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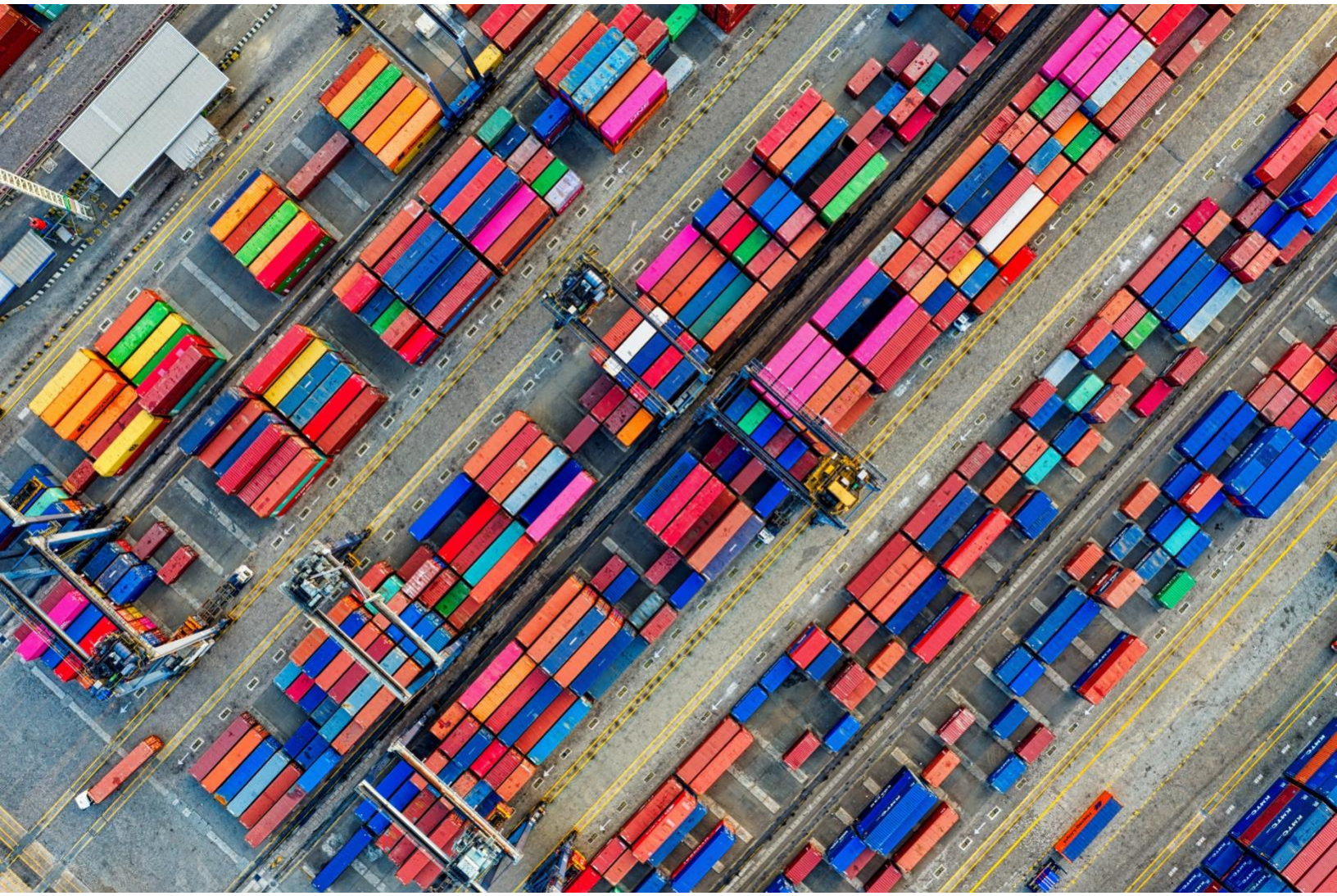
CBAM in a portfolio of measures for industrial decarbonization



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1. Introduction

As the EU Council and Parliament have voted to approve the Carbon Border Adjustment Mechanism (CBAM) and the EU is reaching the end of the CBAM legislative procedure, the issues of CBAM as part of a portfolio of measures for industrial decarbonization have been raised. This brings up questions on the CBAM and how it relates to competitiveness and industrial decarbonisation, including how the EU approach compares to the broader context it is facing, and the competition with other international models, such as the Inflation Reduction Act (IRA) in the United States.

Building on the previous work done in the process leading up to the adoption of CBAM in Phase I (2019-2020), Phase II (2020- 202), Phase III (2021-2022) of its project "Border Carbon Adjustments in the EU", the European Roundtable on Climate Change and Sustainable Transition (ERCST) has extended its analysis of the evolving European Union Carbon Border Adjustment Mechanism (CBAM) into a fourth phase, providing decision makers and stakeholders with a better understanding of critical issues as the CBAM reaches its implementation phase.

Phase IV of the ERCST project is intended to provide in-depth analysis of the implementation phase of CBAM as it progresses to its full operationalization, but also to look at the EU approach together with other instruments in the context of industrial competitiveness and decarbonized industry.

The present report is the first in a series of four reports that together will form the fourth phase of the "Carbon Border Adjustment in the EU" project. Each of the reports provides in-depth analysis and reflection around issues identified as important at this stage in CBAM implementation. This first report covers the role of CBAM in a portfolio of measures for industrial decarbonization and how it compares to the evolving policy landscape abroad.

The report is structured in four sections: The second part of the report looks at the objective of the CBAM, the third section presents the climate and non-climate related gaps in the function of the CBAM. The fourth section discusses the evolving competitive landscape and context, and the options to address gaps and ensure a level playing field.

2. The objective of CBAM

The EU Council and Parliament have voted to approve the CBAM, which is set to come into effect in October 2023. The CBAM aims to work together with the ETS to reduce emissions, while preventing carbon leakage. While there are other measures, such as the Renewable Energy Directive (RED), Energy Efficiency Directive (EED), as well as various funding programs, the EU ETS plus CBAM are often considered the primary instruments for decarbonising EU industry.

Since the introduction of the EU ETS there has always been a concern with respect to carbon leakage. Carbon leakage refers to the phenomenon whereby companies move their production abroad, or redirect their investment, or lose market share to foreign producers, because of the cost of carbon imposed on them in their jurisdiction. This issue arises as a result of competitiveness concerns triggered by carbon costs, including from carbon prices, which is the root cause of carbon leakage. However, it must be clarified that competitiveness in the period of transition is not only affected by carbon costs, but other factors as well, including measures that promote innovation and provide production incentives.

Despite initial hopes that the introduction of the CBAM, working in conjunction with the EU ETS, could "end all wars", that is, would provide an instrument for industrial decarbonization, that will also include provisions to mitigate the risk of carbon leakage, it turned out that this was not enough, given the proposed scope and design options as well as other developments.

Recent developments have seen the introduction of new measures in other jurisdictions, such as the IRA in the US whose objective is beyond decarbonization, and is essentially a tool for re-shoring of industry to the US, in the context of the transition to a low carbon economy.

The EU responded with the Net Zero Industry Act (NZIA) which is still more focused on the transition than the IRA, and seems to indicate that the EU does no longer believe that EU ETS and CBAM are enough to avoid carbon leakage. But what is more important, it also cannot ensure continued competitiveness for industry in the transition. Additional measures, beyond the NZIA, are likely to emerge.

These new developments give rise to questions such as: What is the objective of ETS and CBAM, and what are the gaps that the system causes in avoiding carbon leakage, but also ensuring industry competitiveness? What are the additional measures that would need to be considered in order to close these gaps?

Going back to the beginning of carbon pricing in Europe, ETS was meant to be the main system that decarbonised the EU's economy, both the power sector and industry. The obvious gap at this time was that jurisdictions abroad did not yet have carbon pricing which could potentially push carbon intensive industries abroad. In order to prevent this carbon leakage, the initial phases of ETS introduced grandfathering, with only small amounts being auctioned out. For the same reasons, a limited number of sectors were covered by the ETS. However, the stated intention was for the EU ETS to be an instrument for economic decarbonization.

New EU ambition for decarbonization led to increasing auctioning of EU allowances, with provisions for mitigating the risk of carbon leakage for energy intensive trade exposed sectors in the form of free allocation and, where Member States elect it, indirect cost compensation.

In time, the trend became increasingly clear, with the power sector, perceived as not being at high risk of carbon leakage moving towards complete auction, and with the industrial sectors at risk of carbon leakage, tightening free allocation, and an uneven indirect cost compensation.

It was always recognized that the free allocation had shortcomings and that it could not serve as a sustainable long-term solution. This became increasingly clear as the EU ETS cross sectoral correction factor threatened to be used as a blunt instrument to address the inevitable shortage of free allocation.

The Paris Agreement triggering higher targets for the EU ETS, coupled with the introduction of the MSR, led to rapidly increasing carbon prices and increasing risks of carbon leakage. The need for a more long-term stable solution to the risk of carbon leakage, coupled with a strong constituency to abandon free allocation and the desire to nudge other jurisdictions to adopt strong climate policies led to a re-examination of how to address industrial decarbonization, and what was needed to accompany the EU ETS.

In order to find a way to address the gap, and ensure that industrial decarbonization would and could proceed, the EU turned to the CBAM. The CBAM was introduced with the idea of phasing out free allocation for industrial sectors and instead making imported goods pay the same price for carbon as goods produced within the EU. It was felt that, together with other measures such as funds, CCfDs, etc., this would be enough to ensure that the EU could decarbonize industry without wholesale deindustrialization. At that time, the EU was moving ahead alone, with EU ETS and flanking measures including CBAM as providing the framework for decarbonizing industry, with no further gaps apparent. It was also thought that this would allow the EU to provide leadership and become a role model for industrial decarbonisation.

One additional game changer was the introduction of the Inflation Reduction Act (IRA). This made it abundantly clear that the combination in place (EU ETS +CBAM + existing EU measures) could in no way be enough in the new competition between different models for decarbonization and that additional measures were needed to address carbon leakage and attract decarbonization investments to Europe.

In response to these changing circumstances, the EU introduced the Net Zero Industry Act (NZIA) and is also trying to find additional forms of funding, such as the Sovereignty Fund.

As the global models and policies for industrial decarbonisation continue to evolve abroad, the EU will continue to find gaps created by the discrepancies of the systems in the EU and other countries. It all needs to be seen as work in progress, as the different models around the world try and find ways to adjust and co-exist.

3. Preserving competitiveness on the path to decarbonization: What gaps?

As the previous section makes clear, the CBAM was conceived as a replacement for free allocation within the ETS – as a means to avoid carbon leakage as free allocation is ramped down. While CBAM is explicitly directed at preventing carbon leakage, the avoidance of carbon leakage is ultimately an enabler for decarbonization expressed in a different manner.

Nonetheless, the CBAM should also have the effect of preserving competitiveness, resulting from carbon pricing introduced by the EU ETS as a result of EU ETS carbon pricing. But it does not, and was not meant to, address more broadly defined industrial competitiveness, and lead to maintaining industry in the EU and/or attract industry back in the EU, as the IRA does.

Competitiveness and carbon leakage are almost always two sides of the same coin: carbon leakage is a symptom of loss of competitiveness due to costly climate policies. But preserving competitiveness is not *equivalent* to preventing carbon leakage. For one thing, competitiveness has many more—and sometimes more significant—drivers than climate policies.

It is not surprising that CBAM, a tool intended to prevent carbon leakage, should be an imperfect fit for preserving competitiveness of EU industry in the process of decarbonization - that it alone will not achieve that objective. The question then is: what other policies might be needed? Where are the gaps? This section explores two types of gaps: those related to climate policy, and those unrelated to climate policy.

3.1. Gaps related to climate policy

There are several ways in which the EU ETS working in tandem with CBAM, may be inadequate to preserve or adequately promote industrial competitiveness in the face of climate policies:

- In some respects, the architecture of the coverage of the CBAM itself may fail in its basic goal: preventing carbon leakage as free allocation under the ETS is scaled back.
- Even if the CBAM were adequate at preserving the competitiveness of EU firms under ETS cost pressures, it might be rendered inadequate by developments such as climate policies in other countries (e.g., the US Inflation Reduction Act), or by climate related EU policies (e.g., the EU electricity pricing regime).

3.1.1 Loss of competitiveness in export markets under CBAM/ETS

Most of the EU's CBAM-covered sectors rely on export markets. The iron and steel sector, for example, exports over 20% of its production, and aluminum's share is 18% (Marcu et al., 2022). While the CBAM will level the playing field for those producers on the EU's domestic markets, ensuring that imports have to pay the same carbon prices they are paying under the ETS, there is at present no provision in the CBAM to similarly level the playing field for EU's producers in export markets. Burdened by a carbon cost that will, by 2034, be unabated by free allocation, those producers will find it practically impossible to compete in third-country markets against goods that have not had to pay any carbon price. The Commission's impact assessment of CBAM without export coverage projected a 6.8% loss of export markets (European Commission, 2021), and it failed to recognize the impacts that would arise in domestic markets.

The final CBAM text better acknowledges this challenge. It obliges the Commission to produce a report every two years after the end of the transition period in 2026, as part of its annual report to the European Parliament and to the Council, among other things assessing the effectiveness of the CBAM in addressing the risk of carbon leakage as relates to exports (European Parliament, 2023). But this still leaves a palpable gap. There would be no consideration of the problem until 2028, and no promise of resolution even then.[1] For firms making investment decisions in the next five years, it provides no foundation of assurance that export market competitiveness will be somehow safeguarded, hence also avoiding the negative consequences on resilience in the domestic market.

3.1.2 Circumvention under CBAM

If foreign producers are able to undermine the intent of the CBAM, the result will be a loss of competitiveness for EU producers that are subject to unabated costs of the ETS. There are several ways in which that might occur. The CBAM's Article 27 refers to two possible types of circumvention:

[1] While the first Commission reports on CBAM are due before the end of the transition period, their mandated scope as laid out in Article 30 does not include assessing the effectiveness of the CBAM in addressing the carbon leakage risk of goods produced in the Union for export to third countries. Such an assessment is only mandated for the regular reports that begin in 2028 (Article 30.5).

- Modifying goods to make them fall under CN codes not covered by the CBAM
- Artificially splitting shipments to make them fall below the *de minimis* value threshold

Where the Commission believes these practices are taking place, it can initiate an investigation, with the possible result of adding the CN codes of the slightly modified goods to CBAM coverage. It is not clear what the remedy would be for artificially splitting shipments.

Trans-shipment of goods is another possible mode of circumvention. Four countries are exempt from the CBAM because they are linked into the EU ETS: Iceland, Liechtenstein, Norway, and Switzerland. If those countries do not impose CBAM charges on imported goods covered under CBAM, those goods could then be trans-shipped to the EU and never have been charged for their carbon content.

Another form of circumvention involves foreign producers not changing their existing production processes, and simply rearranging trade flows such that their existing clean production now flows to the EU and their relatively dirty production flows elsewhere. This is an issue that has potential implications and reverberations under the Paris Agreement. It is primarily an issue with the emissions embodied in electricity, since those emissions tend to dominate in terms of distinguishing high-GHG-intensity production from low-GHG-intensity production.

The CBAM would have mechanisms to prevent resource shuffling, but they may not be adequate. The first applies to imports of electricity, where instead of demanding actual data on GHG intensity the CBAM uses a national or regional average CO2 emission factor; this prevents the shuffling of low- and high-CO2 producers from a given country or region.

The second mechanism applies to goods – but only those goods for which indirect emissions are included in the CBAM scope: for now, cement and fertilizer. As with electricity imports, the CBAM will not ask for actual data on the indirect emissions for such goods, but will rely on some sort of default benchmark, to be described in the CBAM's implementing legislation.

One possible default would be the exporting countries' average CO2 emission factors. In both cases, however, there are provisions that will allow exporters to use actual data if they can show that the electricity in question is essentially produced for them on a dedicated basis, and not simply drawn from a national or regional grid (European Parliament, 2023).

While these provisions might open the door to loss of EU competitiveness vis a vis clean foreign producers, it can be argued that this should not be prevented – that protecting competitiveness by discriminating against clean foreign producers is not appropriate.

Outright cheating is another type of circumvention. The CBAM charge is based on an accounting of the emissions embodied in goods produced in foreign factories, certified to a protocol to be announced by the Commission in its implementing legislation. If foreign producers successfully submit false information to the verifying agencies, it will give them an unfair advantage over EU producers and others that have actually been honest in their accounting. It remains to be seen whether this will be a problem in the CBAM context.

3.1.3 Higher effective carbon cost reduces capital for low-carbon investments

Revisions to the EU ETS mean that free allowances to CBAM-covered sectors will begin to be phased out in 2026 and will be eliminated as of 2034. At the same time, the cap will be reduced such that emissions in ETS sectors will be reduced by 62% in 2030 below 2005 levels, meaning likely higher EUA prices.

The impacts should not be understood in static terms. That is, CBAM-covered installations will not simply bear the costs of higher EUA prices on their existing operations; the regulations are meant to spark investment in low-carbon capital and processes that will lower emissions, and hopefully lower the costs of compliance with the ETS.

The challenge is that decarbonizing the CBAM-covered sectors is a costly proposition. A 2020 analysis of the EU's net-zero pathways noted that industry was the most difficult sector to broach, and pegged the incremental cost of greening investment in industry—i.e., vs the cost of business as usual investment—out to 2050 at €410 billion (D'Aprile et al., 2020).[2] This is *in addition to* normal planned investments. The competitiveness of EU industry hinges on finding the considerable resources to invest, so as to reduce ETS compliances costs. But this will be happening at the same time as those compliance costs are increasing, and as free allocation to firms is shrinking.

3.1.4 Support offered in competing jurisdictions

The U.S. Inflation Reduction Act, and its significance for EU industrial competitiveness, is discussed in greater detail in the section that follows. It contains a host of incentives for US industry that could impair the competitiveness of EU CBAM-covered firms. Three specific incentives offer a picture of the more general challenge:

[2] Note that the authors also predicted lower operating costs as a result of those incremental capital investments.

- The IRA establishes a $5.8 billion program for decarbonizing investment (including retrofits) in the steel, aluminum, cement, fertilizers, paper, and chemicals sectors: the Advanced Industrial Facilities Deployment Program.
- For hydrogen producers, it offers an investment tax credit of up to 30% of the costs for the construction of hydrogen production facilities. And it offers a production tax credit of up to $3/kg of hydrogen produced, depending on GHG intensity which is stackable with support measures for renewable electricity.
- It offers a production tax credit of $85/tonne for carbon capture and storage (CCS).

The subsidies for decarbonizing investment are likely to draw investment away from the EU, raising costs of financing, and will also ultimately subsidize the production of goods that will compete with EU's CBAM-covered sectors, both in the EU and in global markets. The hydrogen subsidies are game-changing, wiping away most of the cost advantage currently enjoyed by high GHG-intensity producers. Unabated steam-methane-reforming-produced hydrogen (a.k.a. grey hydrogen) currently costs less than $2/kg (IEA, 2022), and renewables-electrolysis-produced hydrogen (a.k.a. green hydrogen) costs between $4 and $7/kg ((S&P Global, 2023). So a $3/kg tax credit will likely draw investment capital for this sector away from the EU, and will help establish healthy competitors for EU producers. The generous tax credits for CCS will likely attract global investors and innovators in that space, and will help US industries like cement and steel invest in CCS as a decarbonization strategy.

The US is not the only jurisdiction offering incentives to CBAM-covered firms to assist their low-carbon pathways, and the IRA has already started to engender something of a subsidies war among G7 countries that will further threaten the competitive position of firms in countries that do not win that war.

3.1.5 High carbon costs of electricity

The EU electricity market is an integration of various connected national and regional markets. Within that market the price of electricity is set by the marginal producer – the last producer dispatched in the merit order – the highest cost producer. These tend to be gas-fired generators, particularly since the Russian invasion of Ukraine and the resulting spikes in natural gas prices, or coal-fired generators.

These high costs are boosted even more by the fact that, as fossil-fuel-based generators, they must purchase EUAs. Thus, even in a grid where the average carbon content is low—say, a grid dominated by renewable energy generation—if the marginal producer is a gas-fired generator, the price of electricity will reflect the carbon costs from that source, rather than the average. Because there is little trade exposure in electricity markets, the result is that carbon costs are passed through and EU electricity

consumers pay more for electricity than their competitors, most of which have pricing regimes based on average costs.

To address this problem, EU state aid rules allow member states to grant limited compensation to specified sectors in recognition of the fact that electricity makes up a significant share of their operating costs. Within the CBAM-covered sectors, indirect cost compensation is available for producers of iron and steel, aluminum, and hydrogen.

However, this is not a perfect system of protection. For one thing, only some Member States grant such compensation (the number is rising), and not all of those that do grant the maximum allowed (which is already limited to 75% of the proxy cost calculation). For another thing, sectors outside the regime of compensation – fertilizers and cement – also have electricity costs, and in the process of decarbonization it can be expected that their use of electricity will probably increase. For them, the high costs of electricity in the EU will be a source of competitive disadvantage. This is the reason that, for those sectors, the CBAM will cover indirect emissions.

3.1.6 Uncertainty about climate policies

It is a well-practiced truism that business needs some level of regulatory certainty or predictability as a condition of investment. While complete certainty is an unreasonably high bar, there are elements of EU climate policy that make it challenging for ETS and CBAM-covered firms to predict future policy direction.

Within the CBAM itself, it was noted above that there is no certainty about whether exports of CBAM-covered products will somehow be rebated the costs of the EU ETS, or whether producers will be offered some other way to level the playing field in export markets. The first chance to consider whether and how to address this gap will come only in 2028, with a policy response years later in the best-case scenario.

Hydrogen producers face uncertainty about whether the methodologies for determining embodied carbon in hydrogen—to be released with the CBAM implementing legislation—will be aligned with the definition used under the Renewable Energy Directive for renewable hydrogen, with the Hydrogen and Gas Directive for low-carbon hydrogen, or with the EU taxonomy definition of sustainable hydrogen. This uncertainty should be resolved relatively quickly, as it affects not only hydrogen producers, but also those industrial sectors for which green hydrogen is a critical part of their path to decarbonization.

Producers of iron and steel, and aluminum, face uncertainty about whether their indirect emissions will eventually be covered under the CBAM, and their indirect carbon cost compensation scaled back accordingly. Producers of chemicals and plastics, and other candidate sectors, face uncertainty about whether, when, and how their products will eventually be covered under the CBAM.

3.2. Gaps unrelated to climate policy

In addition to the gaps described above, which arise from the elaboration and implementation of climate-related policies, there are broader gaps that challenge the potential of EU industrial competitiveness in the process of decarbonization. The gaps described below are not unique to CBAM-covered firms, nor are they novel. And they do not constitute an exhaustive list of competitiveness-related gaps in EU industrial policy. But they are nonetheless significant, and so they are briefly described here.

3.2.1 State of skills

In the EU, three out of four firms face difficulties in finding employees with the right skills (CEDEFOP, 2022). The problem is most acute for high-skilled workers, and is the result among other things of demographic changes and structural changes like the digitization of production and the shift to a more knowledge-based economy (Rioz, 2019). Industry 4.0 puts a higher premium on dedicated workers, and on specific training that is not being adequately provided in the formal school system. At the same time, however, in the wake of the pandemic, investment in skills training by EU firms has been substantially disrupted (van Loo, Eiffe and van Houten, 2021).

The result is a shortage of workers with the right skills – a shortage that impacts the competitiveness of EU firms. A 2019 survey by Eurochambres found businesses rating the lack of skilled workers as one of the biggest challenges they face (EUROCHAMBRES, 2019). As the EU's CBAM-covered firms invest in new low-carbon technologies, and innovate to achieve ambitious decarbonization targets, they will necessarily rely increasingly on scarce high-skilled workers in the course of the transition.

3.2.2 The basic structure of the EU

The EU as a political and economic union of sovereign states has inherent strengths and weaknesses in assuring the competitiveness of its industry in the process of decarbonization. Strengths come among others from the size and harmonization of the single market, with its single currency and freedom of labour movement.

Some important weaknesses stem from the segregation of powers between the member states and the EU's supranational institutions. The EU, for example, would not be capable of matching the US IRA tax credits were it so inclined, since tax policy is a national competency. Similarly, it was noted above that compensation for indirect carbon costs must work through member states, as it involves state aid, and that the result is a patchwork of practices. The same constraints apply to a number of forms of industrial policy, including many types of subsidies.

4. Flanking measures for industrial decarbonization

If the CBAM is seen as part of a portfolio of measures for industrial decarbonization rather than merely a necessary companion to the EU ETS, then the preceding section has highlighted that, on its own, the CBAM risks falling short in achieving that broader objective. Any viable approach to industrial decarbonization in the EU will have to simultaneously account for the gaps identified in Section 3 as well as the domestic policy frameworks adopted by major trade partners and an evolving geopolitical context.

This includes, in particular, the recent slate of industrial policy initiatives adopted in the United States with the Inflation Reduction Act (IRA) and other legislative and executive measures, but also continuing – and less visible – efforts taken by China and other emerging economies to support strategic industries and in turn respond to new requirements such as the CBAM.

These, along with the more recent European response, are part of broader industrial policy approaches that are fundamentally altering the international economic order and, at least to some extent, stand to reverse the decades-long trend of increased trade liberalization and economic integration.

Securing the competitiveness of domestic industries is only one of many goals of such industrial policy strategies. Geopolitically, that goal will be affected by the growing tensions between Europe and its allies, on the one hand, and China and its expanding sphere of influence, on the other, which pose intractable challenges and will require a delicate balancing act to achieve what European Commission President von der Leyen has recently described as a "de-risking" of economic relations with actors such as China (von der Leyen, 2023), an approach that has variously been referred to – with subtle variations in meaning - as selective decoupling, friendshoring, and localization of supply chains and key industries.

The first subsection below describes the broader competitive landscape, drawing attention to industrial policy efforts especially in the United States, to illustrate the evolving global context that European producers currently have to navigate. The second subsection then focuses on specific gaps, and outlines possible ways to address those gaps with changes to the CBAM design and with flanking measures.

4.1. Evolving competitive landscape and context

In terms of objectives, recent industrial policy efforts go well beyond the already multipronged scope of the CBAM, and comprise a broad range of government interventions aimed at creating, building, or shaping industries to stimulate technology creation and deployment, spur employment opportunities, diversify production, and build supply chain resilience (see generally Rodrik, 2014). The sheer number of parallel and not always mutually consistent goals pursued by industrial policy initiatives such as those recently introduced with the IRA, but also proposed with the EU Net Zero Industry and Critical Raw Materials Acts, is only rivalled by their scale and ambition. But these industrial policy initiatives also differ considerably, reflecting the political and institutional context that engendered them. These, too, will impact the specific European approach to industrial decarbonization, and the role the CBAM will play in that approach: as with other policy areas, and perhaps especially so in the context of industrial decarbonization, no one size fits all.

A comparison of the current approaches to industrial decarbonization in the EU and the U.S. underscores the importance of such context-specific differences. For one, the EU has chosen to rely on a carbon price as the central pillar of its decarbonization strategy, adjusted (albeit only for selected sectors) at the border with the CBAM. Its ability to rely on what is presently a meaningful carbon price has been predicated on a deliberate policy trajectory that began nearly two decades ago with the introduction of a quantity rationing mechanism and a gradually tightened supply of allowances, accompanied by carbon leakage safeguards that have limited the economic burden on industrial facilities and will only be completely phased out once the CBAM takes full effect.

Given the committed timelines for decarbonization, jurisdictions that have yet to embrace a price on carbon or may never do so – such as the US – do not have the same historical vantage point as the EU, which allowed the latter to introduce a carbon price at an initially modest level, become familiar with its operation, and only saw the price increase significantly long after its initial introduction, affording covered emitters and the broader economy some time to adjust to the associated requirements and cost burden. In other words, at this point in time and given existing mitigation commitments, advanced nations that have not yet introduced a carbon price and want to rely on a price signal to address industrial emissions would have to move much more aggressively and ensure much higher price levels than the EU did throughout much of the existence of the EU ETS. That, in turn, further undermines an already unfavorable political economy context for any federal climate policy instruments that would increase costs on industrial facilities in the U.S., as recently confirmed by an annual survey that showed willingness to pay a fee to address climate change has reached its lowest level since polling began in 2016 (AP-NORC, 2023).

As a result, industrial emitters in the U.S. face lower climate policy costs than their counterparts in Europe, a situation that is unlikely to see meaningful change in the near term given Congressional gridlock and constitutional, procedural and judicial constraints on executive rulemaking by the

Environmental Protection Agency (EPA). Additionally, the considerable support for industrial decarbonization and clean technology manufacturing mobilized under several legislative and executive measures, which range from the IRA, the Infrastructure Investment and Jobs Act (IIJA), and the CHIPS and Science Act, to government procurement initiatives such as the Federal "Buy Clean" initiative, will further reduce the costs of decarbonization for U.S. industry through various support measures.

The foregoing political economy challenges facing ambitious climate action in the U.S. is also directly responsible for this focus on investment, in fact; any legislative initiative had to be primarily related to budgetary matters in order to pass through the reconciliation process and avoid a potential filibuster in the U.S. Senate. Just as the requirement of a unanimous vote in the Council when adopting fiscal measures steered the European decarbonization strategy away from a carbon tax towards a quantity rationing instrument, the EU ETS, thus, the need for a supermajority to secure a cloture vote under the standing rules of the U.S. Senate pre-empted the route of ordinary legislation and left only fiscal appropriations and expenditures as viable pathways to advance Congressional climate action.

Such procedural qualifications have not necessarily impaired the potential climate impact of the legislation, however: investment volumes under the various tax credits, grants, loans and other subsidies in the IRA remain uncertain, but are all substantial, with the official estimate by the Congressional Budget Office of $369 billion over a decade representing the lower end of projections (CBO, 2022), and other estimates that anticipate increased uptake of the uncapped tax credits driving the budgetary costs of the IRA up to three times higher (Credit Suisse, 2022; Bistline et al., 2022; Goldman Sachs, 2023). A large share of funds appropriated under the IRA are earmarked for the direct promotion of manufacturing in low-carbon technologies, with many of the incentives conditional on local content or assembly requirements aimed at relocating advanced technology manufacturing to the United States.

Specifically, the IRA includes an estimated $30 billion in production tax credits to accelerate U.S. manufacturing of solar panels, wind turbines, batteries, and critical minerals processing, a $10 billion investment tax credit to build clean technology manufacturing facilities, $20 billion in loans to build new clean vehicle manufacturing facilities across the country, various grants and tax credits to reduce emissions from industrial manufacturing processes, including almost $6 billion for a new Advanced Industrial Facilities Deployment Program to reduce emissions from the largest industrial emitters like chemical, steel and cement plants, and over $9 billion for public procurement of clean technologies to create a stable market for clean products. Additionally, substantial incentives for low-carbon electricity and fuels will accelerate the decarbonization of the energy system, with a lower grid emissions factor also reducing the indirect emissions of U.S. producers.

Taking stock of the fragmented European landscape of fiscal and other subsidies for the decarbonization of the energy, transport, and industry sectors, Kleimann et al. (2023) have argued that investment under

the IRA will not necessarily exceed aggregate financial incentives provided by the EU and its Member States. This observation is an important reminder that Europe is no stranger to industrial policy and aggressive public support schemes, with considerable investment in industrial decarbonization channeled through a variety of funds and other instruments, including, notably, the Green Deal Investment Plan, the NextGenerationEU Recovery and Resilience Facility and the ongoing RePowerEU initiative, the Innovation Fund, and Horizon Europe. Still, overall investment volumes may only partly explain the already observed surge in new or expanded manufacturing capacities in the U.S. (U.S. Census Bureau, 2023).

At least as important as overall subsidy amounts is the simple, transparent and predictable design of the IRA incentives, with uncapped tax credits, in particular, offering guaranteed support to all eligible activities, unlike, for instance, the oversubscribed Innovation Fund, which can only provide support to a subset of applying projects. Also, the nature and level of support in the U.S. have been perceived as more favorable, with Investment Tax Credits (ITCs) that can be "stacked" to cover up to 60% of investment needs for certain technologies, and Production Tax Credits (PTCs) that provide a continuous and predictable financial flow to cover operational expenses for the next decade. Coupled with the absence of a carbon price in the U.S., the incentive structure for producers on either side of the Atlantic are highly asymmetrical, and impacts their bottom-line profitability.

Such heavy reliance on fiscal subsidies certainly has many downsides. It may provide inefficient inframarginal support to activities that might have proceeded anyway, and risks overcompensation and inflationary pressures due to the generous and open-ended nature of support. It may also restrict eligibility for support to a limited set of politically determined activities and technologies rather than leaving it to the market to identify the most cost-effective decarbonization opportunities, a process in which information asymmetries and regulatory myopia can prompt focusing on dead-end technologies and overlooking promising, but as yet unknown options. Industrial policy approaches such as the IRA that rely primarily on fiscal subsidies also entail a substantial fiscal burden that may either require tax increases and the associated economic burden, or force spending cuts and thereby potentially reductions in other important or desirable services currently offered to the public.

Nevertheless, at least in the near term, the IRA has been widely perceived by trade partners and foreign stakeholders – including European industry – as a more attractive and effective way of spurring industrial decarbonization, stoking fears of a green subsidy race and even a new form of leakage: "green leakage" that involves relocation of manufacturing capacities for low-carbon technologies and their supply chains to the U.S. in order to benefit from the extensive support offered there (Bruckner et al., 2023).

While the transatlantic dispute triggered by local content requirements and other conditions in the IRA has dominated recent headlines, however, an even greater imbalance in industrial policy and public

support for strategic industries is actually to be found in relation to China. As a centrally planned economy, China has traditionally relied on heavy government intervention to promote the competitiveness of its industrial producers and expand market shares in global export markets. The latest wave of industrial policy began in China with the Made in China 2025 plan unveiled in 2015, which identified ten strategically important sectors – including several low-carbon technologies, including electric vehicles, advanced rail and shipbuilding, and renewable energy – that would benefit from heavy direct investment in advanced manufacturing and new guidelines to limit foreign competition (State Council, 2015). Its stated ambition has been to achieve global dominance in those industries, objectives that are also reflected in the current 14th Five-Year Plan and its mandate to "[d]evelop and expand strategic emerging industries" (National People's Congress, 2021).

Contrasted with both the U.S. and Chinese industrial policy efforts, the European response to the IRA, represented by the Temporary Crisis and Transition Framework for State Aid measures and the Green Deal Industrial Plan (GDIP) with its proposed implementation measures, including the NZIA and CRMA, has been widely criticized for setting out ambitious goals and targets, but falling short in detailing the means to achieve them. A number of aspects of the EU approach have been singled out as shortcomings relative to industrial policy abroad:

- The shorter time horizon of measures (for instance regarding the temporary relaxation of state aid restrictions);
- Possible distortions to the internal market resulting from an imbalance between subsidies from wealthier and fiscally more capable Member States and those Member States with more limited fiscal space;
- The focus on supporting capital expenditures over operational expenses;
- The reliance on largely existing and only limited new financial resources; and
- An overall more fragmented, uncertain, and less transparent approach to supporting decarbonization efforts.

These perceived shortcomings are at least partly owed to deeply embedded and hard-to-remove legal and institutional limitations, as already indicated in Section 3.2.2 above: the distribution of powers between Brussels and the Member States as well as agreed limits on public debt and budget deficits constrain the ability of the EU to appropriate and spend revenue in a way comparable to the U.S. or China, and the resulting real and perceived risks threaten to limit investment levels behind those currently seen across the Atlantic and in the Far East.

Aside from legal and institutional constraints, the EU also has to contend with a less favorable resource endowment, and only measures that successfully limit the often substantially higher energy and

feedstock costs faced by European producers relative to their foreign competitors would be able to fully level the competitive playing field. Current discussions about electricity market reform can provide some relief, but will not substantially alter the underlying fundamental challenges faced by Europe. While a future point in time is conceivable when domestically produced renewable energy, integrated in a stable and balanced grid, could lower the overall energy cost burden, current geopolitical realities and policy trends that instead stand to at least temporarily increase costs to address overriding security concerns and diversify supply chains caution against expecting a lasting solution to energy cost asymmetries anytime soon.

4.2. Options to address gaps and level the playing field for low-carbon industry

This lopsided industrial policy landscape, as discussed in the preceding chapter, partly determines the gaps and shortcomings which flanking measures alongside the CBAM and other existing policies and measures will need to address.

To compete meaningfully on industrial decarbonization and meet the challenges of deep decarbonization in hard-to-abate sectors covered by the EU ETS and CBAM, the EU will not only have to consider the specific gaps identified in Section 3, but also contend with the evolving geopolitical context and competitive landscape in which its industries will have to decarbonize. To do so, the EU can consider the following measures specifically related to CBAM, as well as broader flanking measures:

1. Address remaining gaps in the CBAM itself: Some of the gaps identified in the preceding section relate to the current design of the CBAM. As a previous report in this series already argued, for instance, the border adjustment introduced under the CBAM could also be applied to European exports through a system of incentive-aligned "Export Adjustment Certificates" that would limit additional legal and political risks faced by the CBAM (Marcu et al., 2022). So far, however, the perceived risk of legal challenges seems to have outweighed concerns about the competitiveness of European exporters and its consequential impacts on the domestic market; if so, at the very least, the policy choices currently included in the CBAM Regulation – to merely mandate a review of possible export leakage risk by 2026 and every two years thereafter – should be revised to enable an earlier and more proactive approach to export leakage. Similarly, the various circumvention risks which could hobble the effectiveness of the CBAM and are not adequately reflected in Article 27 of the CBAM Regulation should be elevated in urgency.

2. Expand financial incentives: Most importantly, to avoid further deterioration of its industrial base due to lacking or as yet uncertain provisions in the CBAM as well as match the support levels offered under competing industrial policy frameworks in the U.S. and elsewhere, the EU should further increase funding for the development and deployment of low-carbon industrial production methods and processes. Any success in lowering the cost and financial

risk associated with investments in low- and zero-carbon manufacturing processes, including through ongoing operational support, will also alleviate the concerns arising from existing gaps in the CBAM regarding export-dependent and electricity-intensive industries. The EU can do so by creating a dedicated fund or by expanding the scope of existing funding mechanisms such as Horizon Europe and the Innovation Fund. Increasing funding levels is not the only or arguably the most important objective; such incentives also should seek to replicate the simplicity, eligibility and predictability of U.S. incentives under the IRA in order to reduce financial risk for investors and facilitate access to capital for innovative projects. While the structural constraints – notably legal and institutional limitations on the powers and capabilities of the EU – preclude emulating the industrial policy choices made in other regions, such as North America and China, the Sovereignty Fund announced in the Green Deal Industrial Plan offers an opportunity to go beyond the current patchwork of rebranded EU and Member State funding initiatives, and send a strong investment signal that does not vary from country to country, nor comes with significant uncertainty about its award.

3. Strengthen monitoring, reporting, and verification (MRV) in trade partner countries: The EU should actively seek to enhance MRV capacities in trade partner countries to accurately track progress in industrial decarbonization and ensure compliance with the procedural and methodological requirements under the CBAM. This could include simulation and training activities to build understanding and capacity to comply among stakeholders in trade partner countries, assistance with the creation of regulatory and institutional frameworks to ensure adherence to the CBAM requirements, and cooperation on the harmonization of data reporting standards and infrastructure, and sharing of relevant data. Support for enhanced MRV would not only increase the likelihood that industries will be held accountable for under- or misreporting the specific embedded emissions of goods exported to the EU, but can also improve overall transparency and strengthen the ability of the EU to monitor trade flows in a way that would better enable it to detect – and thus also pre-empt – circumvention activities.

4. Promote international cooperation: More generally, the EU should continue to strengthen international cooperation on industrial decarbonization by engaging in technology transfer, joint R&D activities, and exchange of best practices with trade partners as a way to develop and deploy breakthrough technologies at scale, thereby promoting convergence in the carbon intensities of industrial goods and lowering the prospect of emissions leakage in both domestic and foreign markets. Whenever possible, linking of ETS is a direct way to address many competitiveness issues because it results in converging carbon prices. In addition, the EU can leverage its trade agreements and diplomatic efforts to promote the adoption of carbon pricing and other climate policies worldwide, further leveling the competitive playing field. Such mutually beneficial collaboration will both help further increase transparency on carbon intensities and decarbonization practices in trade partner

jurisdictions, and – by lowering the costs of decarbonization also in trade partner countries – could help reduce political resistance and diplomatic pressures levelled against the CBAM.

5. Improve price discovery in electricity markets: Recognizing the challenges that can arise in decarbonizing electricity markets when pricing is based on the variable cost – including the carbon cost – of the marginal generator, especially during a protracted energy crisis with an external supply shock, efforts to reform the European electricity market design offer an opportunity to ensure that industry is better shielded from energy price volatility and has access to predictable and competitive lower carbon energy costs. The legislative proposal unveiled in March by the European Commission to improve the Union's electricity market design already envisions additional options for European industry to secure electricity needs through long-term contracts such as Power Purchase Agreements (PPAs) backed by market-based guarantees, would boost liquidity in forward markets, and would require public support for infra-marginal renewable and non-fossil electricity generation to take the form of two-way Contracts for Difference (CfDs). Some of these measures could help address the gaps identified in the previous section that are due to carbon costs unrelated to the actual carbon intensity of purchased electricity. As with any major reform, it remains to be seen how these proposals evolve in the legislative process and whether they ultimately succeed in reducing competitive distortions currently experienced by European industry due to high energy costs.

6. Encourage demand for low-carbon products: The EU could invest greater resources and political capital in developing a comprehensive strategy to stimulate demand for low-carbon products. This could include incorporating sustainability criteria in public procurement policies, promoting the use of carbon labels and certifications, and incentivizing corporate and retail consumers to choose low-carbon products through financial incentives and awareness campaigns. By actively fostering a market for low-carbon goods, the EU can build on existing voluntary and consumer-driven initiatives to create a stronger market pull and support the competitiveness of its industries in the transition to a low-carbon economy. Carbon pricing, including through the CBAM, will also result in some cost increases for the consumers of affected input materials and final products. Thought may also have to be devoted to how cost increases can be managed where they may counteract the energy transition – for instance by increasing the input costs faced by clean technology manufacturing – or destabilize political support for decarbonization.

7. Foster skill development and workforce transition: The EU should scale up its investments in re-skilling and up-skilling programs tailored to the needs of workers in carbon-intensive sectors, and thereby address the staffing bottlenecks already identified as a gap in Section 3. By partnering with industry, educational institutions, and labor unions, the EU can develop targeted training programs to equip workers with the skills needed in the low-carbon

economy. Additionally, policies should be implemented to support regions heavily reliant on carbon-intensive industries through economic diversification and job creation in low-carbon sectors, in line with initiatives already in place to advance a just transition to a low-carbon economy, including the Just Transition Mechanism and Just Transition Platform.

5. Takeaways

While the rising carbon price signal under the EU ETS and its companion CBAM already provides vital long-term incentives for industrial decarbonization in the EU, the real policy thrust in the short-term stems from targeted public support that lowers the risk and cost of early-stage low-carbon industrial processes and technologies, and creates markets with meaningful demand for the ensuing products. Competitiveness has a carbon component, but it is not the only one.

The debate on Europe's CBAM would benefit from honesty about the objectives and capabilities of this instrument. It can only be declared as "fit for purpose" if we are clear about the purpose. Unlike proposals for BCAs under discussion in the U.S., the CBAM is not an industrial policy intervention meant to give domestic industries an advantage over foreign competitors; instead, it merely seeks to rectify a growing imbalance and competitive distortion under the EU ETS as free allocation declines.

That said, the CBAM design still presents important gaps and unresolved questions, for instance with regard to exports, indirect emissions and circumvention, that should be addressed more urgently and clearly than currently envisioned in the CBAM Regulation, which relies instead on monitoring and reviewing these issues, but defers identifying and describing a potential solution.

Industrial policy efforts such as the U.S. Inflation Reduction Act and the EU Net Zero Industry Act are the real battlegrounds for investment in, and scaled-up deployment of, low-carbon solutions for the industrial sector. Over time, the carbon price under the EU ETS and its companion CBAM will grow in its ability to influence operational and investment decisions as technology costs decline due to learning-by-doing, economy-of-scale effects and market competition.

Of particular long-term importance are the revenue-raising functions of both the CBAM and, more importantly, the increasing share of auctioning under the EU ETS, both of which can help, among other things, reduce public debt and budget deficits incurred with present industrial policies awarding significant subsidies. However, it is does not create added value but simply redirect money flows in a period of difficult transition. Similarly, the existence of a carbon price signal will be vital to accelerate the market exit of incumbent technologies and avoid rebound effects caused by future cost declines.

In the short-term, however, the EU's efforts to flank the EU ETS with support policies to match industrial policy initiatives in the U.S. and China suffer from very asymmetrical starting points. Constrained by narrowly defined legislative powers conferred upon it by the Member States - especially in the area of fiscal policy - and limited budgetary resources, Brussels will arguably never be able to provide a centralized package of support measures comparable in overall volume and straightforward simplicity to what the U.S. and China are currently deploying.

Due to its very nature as a supranational organization of economic integration, the EU has little choice but to advance more fragmented approaches to industrial policy such as the NZIA and TCTF that rely on both national and supranational initiatives and resources. Still, it needs to be aware of the growing implications of its structural vulnerabilities when it comes to transformative industrial policy interventions, and make a stronger effort to match not only the levels, but also the predictability and simplicity of public support for industrial decarbonization. The Sovereignty Fund announced, but not yet fully described, in the Green Deal Industrial Plan could offer an opportunity for such an approach.

Over time, the structural disadvantages of the EU and its chosen reliance on carbon pricing should, in principle work in the EU's favor, as it is fiscally more sustainable, provides a more cost-effective decarbonization incentive, and also sends a vital long-term signal to carbon-intensive industrial activities. Revenue from carbon pricing can help offset the fiscal cost of support measures, and tools such as the CBAM are already seen to promote diffusion of carbon pricing approaches in trade partners that, together with technology spillovers from support policies, will accelerate the global convergence of climate policy efforts and costs.

In the short to medium term, and depending on the staying power of other jurisdictions or incentives, there is a non negligible risk of a negative impact on Europe's industrial base. A way to ensure that this is only a risk but does not become reality is a necessity.

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