and transparency to facilitate public scrutiny to make this a credible commitment.

**Firms will need to provide transition plans outlining their pathway of transitioning production to climate neutral processes.** A set of principles need to be achieved with these plans:

- As basic material production is lumpy, so will be the resulting emission reductions. This makes it difficult, particularly for smaller material producers, to define targets at the firm level simply in terms of emission pathways. Instead firms may prefer to outline which of their European installations will transition to climate neutral production during the 2020s and provide interim milestones. This would also facilitate coordination with provision of the relevant infrastructure.
- Building on 20 years of experience from UK Climate Change Agreements,[xxvi] firms would need to provide transition plans and demonstrate progress towards their implementation to benefit from free allowance allocation at the full benchmark level. Flexible processes need to allow for adjustments, for example where provision of public infrastructure or CCfDs are delayed.
- Any reporting needs can build on and needs to be aligned with existing forward-looking reporting, for example under global Task Force on Climate-related Financial Disclosures (TCFD) standards and the proposed Corporate Sustainability Reporting Directive.
- Transparency is of mutual benefit, but where it exceeds the level of information already available to global market analysts, the effect on global competition needs to be considered.

**The design of transition plans has to provide for flexibility.** Transition plans are a coordination instrument, and should be reviewed over time to flexibly respond to new information on technology performance, cost and acceptance.

- Governments should periodically review their plans to adjust technology specific targets. A credible review process can contribute to regulatory security, if the overall effect of an adjustment will not increase emissions, and thus enhances regulatory commitment to the transition process and market potentials for clean technologies.
- Firms also need to be able to adjust their transition plans, and can in case of technology developments or restructuring submit adjusted plans. The UK Climate Change Agreements also illustrate that firms may require flexibility on timelines for emission reductions where governments failed to deliver the enabling environment.

**The design of transition plans has to ensure incentives for firms for efficient technology choice, cost reductions and innovation.**

- Both technology firms and material producers need to also contribute own resources to projects and technology development. This ensures their full attention and dedication to selection and further developments of technologies for growing climate neutral markets.
- Competition between firms will be important for innovation and cost reduction of climate neutral technologies. Transition plans therefore merely define a "minimum requirement" to ensure the engagement of all firms while creating opportunities for firms with better technologies and performance to increase market shares in climate neutral markets.

What is important for the European economy – the targets should help to catalyse a transition which will then develop a dynamic by itself. Hence targets for clean technologies should not be interpreted as guarantees for market shares of conventional technologies.

**The Green Deal can facilitate the coordination of an inclusive transition**

Transparency on public and private planning is the basis for an inclusive transition – to ensure that no region in Europe will be left behind. On the basis of credible plans by firms, governments can invest in the provision of required infrastructure. On the basis of confidence in the provision of public infrastructure and policy frameworks, firms can advance investments in climate neutral production.

This will provide the business case for and enable governments, firms and investors to make strategic choices. It is the basis for the refinement of existing and envisaged complementary instruments addressing technology, financing and local transition needs. (EU Innovation Fund,[xxvii] Next Generation EU, Just Transition Mechanism, Horizon Europe)

# 6 Conclusion

A border carbon adjustment mechanism is proposed at the EU level to allow for a shift from free allowance allocation to full auctioning of EU ETS allowances with the objective of creating effective carbon price incentives while avoiding carbon leakage risks. Detailed analysis points however to economic, legal and administrative constraints associated with the implementation, which translate into potential carbon leakage risks in export markets, along the value chain and through resource shuffling. As a result, a large share of free allowance allocation may continue, and continue to be negotiated, undermining effective carbon pricing incentives and the ability to attract investments towards climate neutrality.

A refined design of a CBAM can address these drawbacks. It involves the combination of a climate contribution levied on production of basic materials in combination with free allowance allocation to conventional installations that pursuit plans towards a transition to climate neutrality and carbon contracts for difference. Together these instruments can ensure effective carbon price incentives while avoiding carbon leakage and regulatory risks.

The strong mandate provided to the European Commission to propose a CBAM in combination with the ambition of the EU Green Deal to support an inclusive transition to climate neutrality offers a unique window of opportunity to implement the reform. This reform will allow industry to realize projects and the EU recovery funds to catalyse these investments across the EU. The urgent need to tackle climate change highlights the importance of making the right policy choice now.

# Endnotes & References

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ii. K. Neuhoff and R. A. Ritz, "Carbon cost pass-through in industrial sectors," Cambridge Working Papers in Economics no. 1988 (2019)

iii. For the importance of efficient material use and recycling in a successful transition to climate neutrality see IEA Net Zero by 2050 Report, International Energy Agency 2021

iv. A. Marcu, M. Mehling, A. Cosbey (2020) Border carbon adjustments ahead – proceed with caution, ESRC Issues and Options paper.

v. R. Ismer, K. Neuhoff, Alice Pirlot, "Border Carbon Adjustments and Alternative Measures for the EU ETS. An Evaluation," DIW Discussion Paper no. 1855 (2020)

vi. Art 10a(15) of Directive 2003/87/EC, was refined from 2020 based on product on carbon and trade intensity.

vii. J. Stede, S. Pauliuk, G. Hardadi, K. Neuhoff. (2021) Carbon pricing of basic materials: Incentives and risks for the value chain and consumers," DIW Discussion paper 1395.

viii. Ismer e.a. (2021) Climate neutral production, free allocation of allowances under emissions trading systems, and the WTO: How to secure compatibility with the ASCM, DIW Discussion Paper.

ix. For analysis of the elements and their interaction: https://climatestrategies.org/projects/european-climate-friendly-materials-platform

x. In principle also secondary production (e.g. recycling) is liable for the climate contribution. This avoids distortions of global steel and aluminium scrap markets. Re-use is however not covered, and thus incentivized, including in the case of mechanical recycling of plastics or cement. Incremental costs of nnovative recycling processes can also be supported through CCfDs.

xi. C. Böhringer et al., "Robust policies to mitigate carbon leakage," Journal of Public Economics 149 (2017): 35–46. De Bruyn e.a. (2018) "External cost charge" propose to trace emissions along the entire value chain, as basis for an external cost charge. Thus, coverage would expand beyond basic material production. This would involve increased complexity and challenges of WTO alignment of international tracing of incurred emissions.

xii. Climate Strategies (2016) Inclusion of Consumption of carbon intensive materials in emissions trading –An option for carbon pricing post-2020 Report May 2016 available together with administrative, economic, and legal analysis at https://climatestrategies.org/projects/inclusion-of-consumption-in-emissions-trading/. For a more recent characterization, see Krzysztof Brzeziński and Aleksander Śniegocki (2020) Climate Contribution and its role in European industrial decarbonisation, Climate Strategies Report

xiii. Based on product categories of imported goods (PRODCOM) with significant cost increase from climate contribution, as for example estimated by Pauliuk e.a. (2016) Quantifying Impacts of Consumption Based Charge for Carbon Intensive Materials on Products, DIW Discussion paper 1570.

xiv. The allocation is directly linked to the produced volume of materials in the preceding year, rather than historic production volumes combined with some adjustment triggers. This stops the – currently desired – incentives to pass carbon costs to material prices to encourage material efficiency, substitution and recycling. The, albeit limited, pass-through results from somewhat fixed volumes of free allowance allocation that allow for opportunity cost pricing. It can however cause wind-fall profits as it is difficult to anticipate the pass-through level and hence to adjust free allowance allocation appropriately. To avoid double charging free allowance allocation is directly linked to production volume and thus avoids pass-through and wind-fall profits.

xv. A clearly defined benchmark should ensure that, for example, higher proportions of steel scrap in individual plants do not reduce the benchmark. See Vera Zipperer, Misato Sato, and Karsten Neuhoff, "Benchmarks for Emissions Trading – General Principles for Emissions Scope," DIW Discussion Paper no. 1712

xvi. Richstein e.a. (2021) Carbon Contracts for Difference. An assessment of selected socio-economic impacts for Germany, Climate Strategies Report.

xvii. UK government, i.e., signs Climate Change Agreements with firms which include reduction targets, UK CCA Evaluation of 20 year experience.

xviii. Gerres e.a. (2021) A legal and administrative assessment of product carbon requirements, RECIEL, https://doi.org/10.1111/reel.12395

xix. Chiappinelli e.a. (2021) A green COVID-19 recovery of the EU basic materials sector: identifying potentials, barriers and policy solutions, Climate Policy DOI: 10.1080/14693062.2021.1922340

xx. For a recent assessment see de Bruyn, Jujin, Schepp (2021) "Additional profits of sectors and firms from EU EU ETS", CE Delft Study

xxi. See paper by Stede e.a. 2021.

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xxiii. R. Ismer and M. Haussner (2016) Inclusion of Consumption into the EU ETS: The Legal Basis under European Union Law, RECIEL Vol 25, No 1, p. 69-80, https://doi.org/10.1111/reel.12131

xxiv. Ismer e.a. (2021) Climate neutral production, free allocation of allowances under emissions trading systems, and the WTO: How to secure compatibility with the ASCM, DIW Discussion Paper.

xxv. Improving Economic Efficiency and Climate Mitigation Outcomes through International Co-ordination on Carbon Pricing – OECD Environment Working Paper No. 147.

xxvi. https://www.gov.uk/guidance/climate-change-agreements—2

xxvii. While the EU Innovation-fund is insufficient to support incremental costs of a relevant scale of climate neutral production processes, as reflected in a reported 20 times oversubscription of the first funding window, together with carbon contracts for difference, it could support particularly innovative components.