

## Border Carbon Adjustment in the EU: Indirect Emissions in the CBAM



Attention please – Border Carbon Adjustment  
Proceed with caution

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## 1. Introduction

The European Union is moving forward with the implementation of a border carbon adjustment (BCA), being the first jurisdiction in the world to do so at a national or supranational level. The only precedent can be found in California and applies narrowly to imports electricity. This initiative of the EU has provoked reactions around the globe, with several other countries apparently interested in following suit. While internationally the discussion around BCAs still frequently focuses on a conceptual understanding of BCAs and their advantages and disadvantages, the policy process moves forward in the EU, bringing with it a host of technical questions. Some of these questions are mainly of administrative concern but others are true ‘crunch issues’ with implications for the effectiveness and feasibility of the EU’s proposed Carbon Border Adjustment Mechanism (CBAM). One such question is whether or not the CBAM should cover indirect emissions,<sup>1</sup> the topic of this report.

The European Roundtable on Climate Change and Sustainable Transition (ERCST) began its work on the CBAM in 2020, initially focusing on a broader understanding of the elements and options of a prospective CBAM. Following the European Commission’s proposal for an EU CBAM, ERCST has provided in-depth analysis of this proposal as well as providing a space of exchange for stakeholders. As of the first half of 2022, ERCST is focusing on technical issues within the CBAM, accompanying the political discussions in the European Parliament and the Council of the European Union. The first paper in this series focused on the question of exports under the CBAM (Marcu et al., 2022).

The present report will be followed by a contextualization of the CBAM in the international policy arena, as we move closer to the CBAM’s implementation. This report on indirect emissions in the EU CBAM is a part of the more technical discussion and seeks to give insight into a complex topic for which different solutions have been proposed by the European Commission and the European Parliament at this stage of the legislative process.

## 2. Policy Context and Evolution of the Debate

As proposed by the European Commission, the CBAM would only cover direct emissions originating within the boundaries of an installation, such as those associated with fuel combustion on site in furnaces and boilers or those associated with chemical processes (European Commission, 2021a). At first glance, that choice appears to be logical: it aligns with the emissions scope of the EU ETS, which the CBAM aims to mirror at the border in order to level the playing field between domestic and foreign producers. Indirect emissions related to electricity, steam or heat generated outside the boundaries of the installation are neither covered by the EU ETS, nor by the legislative proposal for a CBAM regulation.

Because the EU ETS also covers emissions from combustion processes used to generate electricity, heat and steam, however, producers purchasing these inputs from off-site sources owned or controlled by another entity still face a carbon cost that is passed through in the prices for electricity, steam and heat.

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<sup>1</sup> Throughout this text, we will use the term “indirect emissions” to refer to emissions generated in the process of producing purchased electricity, steam or heat – also known as scope 2 emissions.

In other words, although they are not covered under the ETS, these costs from indirect emissions are still borne by EU producers. In addition, the EU electricity market uses marginal pricing to set the price of electricity, and that (See Box 1) has an impact on the consideration of indirect costs from emissions embedded in electricity in the CBAM.

#### **Box 1: EU electricity markets & indirect carbon costs**

The EU has created an internal market for electricity based on the liberalization of national electricity markets across Europe and their integration into a single, interconnected European market. In this framework, the wholesale electricity market design follows a marginal pricing “pay-as-clear” model, in which the electricity price for electricity from all sources is set by the marginal cost of the last generator in the merit order, that is, the most expensive source needed to meet demand at a given point in time.

An intended part of this marginal cost is the cost faced by fossil-fuel-based generators to purchase the EUAs needed to cover their emissions for compliance with the EU ETS. Because electricity generated from natural gas usually sets the price in European markets (European Commission, 2021b), the wholesale electricity price reflects not only the cost of gas and other conventional operational expenditures, but also the carbon price borne by the natural gas generators. Since electricity is less exposed to global competition than other commodities in the EU, this carbon cost is passed through to electricity customers because electricity generation is generally not trade-exposed.

Even when the electricity mix is dominated by renewable electricity sources such as solar photovoltaic or on- and offshore wind generation, the electricity price can thus include a significant carbon cost component. In other words, the electricity price is determined not by the (average) actual carbon intensity of the electricity mix, but by the carbon intensity of the marginal generator in the merit order who sets the electricity price for all sources.

Market coupling through extensive interconnection of national and regional grids enables electricity flows from areas with low electricity prices to areas with high electricity prices. Arbitrage effects can result in electricity customers facing an indirect carbon cost even when the grid they are connected to is serviced entirely by renewable or other carbon-free electricity generation sources.

To address this burden and preempt any related emissions leakage effects, the EU has allowed indirect cost compensation – a mechanism that several Member States have chosen to apply. It is designed to compensate firms for indirect carbon costs associated with electricity consumption (see Box 2).

Given that it compensates for some of the same carbon costs that a CBAM would cover, the continued viability of compensation for indirect costs may depend on whether or not CBAM includes indirect emissions in its scope. Recital 11 of the CBAM regulation proposed by the European Commission suggests that the “CBAM seeks to replace [existing mechanisms for free allocation and indirect cost compensation] by addressing the risk of carbon leakage in a different way, namely by ensuring equivalent carbon pricing for imports and domestic products” (European Commission, 2021a).

A feasibility study accompanying the preparation of the CBAM proposal concluded that inclusion of indirect emissions in the scope of the CBAM was the “preferred option in terms of environmental effectiveness and general climate ambition”, but also acknowledged that doing so was “the most challenging in terms of MRV requirements and administrative burden” (European Commission, 2021d).

As mentioned earlier, however, the European Commission proposal for a CBAM regulation omits indirect emissions, defined in Article 3(28) as “emissions from the production of electricity, heating and cooling, which is consumed during the production processes of goods” (European Commission, 2021a). Instead, it stipulates that “[f]or determining the specific actual embedded emissions of goods produced in a given installation, only direct emissions will be accounted for”, defined in Article 3(15) as “emissions from the production processes of goods over which the producer has direct control” (European Commission, 2021a). Accordingly, coverage of indirect emissions was also not included in the formal impact assessment accompanying the legislative proposal.

Even in the European Commission proposal, however, the omission of indirect emissions is seen as a potentially temporary approach. Recital 17 of the preamble clarifies, for instance, that “[t]he CBAM should initially apply to direct emissions of those GHG from the production of goods up to the time of import into the customs territory of the Union, and after the end of a transition period and upon further assessment, as well to indirect emissions, mirroring the scope of the EU ETS” (European Commission, 2021a). Recital 50, meanwhile, affirms that, starting with the transitional period from 2023 to 2025, declarants already “should have to report on a quarterly basis the actual embedded emissions in goods imported during the transitional period, detailing direct and indirect emissions.” Article 30, finally, mandates the European Commission with collecting “the information necessary with a view to extending the scope of this Regulation to indirect emissions” and presenting a report before the end of the transitional period assessing “the possibilities to further extend the scope of embedded emissions to indirect emissions” and possibly including a legislative proposal to that effect.

Accordingly, the option of including indirect emissions in the scope of the CBAM is still very much on the table in the political debate. The public consultation conducted in October 2020, for instance, indicated a slight stakeholder preference that the CBAM cover direct emissions and indirect emissions from electricity used in the production process (European Commission, 2020a). Likewise, in its resolution adopted under the “Own Initiative” process, the European Parliament indicated that it “considers that the carbon pricing of imports should cover both direct and indirect emissions” (European Parliament, 2021).

With its proposed compromise amendments, the Environment Committee of the European Parliament recommended including indirect emissions in the scope of the CBAM from the outset, defining “embedded emissions” as “direct and indirect emissions released during the production of goods and the electricity consumed during the production processes of goods” in an amended Article 3(16), and changing language in Annex III to include both direct and indirect emissions when determining the specific actual embedded emissions of goods produced in a given installation (European Parliament, 2022a). In June 2022, the European Parliament then voted in the Plenary to follow the recommendation of the Environment Committee and extend the scope of the CBAM to indirect emissions (European Parliament, 2022b).

The Council echoed the European Commission proposal in endorsing a sequenced approach to the CBAM and an extension of its scope, upon further assessment, to indirect emissions: “The CBAM should initially apply to direct emissions of those GHG from the production of goods up to the time of import into the customs territory of the Union, and after the end of a transition period and upon further assessment, as well to indirect emissions, mirroring the scope of the EU ETS” (Council of the European Union, 2022a).

## Box 2: Indirect Cost Compensation in the Member States

Article 10a(6) of the EU ETS Directive sets out the existing mechanism to address the risk of carbon leakage from indirect carbon costs passed on in electricity prices with financial measures compensating for such indirect costs: “Member States should adopt financial measures ... in favour of sectors or subsectors which are exposed to a genuine risk of carbon leakage due to significant indirect costs that are actually incurred from greenhouse gas emission costs passed on in electricity prices, provided that such financial measures are in accordance with State aid rules, and in particular do not cause undue distortions of competition in the internal market.”

Of the 27 Member States of the European Union, less than half currently provide compensation for indirect costs, including Belgium, Finland, France, Germany, Greece, Italy, Lithuania, Luxembourg, the Netherlands, Romania, Slovakia, and Spain (also Norway, which is not an EU member but is an important aluminum producer); compensation for indirect costs constitutes state aid and is delivered as a direct grant, with the exception of Spain which has foreseen also an interest rate subsidy and a tax rate deduction (Ferrara et al., 2020). As state aid, such compensation has to be approved by the European Commission following the standard state aid approval procedure and align with specific guidelines for indirect carbon cost compensation issued by the European Commission to ensure compatibility EU state aid rules.

The state aid rules set out the relevant formula: 75% of a hypothetical cost of emissions, based on actual electricity consumed, actual EUA forward prices, and an emissions-intensity equal to the weighted average of all fossil-fuel-fired producers in that geographic zone. There is also a “supercap” provision that allows compensation limited to 1.5% of the installation’s gross value added, if that amount is greater.

On 21 September 2020, the Commission issued revised guidelines specifying eligibility for compensation based quantitative criteria informed by a qualitative assessment, with an indirect carbon leakage threshold value required where trade intensity (defined as  $(\text{imports} + \text{exports}) / (\text{turnover} + \text{imports})$ ) must be at least 10%, and indirect emission intensity (defined as  $\text{indirect emissions} / \text{gross value added}$ ) must be at least 1 kg CO<sub>2</sub>/EUR of gross value added (European Commission, 2020b).

Based on this methodology, 10 sectors and 20 sub-sectors have been deemed eligible for compensation of indirect carbon costs and may receive compensation in the current trading period. Aid to inefficient production processes is limited by applying a so-called ‘electricity consumption efficiency benchmark’ that takes into account the most electricity-efficient production methods for a given product, and compensation is also conditional upon additional decarbonization efforts by the beneficiary companies, such as complying with recommendations of energy efficiency audits.

## 3. Should the CBAM cover indirect emissions? Pros and cons

CBAM’s inclusion of indirect costs has been one of several issues that elicited and continues to elicit passionate debates under the proposal put forward by the European Commission on 14 July 2021. Some feel that given the importance of indirect emissions (and costs) in some products it is critical to include them in CBAM. Others would argue that the complexities and consequences of including indirect costs in CBAM would militate towards excluding them, at least at this time.

The discussion around the inclusion of indirect emissions in CBAM also needs to keep in mind the multiple objectives that have been enumerated in the context of the CBAM: a) avoid carbon leakage; b) charge the same amount for a ton of carbon embedded in domestic and imported products, c) eliminate free allocation and any incentives that mute the carbon price signal for consumers, d) incentivise trading partners, who are also Parties to the Paris Agreement, to join the EU in taking strict carbon targets and use carbon pricing as the instrument of choice. The thinking, arguments and sentiments of stakeholders and policy makers have become clearer and more opinionated as the general direction of the Fit for 55 package has evolved, and the international debate has progressed, now also including the outcomes from COP 26 in Glasgow.

The arguments for including indirect costs in the CBAM start with the fact that the costs of embedded indirect emissions are significant, and all other things being equal would lead to risk of leakage if imports are not assessed the same costs. As noted above, since the EU ETS covers emissions from combustion processes used to generate electricity, heat and steam, producers purchasing these inputs still face a carbon cost that is passed through in the prices for electricity, steam and heat. For many producers in the EU, for instance, the carbon cost associated with electricity generated off site and purchased in wholesale or retail electricity markets or, more rarely, through power purchase agreements (PPAs) forms a substantial part of the economic burden stemming from the EU ETS, as well as the climate impact of production.

For some electricity-intensive products proposed for inclusion in the CBAM, the emissions associated with electricity consumed in the production process is responsible for an even larger share of emissions than the direct emissions from production. For recycled steel produced using an electric arc furnace, for instance, direct emissions can be as low as 0.1 tonnes of CO<sub>2</sub> per tonne of product, whereas counting indirect emissions from electricity adds between 0.1 to 0.3 tonnes of CO<sub>2</sub> per tonne of steel, depending on the emissions intensity of the electricity grid (Material Economics, 2019).

Out of the covered sectors, aluminum has the highest share of indirect emissions (84% vs 16%). Direct emissions are relatively homogenous across primary aluminium production plants and range from 1.5 to 2.5 tCO<sub>2</sub>e per tonne of aluminium (Maratou, A. and Andrei Marcu, 2021, p.10), averaging globally 2.1 tCO<sub>2</sub>e per ton of primary aluminium<sup>2</sup>. On the other hand, indirect emissions are very heterogenous across regions, with an average of 10.4 tCO<sub>2</sub>e per tonne of aluminium globally (see Table 1). Because of the electrolytic reduction process, however, indirect emissions greatly outweigh direct emissions in primary aluminium production. Electricity is the most significant input to aluminium production (about 15MWh/ton of product) and therefore indirect emissions from electricity consumption during smelting (Scope 2 emissions) account for a significant part of total emissions from the sector. Often, the aluminium industry electricity supply mix differs from the national or regional grid mix, due to captive or directly delivered power supplies. The International Aluminium Institute provides data on the aluminium sector-specific electricity supply mix, and the associated Scope 2 emissions intensity at the regional level, which illustrates this heterogeneity (see Table 1).

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<sup>2</sup> Based on data by the International Aluminium Institute (2020), taking into account direct process CO<sub>2</sub> and non-CO<sub>2</sub> GHG emissions from electrolysis, carbon anode consumption and anode effects.

**Table 1: Aluminium sector-specific electricity supply mix, and associated Scope 2 intensity**

|                     | Production (1000 tons) | Electricity intensity (kWh/ton) | Hydro | Coal | Oil | Natural gas | Nuclear | Scope 2 intensity (tCO <sub>2</sub> /ton) |
|---------------------|------------------------|---------------------------------|-------|------|-----|-------------|---------|-------------------------------------------|
| Africa              | 1.643                  | 14.527                          | 51%   | 49%  | 0%  | 0%          | 0%      | 9,2                                       |
| Asia (ex. China)    | 4.395                  | 14.900                          | 3%    | 97%  | 0%  | 0%          | 0%      | 16,6                                      |
| GCC                 | 5.654                  | 15.126                          | 0%    | 0%   | 0%  | 100%        | 0%      | 6,1                                       |
| China               | 35.795                 | 13.531                          | 11%   | 88%  | 0%  | 0%          | 1%      | 12,8                                      |
| North America       | 3.809                  | 15.499                          | 84%   | 14%  | 0%  | 1%          | 1%      | 2,7                                       |
| South America       | 1.095                  | 15.510                          | 80%   | 0%   | 0%  | 20%         | 0%      | 3,8                                       |
| Europe (in. Russia) | 7.606                  | 15.474                          | 86%   | 5%   | 0%  | 3%          | 6%      | 1,9                                       |
| Oceania             | 1.922                  | 14.501                          | 32%   | 67%  | 0%  | 1%          | 0%      | 9,5                                       |
| Non Reporting       | 2.417                  | 15.510                          | 0%    | 100% | 0%  | 0%          | 0%      | 17,1                                      |
| Global              | 64.336                 | 14.273                          | 25%   | 64%  | 0%  | 10%         | 1%      | 10,4                                      |

Source: International Aluminium Institute (2020)

Other metals have a similarly high intensity of indirect emissions, and along with some chemicals face very high electricity costs as a share of overall production costs (Wyns et al., 2019).

With electrification expected to play an important role in the deep decarbonization of industry, the significance of indirect emissions will only continue to increase, at least until electricity grids are fully decarbonized. As EU electricity prices increase—the result of a lower EUA cap and higher EUA prices—electricity-intensive sectors in the EU will be at a competitive disadvantage vis-à-vis their unregulated foreign competitors. These competitive pressures will be one cause of carbon leakage – investment decisions are not done solely on one consideration, but competitive pressure due to carbon prices will certainly play a role, and at close to 100 Euros per EUA, a significant one at that.

A final argument in favor of covering indirect emissions under the CBAM is that for many products indirect emissions are an important component of total emissions, and one that is not homogenous (direct emissions are more homogeneous from firm to firm). Not covering indirect emissions gives no incentives to foreign firms to decarbonize the electricity they consume, and their decarbonization would reduce the risk of leakage.<sup>3</sup>

Arguments against including indirect emissions in the CBAM start with the fact that, as noted above, there is already an existing regime that does what the CBAM would aim to do in this context: protect against

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<sup>3</sup> That is not to say that covering indirect emissions *would* give foreign firms such incentives; that is a matter of system design, explored below.

leakage arising from the costs imposed by the ETS on electricity-consuming industry: Member States are allowed to compensate for indirect costs.

Electricity-intensive sectors such as non-ferrous metals strongly oppose a regime that would eliminate that compensation and replace it with CBAM coverage of indirect emissions, since the CBAM adjustment would be limited to the costs of embedded indirect emissions, but the EU's marginal electricity pricing model means that firms are often paying costs that are considerably higher than that (Marcu et al., 2021a).

This dynamic is explored in more depth in Section 3 below, but the key point is that while the compensation for indirect costs aims to cover all costs imposed by the ETS on electricity-consuming industry, the CBAM would only adjust for a fraction of those costs.

Those costs will only increase as long as electrification—one of the key approaches seen as the way forward for industrial decarbonization—increases, but remains accompanied by the current electricity market structure with marginal pricing at its core, and where the electricity produced on the margin continues to be fossil-fueled. These dynamics would run directly against the objectives of the CBAM, including ensuring that the same carbon costs are paid by domestic producers and importers as well as the avoidance of carbon leakage.

The current approach of using indirect cost compensation can be seen as having flaws as well as benefits, however. One of the main flaws is the fact that such compensation is at the discretion of EU Member States, and is thus applied unevenly across EU countries. This is changing to some extent as can be seen in Table 2, with a growing number of Member States offering compensation for indirect costs.

Another argument articulated against indirect cost compensation is that as the price of EUAs increases, the cost of indirect cost compensation also increases, diverting financial resources from applications that could be otherwise used for industry decarbonization. Likewise, it is not clear that the formula used, especially the supercap, does a good job of approximating the actual costs firms bear as a result of the ETS' coverage of electricity. There are currently no independent studies that would indicate whether this approach results in overcompensation, or possibly under compensation. Finally, similarly to free allocation for direct emissions, indirect cost compensation contributes to muting the price signal of carbon to consumers, and while electricity users have only limited ability to avoid this price signal through fuel switching or alternative procurement models – such as PPAs – the increased price still incentivizes energy efficiency and process optimization measures.

**Table 2 Indirect carbon cost compensation paid out by EU Member State and the UK in 2020**

| <b>Member State</b> | <b>Compensation disbursed in 2020 for indirect costs incurred in 2019 (in million euros)</b> | <b>Number of beneficiaries (installations)</b> | <b>Auction revenues in 2019 (excl. aviation allowances, in million euros)</b> | <b>Percentage of auction revenues spent on indirect cost compensation</b> |
|---------------------|----------------------------------------------------------------------------------------------|------------------------------------------------|-------------------------------------------------------------------------------|---------------------------------------------------------------------------|
| DE                  | 546                                                                                          | 902                                            | 3146.1                                                                        | 17.4%                                                                     |
| BE (FL)             | 89.4                                                                                         | 108                                            | 353.5                                                                         | 30.9%                                                                     |
| BE (WL)             | 20                                                                                           | 31                                             |                                                                               |                                                                           |
| NL                  | 110.1                                                                                        | 93                                             | 435.6                                                                         | 25.3%                                                                     |
| EL                  | 42.2                                                                                         | 48                                             | 503.3                                                                         | 8.3%                                                                      |
| LT                  | 0.66                                                                                         | 1                                              | 83.7                                                                          | 0.7%                                                                      |
| SK                  | 4                                                                                            | 10                                             | 244.4                                                                         | 4.1%                                                                      |
| FR                  | 266.4                                                                                        | 302                                            | 711.6                                                                         | 37.4%                                                                     |
| FI                  | 74.6                                                                                         | 61                                             | 217.4                                                                         | 34.3%                                                                     |
| ES                  | 61                                                                                           | 204                                            | 1225.2                                                                        | 5.0%                                                                      |
| LU                  | 10.6                                                                                         | 4                                              | 16.8                                                                          | 63.0%                                                                     |
| PL                  | 76.6 (340.9 PLN)                                                                             | 25                                             | 2545.9                                                                        | 3%                                                                        |
| RO                  | N.A.                                                                                         | 44                                             | 747.9                                                                         | N.A.                                                                      |
| UK                  | 57.25 (50.9 GBP)                                                                             | 61                                             | N.A.                                                                          | N.A.                                                                      |

*Source: European Commission (2020c), Table 4, page 21*

There are further arguments against including indirect costs in the CBAM. There are concerns that the inclusion of Scope 2 emissions would allow for widespread resource shuffling, that is, a rearrangement of existing trade patterns such that goods produced with clean electricity would be exported to the EU, without any change in production patterns. There are forms of circumvention that are also a concern, such as those related to any certificates of origin. Resource shuffling is covered in greater depth below in Section 3.

As well, coverage of direct emissions only is in line with the objective of having the CBAM closely mirror the ETS, such that it becomes a domestic regulation applied at the border without discrimination against foreign goods. There is some legal risk to forcing importers to buy allowances for emissions for which domestic producers do not have to buy allowances. That is, the CBAM would not mirror the ETS in this respect; EU producers are not forced to purchase ETS allowances to cover the embedded emissions in their inputs. It could be argued that because those producers face carbon costs via their input materials, there is a sort of equivalency of treatment, but such an argument would face uncertain chances of success in a WTO legal setting. In the same vein, there is some risk that the EU's trading partners would argue against this design element as a form of discrimination against their producers.

Finally, it is clear that a CBAM that did not cover indirect costs would be much simpler to administer and would have the advantage of using existing institutions for its implementation. The EU could continue to

use the existing regime for compensation of indirect costs, and importers would avoid having to elicit a different and more complex class of emissions data from foreign producers.

## 4. Assessing the Options

This section describes five policy options available to the EU with respect to indirect emissions in the CBAM. For each option, we assess strengths and weaknesses, guided by a framework for analysis that we have applied to previous CBAM policy assessment (Marcu et al., 2020):

- Environmental benefit
- Competitiveness benefit
- Legal feasibility
- Technical and administrative feasibility
- Political feasibility

Section 4, following, then offers concrete policy recommendations on the basis for the options analyzed in this section.

### Option 1: Baseline

The first option is a baseline - a CBAM that does not include indirect emissions. It involves the continued use of the existing compensation for indirect costs as a means of protection against the risk of leakage and competitiveness impacts.

The strengths and weaknesses of this option are explored in Section 3 above. On the plus side, not covering indirect emissions reduces the risk of resource shuffling, thus contributing to environmental effectiveness. It also involves considerably less administrative complexity.

On the minus side, the existing compensation mechanism keeps producers from feeling the full ETS carbon price. Similarly, foreign firms will not feel any incentives to reduce indirect emissions which, for many basic materials, are the most significant part of overall emissions. As well, as the price of EUAs increases, the budget for compensation of indirect costs will also increase (although so will auctioning revenue from EUAs).

Finally, EU industry is on a path to decarbonization, and electrification is part of that. Until decarbonization of electricity is achieved, that implies higher indirect emissions, and it implies massive capital investment. As such, the need for protection that covers indirect emissions will only increase.

### Option 2: Basic inclusion

Option 2 is a CBAM that covers indirect emissions. They are treated similarly to direct emissions in the baseline case: foreign goods are charged according to their actual emissions. The current regime for compensation of indirect costs would be phased out or cancelled, on the assumption that the CBAM's

coverage of indirect emissions is adequate to protect against risk of leakage (for imports) and competitiveness impacts from foreign producers.

On the plus side, this option has the advantage of bringing indirect emissions under the purview of the CBAM, with all the ensuing benefits discussed above. There are, however, three major problems with this option. As they are the main challenges facing any CBAM option that includes indirect emissions, they are unpacked below in some detail.

**Problem 1: Indirect costs.** A CBAM that covered indirect emissions would force importers to pay for emissions associated with any electricity used in the production processes of imported goods. But that may not level the playing field; EU producers may still face electricity-related costs from the EU ETS that foreign producers would not.

That occurs because EU electricity markets price electricity at the margin (something that not all jurisdictions outside the EU do), so prices for consumers in the EU are determined by the highest cost producer – the last in the dispatch order.

In today's market that will typically be a gas- or coal-fired generator that incurs high costs under the ETS. Thus, even in very clean grids such as the Nordic hydropower market, where marginal costs of the largest share of generators are close to zero, the price of electricity is defined by the marginal plant which, because the grid is connected to other regional grids, will typically be a fossil-fuel based power plant. The combination of marginal cost pricing, marginal producers that tend to be fossil-fuel fired, and ETS obligations for those producers, means that EU electricity consumers are paying high indirect carbon costs even when the emissions intensity of the electricity mix is close to zero.

By contrast, foreign producers would face CBAM charges that tried to approximate the actual carbon cost of the electricity they used. There are several possible options, but the most likely involves either assuming the average emissions intensity for the grid from which they purchase electricity or, where there is captive power or a power purchasing agreement, taking into account the actual emissions intensity of electricity. These charges would be much lower than the indirect costs faced by EU producers.

Two things should be noted. First, this problem is most acute for sectors like aluminium that use large amounts of electricity. Second, this problem will attenuate over time, as the EU's electricity grids become more decarbonized and there are fewer high-cost marginal producers. Sartor et al. (2022; Figure 9) use data from the Commission's impact assessment of the 2030 Climate Target Plan to show that the emissions intensity of the EU power sector should be reduced by more than half by 2030. Even this, however, may have limited impact – it only takes one marginal gas-fired plant to result in carbon costs being felt by all electricity users in a grid.

**Problem 2: Resource shuffling.** Circumvention is a broad concern that applies to CBAM in general, but the challenge of resource shuffling becomes much more acute when indirect emissions are covered. Resource shuffling gets increasingly hard to define as we get deeper into its specifics (see Box 3 below), but at a high level it involves global trade flows in covered goods simply being rearranged, such that existing clean production flows to the EU, where it has an advantage under CBAM, and existing dirty production flows elsewhere. The key is that nothing has changed – no producers have lowered their emissions – but EU now producers face competition from relatively clean producers that incur low charges under a CBAM that uses individual emission intensities to determine the border charge.

The necessary ingredients for resource shuffling are:

- A significant difference in emissions between lower and higher carbon intensity producers – meaning large cost variations in CBAM charges – and;
- Significant amounts of existing foreign clean production that can be diverted to the EU.

In the context of indirect emissions – much more so than with direct – that first condition exists; indirect emissions are the major source of difference between high-emission and low-emission producers, since electricity generation can range from highly GHG-intensive coal-fired generation to near zero-emitting renewables. Including indirect emissions in the CBAM thus increases the risk of significant resource shuffling. The second condition certainly exists in some sectors; for example, Figure 1 shows the volumes of clean aluminium production in China relative to total Chinese exports to the EU.

### **Box 3: Understanding Resource Shuffling**

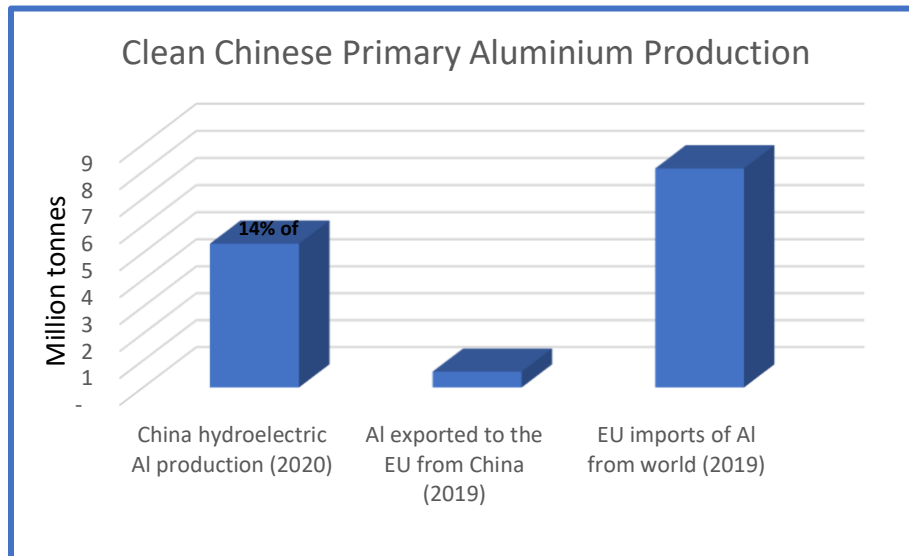
Resource shuffling describes a form of potential circumvention under the CBAM in which, broadly defined, trade flows adjust to the CBAM by substituting existing low-carbon production for high-carbon production currently exported to the EU, so that goods from the latter are instead sold and consumed outside the EU. As an intentional change to existing trade patterns aimed at lowering or altogether eliminating the CBAM compliance obligation for foreign producers without reducing the carbon intensity of their goods, such resource shuffling could be considered a circumvention practice. Whether or not resource shuffling can be seen as undermining the objectives of the CBAM depends on how these objectives are defined. If the CBAM only aims to ensure symmetrical treatment of covered goods entering the EU and comparable goods produced domestically, then resource shuffling is not a problem. If the CBAM strives to create a level playing field for producers more generally by considering foreign production beyond just the goods entering the EU, then resource shuffling is a problem.

Article 27 of the proposed CBAM regulation does not mention resource shuffling or include it in its definition of circumvention, which narrowly focuses on product modification by specifying that “[p]ractices of circumvention include situations where a change in the pattern of trade in relation to goods included in the scope of this Regulation has insufficient due cause or economic justification other than avoiding obligations as laid down in this Regulation and consist in replacing those goods with slightly modified products.” In its proposed amendments adopted in June 2022, however, the European Parliament proposed expanding the definition of circumvention to “any measures that have the objective of avoiding any of the obligations laid down” in the CBAM regulation, including “the reorganisation by exporters or producers of their patterns and channels of sale and production”, and expressly mentions resource shuffling as an issue of concern in a newly inserted recital without however proposing a clear solution.

It bears noting that any attempt to define resource shuffling and prevent it through policy design faces challenges which extend beyond the question of the legitimate objectives of the CBAM. In California, for instance, which includes electricity importers in the scope of its emissions trading system by way of a border carbon adjustment, an initial attempt to prohibit resource shuffling – defined as “any plan, scheme, or artifice to receive credit based on emissions reductions that have not occurred, involving the delivery of electricity to the California grid” – was rejected due to the legal uncertainty such a broad definition introduced. California subsequently replaced this prohibition with a whitelist of 13 expressly permitted

practices, or “safe harbors”, which research suggests have resulted in extensive circumvention through facility swapping, “cherry picking” and laundering or relabeling practices, essentially negating any environmental benefits from including electricity imports in the scope of the Californian emissions trading system (Bushnell et al., 2014; Caron et al., 2015).

**Figure 1: Chinese Clean Primary Aluminium Production in Context**



**Notes:** Chinese hydroelectric production of primary aluminium estimated from total hydroelectricity used in primary aluminum production, and Chinese average electricity used per tonne of production, 2020 figures, International Aluminium Institute (<https://international-aluminium.org/statistics/primary-aluminium-smelting-power-consumption/>; <https://international-aluminium.org/statistics/primary-aluminium-smelting-energy-intensity/>). Trade data for the 4-digit eight categories of aluminium covered under Commission proposal sourced from: Eurostat, ‘EU trade since 1988 by HS2,4,6 and CN8’ dataset.

**Problem 3: WTO law.** If we assume that the EU ETS is a regulatory regime, and not a tax regime, then the requirements for CBAM under WTO law include the need to ensure that foreign goods are treated no worse than domestically produced like goods. The general idea is for the CBAM to mirror, as closely as it can, the internal ETS regulatory requirements in its treatment of imported goods.

But internal ETS regulatory requirements do not include asking producers to purchase allowances to cover their indirect emissions. So including indirect emissions in the CBAM means imposing costs on foreign products that are not imposed on domestic products. Of course, the domestic producers ultimately do pay those costs, since EU electricity producers must purchase allowances, and since they pass on to their customers most or all of the costs of that purchase. But it is not clear that the WTO would regard those costs as being imposed by the ETS—the regime the CBAM is supposed to be mirroring—in the event the CBAM were taken to dispute settlement.

### Option 3: Basic inclusion, plus reform of marginal cost pricing of electricity

Option 3 is a CBAM that covers indirect emissions, following the approach described under Option 2 above. Indirect emissions are thus treated similarly to direct emissions, with foreign goods subject to a CBAM payment obligation based on actual emissions. However, since this would fail to adjust for higher

electricity costs attributable to the marginal cost pricing regime in the presence of marginal high-carbon electricity generation, this option should also entail examination of the current European electricity market design – as this affects CBAM design and effectiveness.

As already highlighted in the description of Option 2 (and in Box 2), a CBAM that adjusts for the indirect emissions embodied in imported goods would not account for indirect carbon costs that are owed to the marginal electricity pricing model and cost pass-through, rather than the actual carbon intensity of electricity consumed during the production process. As a result, domestic goods will generally bear a higher overall carbon cost than will foreign goods, since very few jurisdictions have both carbon pricing and marginal pricing for electricity, meaning foreign producers will not face indirect carbon costs at home.

The rationale and objective for examining the current European electricity market design would be to ensure that the electricity price captures carbon costs in a manner similar to the way this is done in jurisdictions that export to the EU and are subject to the CBAM, making the application of CBAM to indirect costs more effective.

However, the consideration of electricity market reform that alters more than two decades of wholesale electricity market design is not a matter that should be taken lightly, and the “cure” and its consequences need to be considered in the context of the problem that needs to be solved. Making CBAM implementation more straightforward is arguably not enough of a gain, in and of itself, to justify such a fraught undertaking. While there is some political support for and there has been some debate on this topic in the EU, currently there is far from being a consensus and revisiting market design faces almost unanimous opposition from within the power industry.

#### Option 4: Basic inclusion, plus use of grid averages to assess GHG intensity of foreign electricity

Option 4 starts from the basic inclusion of indirect emissions as described in Option 2. But instead of asking foreign producers for actual data on their indirect emissions, and deriving the CBAM charge from those, it uses some form of default value for emissions intensity. That default might be based on average emissions intensity of the regional grid that supplies the producer. Or it might be based on the national average in the country of export

This option addresses problem 2: resource shuffling. If, for example, a national average is used as default, then clean producers from a given country won’t be able to re-orient their exports to target the EU, since they face the same charges as high-emission producers. The Commission’s CBAM proposal in fact uses default GHG intensity values for electricity imports<sup>4</sup>—as distinct from how it treats goods imports—for exactly this reason: avoiding resource shuffling via imported electricity. Producers of semi-finished aluminium products could claim to have purchased their aluminium from countries with a cleaner electricity mix, in which case the national grid average from those countries would have to be used. This is addressed to some extent by the Commission’s proposal for addressing complex goods by including emissions embedded in selected inputs.

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<sup>4</sup> Commission proposal Annex III, Article 4.2.

The Commission's proposed rules for electricity make exceptions for cases where it can be definitively shown and independently verified that the electricity in question was nominated and transmitted directly to the purchaser, under a power purchase agreement.<sup>5</sup> Option 4 might similarly need to allow for the use of actual data where it can be shown that the producer has direct links to the electricity generator, as in the case of captive power or a dedicated generating facility.

From a competitiveness perspective, allowing actual data in those cases would be problematic if a considerable amount of foreign production is directly linked to such clean electricity generation. This would be the case, for example, in regions with rich endowments of hydro-electric capacity, such as the aluminum producing regions of Quebec in Canada.

One of the biggest challenges to such an approach is legal feasibility. In *US - Gasoline*, the WTO Appellate Body found a US regulation to be unjustifiable discrimination and a disguised restriction on international trade because it imposed a *default assumption* about gasoline production processes on foreign producers while allowing domestic producers to be regulated per their *actual* production data.<sup>6</sup> It specifically rejected the US argument, among others, that the fungible nature of gasoline would make it too easy for importers to claim their product originated in the refinery with the most advantageous data – a dynamic very similar to resource shuffling.<sup>7</sup> Box 3 below explains how the foregoing case law provides an opening to argue why the unique physical characteristics of electricity can justify aggregation and use of average values.

**Box 3: Legal Implications of an Aggregated Approach to Inclusion of Indirect Emissions from Electricity**

As indicated earlier, inclusion of indirect emissions could face legal challenges under international trade law. Because of the physical characteristics of electricity, notably its homogeneity and the inability to physically trace it from the user back to its source, one option for attribution of indirect emission carbon intensity under CBAM is to use grid averages, as opposed to trying to determine individual producers' data. While this risks being found arbitrary or discriminatory under free trade disciplines, the nature of electricity markets means that risk is not a certainty.

Where available, documentation of indirect emissions through Power-Purchase Agreements or Certificates of Origin can allow more precise determination of indirect emissions, but in many cases foreign producers – like their European counterparts – will purchase electricity on wholesale markets that clear bids of multiple generators in day-ahead and intra-day trading, rendering it more difficult to individually attribute the carbon intensity of electricity used during production.

Reliance on aggregated values, such as the average carbon intensity of the foreign electricity mix, could in turn be seen as a violation of the reasoning of the Appellate Body in the *U.S. – Reformulated Gasoline* case, where it held that reliance on a reference value rather than individual data violated the conditions of the *chapeau* to Article XX of the General Agreement on Tariffs and Trade.<sup>8</sup>

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<sup>5</sup> *Ibid.* Article 5.

<sup>6</sup> World Trade Organization (WTO), *United States – Standards for Reformulated and Conventional Gasoline*. Report of the Appellate Body. WT/DS2/AB/R, Appellate Body Report, 29 April 1996, adopted 20 May 1996,

<sup>7</sup> *Ibid.*, para. 27.

<sup>8</sup> *Ibid.*, para. 29.

Importantly, however, in that case the Appellate Body was ruling on a situation in which such individual data could have been provided by foreign producers and reliably assigned to a specific shipment of imported goods. Where technical limitations prevent individual differentiation, as in the case of electricity, reference values may be the only fallback available to the implementing jurisdiction. Such inability to consider the individual carbon intensity of electricity consumed is not a consequence of a policy choice, but a function of technical limitations in the case of trade in electricity.

Already in the *U.S. – Reformulated Gasoline* case, the Appellate Body considered an exception from the need to allow individual differentiation justified where “the source ... could not be determined or a baseline could not be established because of an absence of data.”<sup>9</sup> A reference value based on the average carbon intensity of the electricity mix in the country of origin could thus be defensible despite the legal primacy of individual facility-level adjustment. The same reasoning could also apply to justify the use of lower resolution temporal averaging if the data and technical means for higher granularity are unavailable.

Another legal problem arises because any CBAM that is taken to WTO dispute settlement will probably have to be defended under GATT’s Article XX General Exceptions, which means they will have to show that they are environmentally motivated, as opposed to being aimed at protecting the competitiveness of EU firms. Measures to combat resource shuffling may not always rise to that bar. From an environmental perspective, it is not clear why the EU should try to thwart the import of goods produced by low-carbon foreign producers. In the situation where the foreign producers were cleaner than their EU counterparts, increasing their market share at the expense of EU producers would actually be environmentally desirable. Box 3, however, describes a reasoned justification for using grid average defaults that does not involve trying to prevent resource shuffling, even though that would be one of the final effects.

#### Option 5: Basic inclusion, plus reform of compensation for indirect costs

This option starts from the basic inclusion of indirect emissions in the CBAM, and also reforms the existing regime for compensation of indirect costs. The reform would take two tracks. First, it would see the regime applied consistently across all Member States, whether via centralized operation or by directive. At present, as described above, compensation is dependent on member state policy, and only maximum rates are set. The result is that the existing protection is patchy, though it is becoming increasingly less so.

The second track of reform would change the basis on which the compensation is calculated. The CBAM would protect against cost differentials arising from pass through costs of the ETS by electricity producers. But there would still be a need for a mechanism that compensated for the idiosyncrasies of the EU’s marginal cost pricing regime for electricity, paying the difference between what a firm would pay for electricity under an average cost pricing regime and what it actually paid under the existing marginal cost pricing regime. For illustration, we offer an example of one possible methodology for calculating compensation:

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<sup>9</sup> *Ibid.*, para. 27.

- The regime would determine *ex post* for a regional grid the GHG intensity of the marginal producer, and the average GHG intensity of total production
- The difference in GHG intensity times the amount of electricity consumed by a firm approximates the extra GHG emissions priced in the firm's electricity purchases due to the marginal cost pricing regime.
- The firm would be compensated for that quantity of emissions times the carbon price, possibly times some agreed percentage (current compensation is capped at 75%). This could be anything from an uncomplicated annual average figure to a complex matching of the daily rates to the quantity of electricity consumed on those days over the historical period.

While not perfect, this option addresses problem 1 to a certain degree, thereby reducing risk of leakage and competitiveness impacts. As well, it ensures that the extent of compensation is consistent across member states. Also, the compensation formula is at least conceptually a step in the right direction, and approximates the costs involved. The status quo, by contrast, may well be dispensing fair levels of compensation, but there is nothing about the formula—in particular the supercap option—that would give us any confidence that this is so.

One drawback to this option is the budget requirement for the centralization reform. Transferring those expenditures from Member State responsibility and fully funding them centrally would be a massive new budget line for the Commission, especially as the price of EUAs increases. Reforming the mechanism so that it only covered the costs not covered by the CBAM, however, would reduce that budget somewhat.

There is also concern from a legal feasibility perspective. The existing regime for compensation for indirect costs has never been challenged as a subsidy in the WTO, but it could be, as could this option for reforming it. While it is quite possible that compensation might be found a subsidy, proving that it has caused adverse effects might be more difficult, given that it is simply giving back with one regulatory hand what is being taken away with another. The final result does not likely lower final prices in a way that undercuts foreign competitors.

## 5. Recommendations

Based on the foregoing analysis, and our larger body of work on the design and function of the CBAM, we recommend that indirect emissions should only be included in the CBAM as part of the policy option packages described below:

**Covering indirect emissions through the CBAM is one option, but others should continue to be explored as the energy matrix changes in the EU and outside.** Indirect emissions are, for some covered goods, the majority of their total greenhouse gas emissions – a percentage that will only grow over time as all covered sectors in the EU decarbonize in part by electrifying. They are also the key determinant that separates low-carbon and high-carbon foreign producers, given the wide variation in emissions intensity possible in the power sector, and are a potential source of competitive advantage for decarbonized EU industries.

**The CBAM's coverage of indirect emissions should not start immediately on its entry into force.** A delayed start would allow for a continuous examination of other options as well as a deeper analysis of the impacts of covering indirect emissions, and the establishment of mechanisms to deal with any

challenges, including to avoid circumvention. As well, delay allows the EU electricity grid to further decarbonize, reducing impacts and risk of leakage from the expanded CBAM coverage. The pace of decarbonization of the electricity grid should be considered in determining the timing for CBAM coverage of indirect costs.

**If the current system is maintained for a reasonably long period of time the EU should examine the tensions between the electricity market design and the needs of covering indirect emissions/costs through the CBAM.** The CBAM will certainly be one of the drivers for that examination. When it comes to indirect costs coverage, the current approach exposes EU industry to risks of leakage and competitiveness impacts, and it greatly complicates the prospect of implementing a comprehensive CBAM. However, electricity market design has an evolutionary momentum of its own, with multi-faceted pressures and imperatives that go well beyond the CBAM.

**The basis for calculating indirect emissions in imported goods should be the average GHG intensity of all generating sources in the grid of origin.** The only exceptions to this rule should be for captive (on-site) electricity generation, or under the same demanding conditions that the European Commission has proposed for considering actual embedded emissions baselines in the import of electricity. Using actual embedded emissions in any other circumstances is inherently uncertain, providing too much leeway for intentional gaming of the regime.

**The regime of compensation for indirect costs should be reformed in two ways.** First, it should be made to consistently apply across Member States, rather than being at their discretion. Second, it should be calculated so as to only compensate for the effects of the EU's marginal cost pricing regime, as compared to a hypothetical state in which the ETS co-existed with average cost pricing. In this form, it could co-exist with the CBAM without constituting double protection for EU producers.

**The EU should show political courage in the face of potential WTO challenges.** As we have argued above (see Box 3 in Section 4), the recommendations we make can be credibly argued to be consistent with the EU's trade law obligations due to the unique physical characteristics of electricity, and complete certainty in that respect is an inappropriate goal.

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