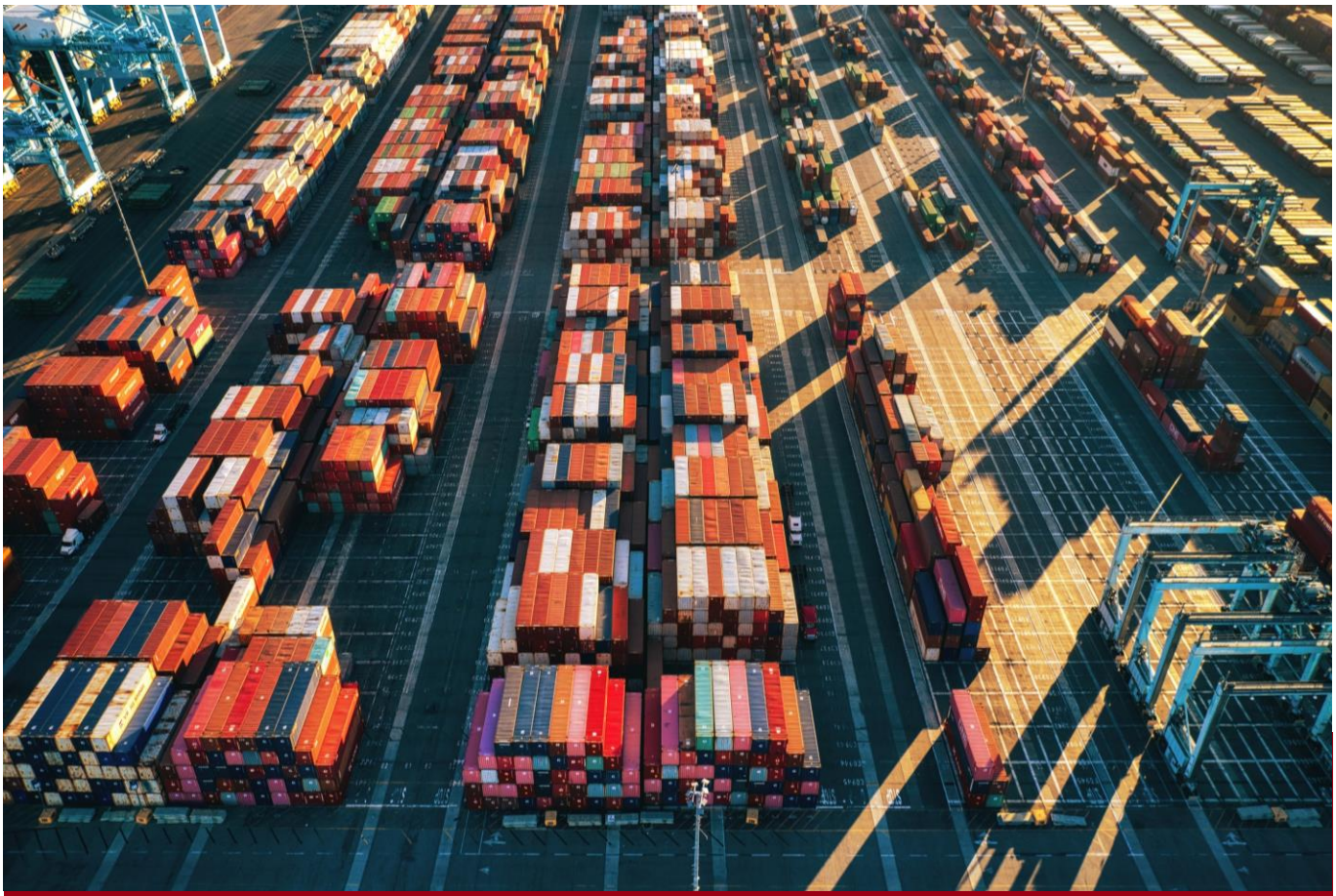

The EU carbon border adjustment mechanism (CBAM) and China

Unpacking options on policy design, potential responses, and possible impacts

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Supported by:

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Suggested citation

Kardish, C.; Duan, M.; Tao, Y.; Li, L.; Hellmich, M. (2021). The EU carbon border adjustment mechanism (CBAM) and China: unpacking options on policy design, potential responses, and possible impacts. Berlin: adelphi.

Acknowledgement: This paper was made possible with support of the project Sino-German Cooperation on ETS, Carbon Market Mechanisms, and Industry-related N_2O Mitigation. The project is implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) and is part of the International Climate Initiative (IKI), an initiative of the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU).

Photo credit: Cameron Venti - unsplash.com

Imprint

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Contents

List of Abbreviations

CBAM	Carbon border adjustment mechanism
CBDR	Principle of common but differentiated responsibilities
CCUS	Carbon capture, utilization, and storage
EITE	Energy-intensive, trade-exposed
ETS	Emissions trading system
FYP	Five-Year Plan
GATT	General Agreement on Tariffs and Trade
GHG	Greenhouse gas
MEPS	Minimum energy performance standards
MIIT	The Ministry of Industry and Information Technology
SCM	Agreement on Subsidies and Countervailing Measures
WTO	World Trade Organization

1 Background and rationale of the EU CBAM

With the announcement of the European Green Deal in 2019, the European Union significantly increased the scale and pace of its climate ambition. The proposal contains a set of policy initiatives with which the bloc hopes to reduce greenhouse gas (GHG) emissions by at least 55% compared to 1990 levels by 2030 and achieve carbon neutrality by 2050 (EC 2019a). This increase in ambition brings with it increased risks of carbon leakage and loss of competitiveness for domestic producers, whose costs rise along with the EU's scale of climate abatement.

One of the key tools the EU uses to reduce emissions is its emissions trading system (ETS). The EU ETS was launched in 2005 as the world's first mandatory carbon market. The system covers emissions from the power, industry, and aviation sectors, amounting to approximately 40% of the bloc's total emissions, and the EU is considering expanding sectoral coverage to achieve its new 2030 targets (ICAP 2021). The EU ETS addresses carbon leakage risk through the free allocation of emission allowances to industrial sectors for direct emissions, as mandated by the ETS Directive (EC (2003/87/EC)), as well as for rising costs of the electricity they consume through indirect cost compensation, which is regulated at the Member State-level. Both leakage protection measures are based on predetermined benchmarks and further limited in their availability as a proportion of the ETS cap or through annual declines set out in the ETS Directive.

The EU ETS entered its fourth phase in 2021, ushering in a more rapid decline of the annual emissions cap and more stringent benchmarks for free allocation. Meanwhile, the EU's Market Stability Reserve, which regulates the volume of allowances available at auction, has begun to address the EU's structural oversupply of allowances and contributed to rising prices. These developments, combined with a significantly higher 2030 target and other factors, have pushed allowance prices well beyond record levels, hitting above EUR 50 in May 2021, with prices expected to continue climbing.

As domestic firms face higher allowance prices and receive fewer allowances for free, they face growing risks of carbon leakage, whereby investment and production shift to third countries with fewer constraints on emissions or domestic producers lose market share to more emissions-intensive competitors. The European Green Deal proposed a carbon border adjustment mechanism (CBAM) to mitigate this risk. A CBAM applies tariffs or other fiscal measures to imported goods based on their embedded GHG emissions. The mechanism can also provide rebates or exemptions from carbon costs to domestic firms that export their goods to markets without comparable emissions pricing.

These measures therefore aim to reduce the asymmetry in carbon prices between domestic firms and their competitors abroad, enabling more ambitious climate policy in the EU and incentivizing stronger measures among trading partners. An effective CBAM would also allow the EU to end free allocation, which provides leakage protection but is incompatible with the long-term demands of deep decarbonization (Acworth et al. 2020).

The ability of a CBAM to achieve these objectives, however, is constrained by international trade law, along with political and administrative challenges. The mechanism must comply with two principles of non-discrimination under the World Trade Organization's (WTO) General Agreement on Tariffs and Trade (GATT). There are exceptions to these principles under Article XX of the GATT, which may apply to a CBAM on environmental grounds but still includes language on non-discrimination and arbitrary treatment of foreign producers (Mehling et al.

2019). Additionally, the WTO compatibility of the CBAM could be undermined by the inclusion of export rebates, as they present significant legal uncertainty under both Article XX and the WTO Agreement on Subsidies and Countervailing Measures (SCM) (Cosbey et al. 2019; Mehling et al. 2019).

The EU CBAM would be the first instrument of its kind to exist at the international level, at a time of growing mid- and long-term ambition from other major emitters as well as interest in addressing leakage risks through trade policy. Similar instruments are under consideration elsewhere in the world. The United States under the Biden administration has re-joined the Paris Agreement, announcing a doubling of its 2030 target, and has expressed interest in applying a levy on imports from countries with weaker climate policies via a border adjustment tax (USTR 2021). The Canadian government will also begin a consultation process soon on establishing a CBAM (Department of Finance Canada 2020).

The EU will include its CBAM proposal in the “Fit for 55” legislative package that will be released in July 2021. To prepare for the proposal, the European Commission began consultations in 2020 following the CBAM’s inclusion in the 2019 European Green Deal announcement. The Commission also established an “inception” impact assessment and engaged in public consultations in 2020. The final impact assessment will accompany the proposal in July.

2 Possible design options for the EU CBAM

The design of a CBAM is complex and implies trade-offs between its likely effectiveness on leakage protection and its feasibility, including legal, administrative, and political dimensions (Acworth et al. 2020). This section outlines the key design elements of a CBAM and options for EU policymakers, highlighting the above constraints.

2.1 Coverage of trade flows

The first design element concerns the coverage of trade flows – namely, whether the CBAM includes only imported goods or also provides rebates or exemptions to exporters in the implementing jurisdiction who face competition in third countries without comparable carbon pricing. While an imports-only CBAM may provide strong leakage protections for industrial sectors with relatively low trade intensity, more export-driven sectors may face continued vulnerability (Fischer and Fox 2012; Branger and Quirion 2014). Dröge et al. (2009) found this to be the case with key EU industrial sectors, particularly steel.

However, including rebates or exemptions for domestic exporters in the EU CBAM would significantly increase the risks of WTO non-compliance. An ETS is likely considered a regulatory measure rather than a tax under trade laws/norms, and the SCM Agreement does not allow for export rebates of regulatory costs, likely making export rebates under an ETS an illegal subsidy (Cosbey et al. 2019). Their inclusion in the mechanism would also raise further methodological challenges to ensure EU exporters do not receive rebates in excess of what foreign producers are charged, given allowance price fluctuations (Mehling et al. 2019). Lastly, export rebates might undermine the rationale for a CBAM as an environmental exemption to GATT under Article XX (ibid).

Of the three prior proposals for an EU CBAM, only 2007's Future Allowance Import Requirement included immediate provisions for export adjustments (Mehling et al. 2019). The European Commission's inception impact assessment launching the CBAM proposal included no mention of export rebates or exemptions, exclusively focusing on imported goods (EC 2020a). The European Parliament stopped short of calling for export rebates in its CBAM resolution, urging the Commission to consider rebates only if they can be demonstrated to be environmentally beneficial and WTO compliant (EP 2021). With the unlikely inclusion of export rebates in the EU CBAM, however, there is considerable pressure from industry stakeholders to maintain free allocation alongside the border adjustment, which is explored at the end of this section.

2.2 Sectoral scope

EU policymakers will also need to decide the sectoral scope, or the specific products covered under the CBAM. As with other measures to protect against leakage risks, a CBAM is intended for sectors of high emissions intensity and trade exposure. As these products are typically basic or raw materials of high emissions costs relative to their added value, targeting them maximizes the environmental benefit of the instrument while avoiding the administrative demands of covering more complex manufactured goods downstream. The EU already

defines these sectors in its Carbon Leakage List, which is used to determine eligibility for free allocation and was updated for Phase 4 of the EU ETS (2021-2030) in 2019 (EC 2019b).

The EU's Carbon Leakage List could serve as a useful basis for sectoral scope, but with more than 60 sectors and subsectors – many of which with relatively low emissions intensity or trade exposure – it might prove overly broad, posing significant administrative demands and increasing political opposition domestically and abroad.

While past CBAM proposals have suggested a scope of all sectors on the leakage list, in its 2020 inception impact assessment the European Commission suggested a sectoral scope that encompasses those with the highest leakage risk (EC 2020a). Such sectors typically include the major emissions-intensive industrial commodities, such as cement, steel, aluminum, fertilizers, and other basic chemical products. Another possible candidate for sectoral inclusion is electricity, owing to growing imports and increasing grid interconnectivity with non-EU countries (Sandbag 2020).

In general, the wider the sectoral scope the greater the administrative demands, potential for trade disputes, impacts on value chains downstream, and potential for evasion or resource shuffling. Some products, such as cement, have relatively simple value chains with few additional products farther downstream, whereas others, such as steel, aluminum, and chemicals, are highly complex (Marcu et al. 2021c).

2.3 Emissions scope

As emissions are generated at different stages of the product value chain, EU policymakers will need to decide the emissions scope of the CBAM. Options include Scope 1 (direct), consisting of emissions from on-site combustion and industrial processes; Scope 2 (indirect), consisting of emissions stemming from purchased electricity or heat; and Scope 3 (other indirect), consisting of all other indirect emissions, such as those from purchased materials and many transport-related activities. Coverage of direct emissions at a minimum is likely, given that they commonly constitute the bulk of emissions for basic materials and fall under the compliance obligations of industrial producers in the EU ETS.

Because Scope 2 emissions intensity often presents the widest potential for variation between countries and such costs are largely passed through to industrial sectors from EU ETS coverage of electricity generation, there is also a strong environmental rationale for including such indirect emissions in a CBAM (Cosbey et al. 2012). However, coverage of Scope 2 emissions faces methodological challenges, as the costs of electricity consumed by EU industrial producers do not reflect their emissions intensity owing to the pricing structure of the wholesale electricity market (Marcu et al. 2021c, 2021a). In European electricity markets, the price is set by the unit capable of meeting marginal demand, usually a fossil-fuel-based generator, whereas an industrial producer may source its electricity from less emissions-intensive suppliers.

Scope 3 emissions would generally prove even more daunting methodologically to account for and would increasingly fall outside of the price constraints posed by the EU ETS. However, the European Commission has identified Scope 3 coverage as an option in its public consultation (EC 2021), which would extend leakage protections further downstream to manufacturers that consume basic industrial materials as inputs.

2.4 Determination of embedded carbon

Another critical element of CBAM design is the determination of embedded carbon content on which to base the adjustment for the covered products. There are two main options: using verified, facility-level emissions data or developing benchmarks that establish an assumed emissions intensity for various emissions scopes and covered sectors. Using actual verified data at a granular level would most accurately capture embedded carbon and best incentivize abatement (Kortum and Weisbach 2017), but this would be controversial with trade partners owing to the costs and requirements it would impose, especially if the CBAM goes beyond Scope 1 emissions, which would also further increase the EU's administrative demands. Many countries do not currently require emissions reporting of their companies, so this would pose a significant burden and rapid change for non-EU exporters.

The more likely option is establishing benchmarks for the various sectors included in the CBAM for each type of emissions. From a WTO standpoint, the most feasible approach would be establishing a single benchmark for a given product that applies to all trading partners, such as an average emissions intensity of the EU producers in that sector or a global sectoral average/best practice (Mehling et al. 2019; Cosbey et al. 2019; Marcu et al. 2020b). The downside of this approach from a leakage standpoint is it will underrepresent true emissions where producers in third countries significantly exceed the benchmark. Benchmarks based on sectoral averages or practices in individual countries of origin may more accurately represent embedded carbon but raise the likelihood that the CBAM would be found arbitrary or discriminatory under WTO (Cosbey et al. 2012; Marcu et al. 2020b).

To complement a system of benchmarks, better incentivize abatement, and improve the WTO compatibility of the measure, the EU could also allow foreign exporters to present verified data on their emissions intensity to demonstrate performance below the benchmark and, in doing so, reduce their adjustment (Cosbey et al. 2019). This would, however, increase the prospects for resource shuffling, as companies in third countries would be incentivized to dispatch their most efficiently produced goods to the EU to reduce exposure to the CBAM (Mehling and Ritz 2020).

2.5 Accounting for emissions costs of foreign producers

To comply with WTO rules, the level of price adjustment at the EU border would need to account for emissions costs foreign producers face in their home jurisdictions (Mehling et al. 2019). As the EU places an explicit carbon price on firms' emissions via the EU ETS, it would similarly need to credit for carbon pricing policies – such as a carbon tax or ETS – in third countries. Only recognizing explicit carbon prices would be the most straightforward option to implement, with the lowest administrative burden for the EU; however, it may appear punitive to trade partners that do not have explicit domestic carbon pricing policies. This choice is further complicated by the existence of free allocation or exemptions under the carbon pricing instruments of trading partners, which makes determining actual or average carbon costs for a sector complex. Additionally, there may be pressure for the EU to consider carbon prices at lower levels in developing or emerging economies to be equivalent to EU allowance prices on equity grounds. This would greatly improve the CBAM's international acceptability but would likely limit its effectiveness as a leakage-protection measure, as it would fall far short of levelling differences in carbon costs between EU producers and their competitors.

As an alternative to this option, the EU can credit for both explicit and implicit carbon prices. Implicit prices are the result of regulatory standards and other measures that impose compliance costs on producers. Though not a direct price per ton of emitted GHGs, these "shadow costs" raise the price of affected goods. The implicit carbon price, therefore, would be the difference between the price of a good produced under regulatory standards and the price of this good were no regulatory standards in place. By crediting for both explicit and implicit carbon prices paid for by foreign producers, the EU would likely increase the CBAM's overall acceptance among trading partners. However, this option would raise major administrative and methodological challenges to consistently measure the per-ton costs of non-pricing policies and further raises the question of which policies would be counted, as many climate policies impose costs that are difficult to measure. Furthermore, the CBAM's purpose is levelling costs imposed by different carbon pricing instruments, and the EU also imposes additional shadow costs through policies such as renewable energy standards.

In addition to determining how to credit for foreign carbon prices, the EU must also choose at which level of governance to credit these policies in third countries. The EU could recognize only country-wide carbon pricing schemes or also credit those that operate at a regional level, such as the California ETS or China's regional pilots. There is also the more granular option to credit at the installation level.

2.6 Type of policy instrument

The type of policy instrument through which the EU implements a CBAM could take many forms, such as a tax/duty or, as it will operate alongside the EU ETS, a requirement for overseas exporters to purchase allowances in proportion to the weight and carbon content of their goods (Acworth et al. 2020). If the EU chooses the latter option, it must further decide whether these allowances come from the existing ETS cap or whether it will establish a separate pool of single-purpose, non-tradable allowances (ibid). The European Commission has indicated the CBAM will be a parallel ETS for imports whereby foreign producers purchase "virtual", non-tradable allowances from a separate pool whose price reflects the dynamic evolution of the EU allowance price (EP 2021).

2.7 Status of existing leakage protections under an EU CBAM

The final critical issue is the status of the existing leakage protections under a CBAM. As envisioned in academic literature, CBAMs are assumed to replace free allocation as the preferrable option to prevent leakage as they better enable energy-intensive, trade-exposed (EITE) sectors to pass on their costs of ETS compliance in product prices, creating better conditions to invest in low-carbon technologies, triggering demand-side abatement, and establishing markets for low-carbon products (Acworth et al. 2020). However, in the likely absence of export rebates, industrial sectors have raised concerns about competitiveness in third countries and have insisted on maintaining free allocation alongside a CBAM.

Methodologically, this option would require a modification to the CBAM formula (e.g. taking the difference between a foreign exporter's emissions intensity and the EU benchmark for free allocation), but it also likely increases the potential for WTO non-compliance as well as opposition from trading partners. Maintaining indirect cost compensation for EU producers while covering indirect emissions under a CBAM would raise similar challenges. The European

Parliament has also raised concerns that continuing current leakage measures after implementing the CBAM could constitute double protection for EU producers, which could further hinder its compliance with WTO rules. However, some authors have suggested maintaining free allocation is significantly more likely than export rebates to be compatible with WTO rules because the former is not contingent upon whether the good is exported but rather awarded broadly to all producers covered by the ETS in the sector (Marcu et al. 2021b).

2.8 Likely EU CBAM design features

Based on the challenges and constraints outlined above and statements from European policymakers, some likely design features of the EU CBAM emerge.

- **Coverage of trade flows** – the EU CBAM is likely to cover only imported goods, not providing relief to EU exporters, owing to risks of WTO incompatibility and strong resistance from trading partners.
- **Emissions scope** – the EU CBAM is likely to cover direct emissions and indirect emissions from electricity consumption, owing to significant regional variation in indirect emissions intensity. However, the EU may face methodological challenges equating indirect costs with indirect emissions intensity such that the CBAM provides strong leakage protections relative to the existing mechanism for indirect cost compensation. This will be especially true under a single benchmark based on the emissions intensity of EU electricity production.
- **Sectoral scope** – the EU CBAM is likely to begin with relatively narrow coverage of the industrial sectors that are considered most vulnerable to carbon leakage. Narrow coverage initially also helps minimize international pushback and domestic opposition. The complexity of the product's respective value chains and share of direct emissions are also likely to be crucial factors in this decision. These factors together suggest a possible initial scope of cement, iron and steel, and fertilizers. Electricity is also a likely sector of inclusion. Aluminum may be included in the initial stage of the CBAM if it includes indirect emissions within its scope and will remain a high priority sector for future inclusion if it is not among the first wave of sectors.
- **Determination of embedded carbon** – the EU CBAM is likely to take a benchmark-based approach to determining embedded carbon content. This approach is likely to set a single benchmark for each covered product based on the emissions intensity of EU producers (e.g. average sectoral emissions intensity or an average of the top/worst performers in a sector) or a global sectoral average. Uniform benchmarks will help ensure the EU CBAM's WTO compatibility. Given wide variability of indirect emissions intensity between countries, however, the EU may adopt benchmarks for indirect emissions based on each individual trading partner's power sector. The EU will also likely allow foreign exporters to demonstrate emissions intensity below the benchmark value to reduce the adjustment they face, which will enhance the EU CBAM's WTO compatibility and environmental effectiveness.
- **Accounting for emissions costs of foreign producers** – of all the EU CBAM design elements, this one defies prediction. It is arguably the most controversial from an international relations perspective, while all options present significant complexity and risks. The EU is likely to seek an approach that balances domestic environmental effectiveness with some degree of international viability.

- **Type of policy instrument** – the EU CBAM is likely to take the form of a "notional" ETS with a separate pool of non-tradable allowances for importers that are linked to the EU ETS price.
- **Status of existing leakage protections under the EU CBAM** – the EU is likely to maintain free allocation for the sectors covered under the EU CBAM, though likely on a transitional basis, despite the European Commission's initial framing of the CBAM as an alternative to existing leakage protections. This would mean the adjustment on imports would include a reduction factor to account for EU free allocation. The EU is likely to continue indirect cost compensation, especially in a scenario where the CBAM does not cover indirect emissions, given the challenges referred to previously. This would similarly require a reduction factor to account for indirect cost compensation.

3 European stakeholder views on the EU CBAM

The European Commission's 2020 public consultation on the CBAM identified the positions of several EU stakeholders regarding the mechanism. Across business, emissions-intensive industry, and civil society actors alike, there is strong consensus that carbon leakage is a serious problem and that a CBAM can play a role in successfully addressing it (EC 2021). There is also general agreement that implementing a CBAM is justified if differences in climate ambition between the EU and third countries persist and that raising prices on certain imports is acceptable if it helps to combat global climate change. Furthermore, a majority of EU stakeholders believe a CBAM can help accomplish the EU's objectives of achieving climate neutrality by 2050, stimulating the deployment and consumption of low-carbon products in the EU and abroad while increasing global climate efforts (EC 2021).

These actors' stances diverge when considering specific design options of the EU CBAM. Perhaps the most strongly disagreed upon concern between EU stakeholders is the question of how the CBAM will interact with current measures to combat carbon leakage. Business, emissions-intensive industry, and trade associations believe a CBAM should exist alongside free allocation of allowances to EITE sectors. Actors such as Fertilizers Europe, the European Cement Association (Cembureau), Business Europe, and the Federation of German Industries (BDI) insist that protecting against carbon leakage and creating a level playing field for EU industry is only possible by maintaining free allocation (Marcu et al. 2020a). Indeed, these stakeholders see the primary objective of the CBAM as one of preserving the competitiveness of EU industry, and they have made their support of the mechanism contingent on its ability to achieve this goal (Marcu et al. 2020a). Therefore, business and heavy industry see the EU CBAM as a complementary leakage measure.

EU environmental and civil society actors, on the other hand, believe the CBAM should be an alternative to existing measures to address leakage, such that a phase-in of the CBAM coincides with a phase-out of free allocation (Marcu et al. 2020a). These stakeholders see the primary objectives of a CBAM as addressing climate change and carbon leakage while fostering global climate ambition. Actors such as Carbon Market Watch, the World Wildlife Fund (WWF) European Policy Office, and the Climate Action Network (CAN) Europe assert that maintaining free allocation with the CBAM would hinder achieving these environmental goals (Marcu et al. 2020a; EC 2020b).

Business and heavy industry stakeholders further disagree with environmental and civil society actors on how to use revenues from the mechanism and on the inclusion of export rebates in the CBAM. Business and emissions-intensive industry argue on behalf of directing revenues toward investment in low-carbon technologies and research (Marcu et al. 2020a). They also support a CBAM design that includes export rebates for sectors impacted by the mechanism, especially if free allocation is phased-out, as they argue the inclusion of rebates will provide further necessary protection for competitiveness (Marcu et al. 2020a).

Environmental and civil society stakeholders agree with heavy industry that a portion of CBAM revenues be recycled towards investment in low-carbon technologies. However, unlike the private sector, pro-climate NGOs also call for revenues to be directed towards the EU Just Transition Fund and towards assisting developing countries in their green transitions (Marcu et al. 2020a). Environment and civil society groups also heavily oppose the inclusion of export rebates in the mechanism's design (Marcu et al. 2020a).

4 China's climate policy environment and its reference points to the EU CBAM

4.1 Climate target

China has recently enhanced its climate ambition. In September 2020, China announced it will peak its carbon emissions before 2030 and achieve carbon neutrality before 2060. In December 2020, China further announced at the 2020 Climate Ambition Summit it will increase its intensity target of emissions relative to GDP between 2005 and 2030 to over 65% from the previously announced 60-65%. In March 2021, a binding 18% reduction target for emissions intensity of GDP was established for the 14th Five-Year Plan Period (FYP), i.e. 2021-2025, with the longer-term prospect for 2035 described as "CO_2 emissions steadily decrease after peaking". The idea of establishing an absolute carbon emissions target for the whole country has also been introduced, but no details have yet been given (State Council of the People's Republic of China 2021).

4.2 Energy consumption target

According to its updated NDC, China will increase the share of non-fossil fuels in primary energy consumption to around 25% and bring its total installed capacity of wind and solar power to over 1.2 billion kilowatts by 2030. During the 14th FYP, China will continue to apply 'Dual Control' on total energy consumption and energy intensity, i.e. the amount of energy consumed per unit of GDP. The binding target for energy intensity has been set as a 15% cut by 2025 compared to 2020 levels, while the total energy consumption goal is still to be determined. During the 14th FYP, the target for the share of non-fossil energy in total energy consumption is around 20% by 2025, up from 15.8% in 2020.

4.3 Energy efficiency policy

Energy efficiency policies will also impact the decarbonization of energy-intensive sectors. Most energy savings achieved to date in China have been largely driven by the state's energy saving programs, such as Energy-Saving and Low-Carbon Action among Top-10,000 Enterprises Program, which covers more than 16,000 energy-intensive companies. The Energy Efficiency Top Runner Program has been implemented in parallel to the state's energy saving programs by accrediting high energy efficiency companies in some energy-intensive sectors and their corresponding product energy efficiency, with incentives provided to top runners and their efficiencies established later on as benchmarks for the whole sector. China has also released Minimum Energy Performance Standards (MEPS) for energy-intensive products on a per-unit of product basis, covering energy-intensive industries such as steel, non-ferrous metals, building materials, petrochemicals, and electric power.

4.4 Industrial transformation

During the 14th FYP, China envisions steeply curbing the haphazard investment in energy-intensive and carbon-intensive projects;[1] promoting the low-carbon transformation of raw material industries such as petrochemicals, iron and steel, and nonferrous metals; and accelerating the upgrading of the chemical and papermaking sectors. The Ministry of Industry and Information Technology (MIIT) – which directly affects developments in Chinese industrial sectors through the issuance of, for example, relevant development plans, policies, and technical standards – has declared the target of further reducing crude steel capacity, prohibiting new capacity of cement and flat glass as well as strictly controlling new aluminum capacity. Later in 2021, MIIT plans to put forward a green manufacturing strategy and formulate carbon peaking roadmaps of some energy-intensive sectors. The iron and steel and non-ferrous metal sectors have begun drafting plans to achieve carbon emissions peaking by 2025 or earlier. For example, Sinopec Group, a super-large petroleum and petrochemical enterprise in China, has pledged to peak its carbon emissions by 2023. China Baowu Steel Group, the biggest steelmaker globally, seeks to bring its carbon emissions to a peak in 2023 before cutting them by 30% in 2035 and to achieve carbon neutrality by 2050.

4.5 Tariff policy

In the 14th FYP, China continues to promote a higher level of international cooperation, further reduce import tariffs, and optimize the quality and structure of export commodities by increasing the proportion of high added-value products. In order to phase out over-production capacity and accelerate a low-carbon transition, China is in the process of adjusting its import and export tariffs for energy-intensive sectors. In April 2021, the Customs Tariff Commission of the State Council declared that from 1 May it will scrap import tariffs on certain steel products and raw materials like crude steel and pig iron, increase export tariffs for high-purity pig iron and other products to 15%-25%, and remove export rebates for certain steel products. It is envisaged that in the future, similar adjustments would be made to tariffs on other energy-intensive products like chemicals, which may have implications for the impacts of the EU CBAM.

4.6 Carbon pricing policy

The national ETS is expected to be one of the key policy instruments for China to realize its short- and long-term mitigation targets. China's national ETS started operation in 2021, regulating more than 2,200 power companies and covering around 40% of China's carbon emissions in its initial phase. The scope of China's national ETS is expected to be gradually expanded to other carbon-intensive sectors, while the specific expansion timeline is still to be clarified.

Iron and steel, cement, and aluminum have been identified as the key sectors for the EU CBAM's implementation due to their high carbon leakage risk. In China, these sectors contributed to around 15% (WSA 2019), 11% (Shan et al. 2019), and 4% (Hao et al. 2016) of China's total carbon emissions respectively and are very likely to be included in the national

[1] The specific wording for curbing energy- and carbon-intensive projects is very strong in the 14th FYP compared to previous FYPs. At US President Joe Biden's climate summit in April 2021, President Xi again emphasized China's resolve to control coal consumption. How this will translate into robust implementation remains to be seen.

ETS during the 14th FYP. Almost all iron and steel, cement, and aluminum enterprises in the areas where eight regional ETS[2] pilots are in force face a carbon price, with the regulated steel entities accounting for about one-seventh of China's total crude steel output. They will continuously be covered by the regional ETS pilots before the national ETS is expanded to these sectors. Prices in the Chinese regional ETS pilots are significantly lower than those in the EU ETS, with average allowance prices in 2020 ranging from USD 3.28 to USD 12.62 (ICAP 2021). By contrast, secondary spot prices in the EU averaged USD 28.28 in 2020 (ibid). Allowance prices in the EU ETS have soared since the beginning of 2021, closing the second quarter above USD 60 in futures trading.

[2] These regional ETSs are located in Beijing, Shanghai, Tianjin, Shenzhen, Guangdong, Chongqing, Hubei, and Fujian. They were launched in 2013-2014, with the exception of Fujian, which was launched in 2016.

5 Chinese stakeholder views on the EU CBAM

Although the specifics of the EU CBAM have not been announced, there has been increasing attention and discussion on this topic among different stakeholders in China. In April 2021, President Xi made it clear at the Leaders' Summit on Climate that China is committed to multilateralism and called on developed countries to refrain from creating green trade barriers. At the 30th BASIC Ministerial Meeting on Climate Change in April 2021, the ministers also expressed grave concern regarding the EU CBAM proposal, framing it as a unilateral trade barrier. There are clearly various concerns from the Chinese side regarding the EU CBAM.

Industries likely to be included in the EU CBAM at the very beginning, such as iron and steel, cement, and aluminum, which have especially prominent industry associations, have expressed serious concerns about the EU CBAM. However, they have not yet started to prepare themselves to respond to the mechanism for several reasons. First, the specific format of EU CBAM is still to be determined, making it difficult to establish the specific actions they could take at this stage. Second, China is now in the process of formulating action plans for peaking carbon emissions in key sectors. These sectors are intensively involved in this process and are fully occupied by formulating their sectoral plans. Third, many industry decision makers believe that their participation in China's national ETS will either exempt them from the EU CBAM, or the Chinese government will intervene before the mechanism would affect them (Hübner 2021). Nevertheless, the EU CBAM proposal is likely to have an impact on speeding up the implementation timeline of climate action of these sectors and the large companies under them. The chair of BaoWu Steel Group's board of directors, for instance, said that the EU CBAM will impose higher requirements for China's steel exports and, as a result, may encourage Chinese companies to speed up their low-carbon efforts, such as R&D on zero-carbon technologies to enhance the international competitiveness of their products.

Academia and think tanks in China are paying close attention to the possible policy instrument types, related legal issues and potential impacts concerning the EU CBAM, but limited discussions have been held on specific CBAM design elements such as approaches for calculating carbon content of products exported to the EU. As to the type of policy instrument, most Chinese experts are of the view that a consumption tax and EU ETS extension are more plausible options than a carbon tariff with regard to WTO compatibility, and the improvement of China's national ETS could be a useful measure to contend with the EU CBAM. Most experts believe that the EU CBAM would result in an additional cost on the EU's imported goods and thus exert disguised restrictions on trade, leading to risks of violating the WTO's non-discrimination principles.

Among this expert group, the EU CBAM is also perceived as being contrary to the spirit of the Paris Agreement because other countries could feel compelled to increase their mitigation ambitions, which are supposed to be determined voluntarily by parties themselves. Along this vein, some experts are keeping a watchful eye on and are concerned about the significant difference between carbon prices in the EU ETS and China's ETSs, but others insist that the different prices should be treated as equivalent given the principle of common but differentiated responsibilities (CBDR). They thus believe that China will not be greatly affected by the EU CBAM or will even benefit from a competitive advantage in the long term, as many other developing countries do not have any carbon pricing instruments in place (Hübner 2021).

Several experts in China further believe that the EU CBAM would lead to a reluctance of EU enterprises to fund R&D for low-carbon technologies and would damage international cooperation on climate change. As such, these experts believe the EU CBAM would not be an effective way to reduce carbon leakage and would generate only small global emissions reductions (Xie and Peng 2021).

6 Potential impacts of EU CBAM on China and response options

6.1 Chinese exports to EU in CBAM-relevant sectors

China is currently the world's largest exporting country and the EU's biggest trading partner. In 2020, exports from China to the EU amounted to EUR 383.5 billion, accounting for approximately 15.1% of China's total exports and 22.4% of the EU's total imports (Eurostat 2021). The embedded emissions of China's exports to the EU are relatively high, owing to the energy consumption structure, production technologies, and the proportion of carbon-intensive goods in its exports. It was estimated that in 2014 around 26% of the embedded emissions in the EU's imports came from China (Simola 2020). An estimation from Tsinghua University (Wang et al. 2020) shows that in 2018 emissions embedded in China's imports from the EU totaled a mere 30 million tons of CO_2, while the exported emissions reached 270 million tons. Significant differences between trade-embedded emissions in imports and exports with the EU will make Chinese exports vulnerable to the EU CBAM, depending on the precise design and sectoral scope of the instrument.

The largest share of exported goods from China to the EU in terms of value are machinery and electric products, textiles, metals, and chemicals. Most of these products are on the carbon leakage list of the EU ETS but are unlikely to be covered by the EU CBAM during its initial implementation phase due to the complexity in determining their underlying carbon content. The steel, cement, and aluminum sectors are among the most likely to be included in the mechanism's initial stage owing to their solid data foundations and relatively simple value chains. China is the world's largest producer of steel, cement, and aluminum, comprising over half of the global output in these sectors. China exports large amounts of steel and aluminum products to the EU, accounting for around 8% and 9% of the total sectoral imports in 2019 by the EU respectively, while exports of cement products are relatively small (Marcu et al. 2021a).

6.2 Potential trade and economic impacts of EU CBAM for China

Large gaps exist between China and the EU in terms of the carbon intensities of their industrial products, which would suggest significant impacts on China depending on the sectoral scope and other design features of the EU CBAM. The carbon intensities of steel production vary greatly across production processes. Primary steel production from iron ore is generally much more energy – and therefore carbon – intensive than secondary production from scrap steel. For the primary steel production process, an average of 2-2.2 tCO_2 are released for every ton of crude steel in China (Ren et al. 2021), while European steelmakers on average release 1.9 tCO_2 per ton of crude steel (Material Economics 2019). For crude steel produced in the secondary process, only 0.2-0.4 tCO_2 are released per ton of product in the EU (Material Economics, 2019), while in China the emissions amount to 0.6 tCO_2 (Ren et al. 2021). This divergence is related to the emissions intensity of Chinese electricity generation. Furthermore, 90% of crude steel in China is produced with primary production processes, while in the EU this figure amounts to 59%. In aluminum production, indirect emissions greatly outweigh direct emissions, amounting to 75-90% of total emissions. In the EU, indirect emissions average 7 tCO_2e per ton of aluminum, whereas in China they average 20 tCO_2e per ton of aluminum

(Marcu et al. 2021a). Similarly, this is related to the higher emissions intensity of Chinese electricity production.

However, the ultimate impact will depend on the precise design of the EU CBAM, especially its sectoral scope. A narrow sectoral scope, as is likely at the outset of the EU CBAM, will likely impact China's export value and GDP only to a minimal degree. What little modelling exists on potential EU CBAM impacts on China often assumes a significantly wider sectoral scope than is likely under an initial EU CBAM and thus tends to overstate the likely early impacts. For instance, Kuusi et al. (2020) estimate impacts of an EU CBAM on specific third countries, including China, but in a scenario of 14 sectors, some of which are complex finished products such as medical instruments. This scope likely extends well beyond what an EU CBAM will cover in the near term but could result in a loss of export value for China of between 6.8% and 11.6% depending on emissions scope. Xie and Peng (2021) and a forthcoming Tsinghua University study take a comprehensive view, modelling impacts under a CBAM that covers all industrial commodities – an unlikely sectoral scope.

6.3 Analyzing possible response options of China and their likely impacts

China may employ a variety of measures to address the possible negative impacts of the EU CBAM, including export policy adjustments, resource shuffling, sectoral expansion of the Chinese national ETS, linking the EU ETS with the Chinese national ETS, and the coordinated implementation of a carbon tax and ETS.

In the short term, China may pursue export policy adjustments**,** such as export tariff exemptions or rebates, to reduce the adverse effects of the EU CBAM in certain sectors. However, export policy adjustments may be considered a disguised subsidy and, consequently, face legal uncertainty under the WTO's SCM Agreement. They would also undermine the environmental benefits of the EU CBAM, since exporters would be able to lower or avoid carbon costs when entering the EU. In addition, export policy adjustments cannot promote the low-carbon transformation of energy-intensive industries and, thus, are unlikely to help achieve China's short- and long-term mitigation goals.

China may also turn to resource shuffling as a measure to limit the economic impacts of the CBAM in the short term, especially in sectors where the proportion of indirect emissions is high. Resource shuffling involves shifting cleaner production to jurisdictions with stricter climate regulations or carbon pricing to reduce costs while dispatching more emissions-intensive production to markets with weaker climate protections. Taking aluminum as an example, the substantial heterogeneity of indirect emissions in production indicates significant potential for resource shuffling. Chinese producers could redirect the 10% of Chinese aluminum produced with hydroelectric power for export to the EU and retain the remaining 90% of aluminum – much of which is produced with coal-fired electricity – for the domestic market or third countries (Marcu et al. 2021a). Such resource shuffling would diminish the pressure on Chinese exports in the initial stage of the EU CBAM, but it cannot help China achieve its mitigation targets and would threaten to undermine the intended effects of the EU CBAM.

If the EU CBAM is fairly designed and carbon costs in other countries are reasonably credited, expansion of China's national ETS to cover CBAM-related sectors could be one of China's best policy instruments for responding to the mechanism. As the EU CBAM is proposed to enter into force in 2023 and certain sectors, such as steel and cement, are likely to be included in the initial stage, ETS expansion to these sectors needs to be implemented in China as soon as possible. In addition to sectoral expansion, a higher carbon price is likely to reduce the

overall adjustment Chinese exporters would face and thus mitigate the EU CBAM's adverse effects. Therefore, measures should be taken in China to increase the carbon price in its national ETS, including tightening the emissions cap, gradually reducing the free allocation ratio, and introducing allowance auctioning, etc.

Linking the EU ETS and China's national ETS can effectively address the EU's concerns about carbon leakage and loss of competitiveness, as well as reduce the policy risks and additional costs faced by China's exporters. However, different features in the systems would pose potential barriers, and strong political will and significant policy coordination are required for linking ETSs (Li et al. 2019), making this option infeasible in the short term. Therefore, full linking of the EU ETS and China's national ETS should be considered as a long-term option. Limited linking in key EU CBAM-related sectors would bring less administrative burden and thus be more feasible in the medium term.

For some of the most exported products from China to the EU – such as machinery and electric products and textiles, which could be covered by the EU CBAM in the medium term – the embodied carbon emissions are relatively high, accounting for around 25% of the total export emissions from China to the EU in 2014 (Simola 2020). The emission sources are widely distributed, with highly heterogeneous production technologies used in electromechanical and textile industries, which makes regulating these emissions under an ETS difficult. Therefore, implementation of a carbon tax in China in these sectors may effectively supplement the ETS system in putting a price on carbon. Additionally, a carbon tax and allowance auctions would bring additional revenues to the Chinese government. Directing part of these revenues to investment in low-carbon technologies will contribute to deep decarbonization in industries and the achievement of long-term mitigation goals in China.

7 Policy suggestions to both EU and Chinese policymakers

There are steps that EU and Chinese policymakers could take to maximize the environmental impact of the EU CBAM through its design, the policy process, its implementation, and engagement in dialogue on other areas of shared interest in industrial decarbonization. At the same time, there are approaches China can take to minimize the potential negative effects that the EU CBAM may exert on its trade and economy through its domestic response, technical preparation, and engagement in dialogue.

7.1 Modifications to current EU leakage measures

To begin with design elements, a key issue for the wider perceived legitimacy of the instrument, its environmental impact, and likely its WTO compatibility is the status of free allocation and indirect cost compensation in the EU alongside the CBAM. It may be methodologically possible to account for ongoing free allocation in an import adjustment so as to not provide "double protection" for EU producers, but maintaining dual measures for leakage protection undermines the environmental rationale of the instrument and its perceived legitimacy among trade partners. It may therefore be advisable to signal at least a gradual phaseout of free allocation for EU sectors covered under the CBAM. A similar logic applies to the EU's indirect cost compensation, but if the CBAM does not include indirect emissions within its scope there may be cause to continue such protections. The phaseout of free allocation in the EU ETS, however, should be combined with increased financial support for industry to deploy low-carbon technologies, which could be partly financed using CBAM revenue to supplement existing sources of funding, such as EU ETS auction proceeds.

7.2 Demonstration of emissions levels by foreign exporters

Assuming the EU CBAM takes a benchmarking approach to determine the carbon content of imports, EU policymakers will likely need to allow foreign exporters to demonstrate emissions performance below the benchmark. The benefits of better incentivizing abatement, and thus maximizing the environmental impact of the EU CBAM, as well as improving its fairness likely outweigh concerns about resource shuffling and the administrative demands this mechanism would entail. The EU CBAM should adopt internationally recognized reporting standards and assure trading partners of its impartiality, though establishing the mechanism through an international third party such as the UN may be unrealistic. Regardless, dialogue with trading partners – especially China – as well as the WTO and other international bodies on shaping the design of this critical issue is needed. Chinese policymakers could also play a role in discussions over appropriate benchmark values that seek to balance the EU CBAM's environmental effectiveness with the interests of trade partners.

7.3 EU CBAM revenue earmarked for developing and emerging economies

To further enhance the fairness and legitimacy of the EU CBAM, EU policymakers should direct a significant share of CBAM revenue towards developing and emerging economy trading partners as targeted investments in decarbonization and emissions monitoring/verification. This would benefit abatement in the sectors covered under the EU CBAM in third countries while also improving compliance with the EU CBAM and the availability of emissions data, which is vital to future enhancement of the instrument. Enhancing data monitoring and verification would also help trading partners develop the vital building blocks of their own carbon pricing instruments, furthering one of the key long-term aims of the EU CBAM. Revenue distribution could be prioritized based on degree of trade in goods covered under the EU CBAM as well as the country's existing capacity to implement meaningful climate policies and collect emissions data. Directing CBAM revenue to the EU's general budget, which the European Council unanimously endorsed in July 2020, would likely generate strong opposition from China and other trading partners, as it would undermine the environmental effectiveness of the instrument while damaging its international credibility. The EU will need to find compromises between domestic political interests and those of its trading partners, and the use of revenue is perhaps the best avenue for compromise on the international front without sacrificing the environmental effectiveness of the instrument.

7.4 Crediting of non-explicit carbon prices

As a final note on EU CBAM design, the EU should explore or consider methodologies that would allow for crediting of non-explicit carbon prices and pursue a policy design that maximizes flexibility in this area. Accounting only for explicit carbon pricing in the jurisdiction where an import originated is far simpler and could be justified on the grounds that the EU CBAM is meant to address potential leakage stemming from the EU ETS, but a narrow approach to this issue will damage the instrument's international reception, including in China. The EU should explore a more flexible methodology with trading partners and relevant international institutions, including the WTO. China in particular should play a role in these discussions and promote the recognition of existing carbon costs on exported goods to minimize negative trade impacts from domestic policies in combination with the EU CBAM. To further enhance a flexible approach and acknowledge that climate policies differ at the sub-national level, the EU CBAM should also account for policies at the sub-national level. In the case of China, some regional ETS pilots already cover the industrial sectors that are most likely to be included in the EU CBAM. If the EU does not credit non-pricing policies, which may indeed prove impossible, it will face strong pressure to acknowledge lower carbon prices in developing and emerging economies as equivalent on equity grounds. The impact of such a compromise on the leakage protections of the instrument should be carefully considered.

7.5 Engagement between EU and trading partners on EU CBAM implementation and timeline extension

On the EU CBAM policy process and implementation, the EU should take a stepwise approach allowing for greater dialogue with trading partners and delaying the launch of the program until

after 2023. Given the need for greater dialogue with key trading partners, especially China, and the likelihood that EU CBAM legislation will take time to be ratified after its release in mid-2021, a launch date of 2023 is likely premature, especially given the novelty of the instrument and its administrative demands. Delaying the launch date would also give trading partners more time to adapt their climate policies in response to the EU CBAM, which, in the case of China, could mean speeding up the expansion of its national ETS to industrial sectors. Further, implementation could be handled in stages, starting with a relatively narrow sectoral scope before expanding. A slower approach, especially in combination with the design features outlined above, could additionally help reduce the risk that China resorts to export tariff rebates or resource shuffling in response to the EU CBAM.

Chinese policymakers should support this stepwise approach and could use this period to expand the Chinese national ETS to the initial EU CBAM sectors as soon as possible, ensuring a high carbon price to reduce export losses for the sectors most exposed to the EU CBAM. The EU should be transparent about its roadmap for coverage of future sectors, which Chinese policymakers could use to launch complementary carbon pricing policies in those sectors ahead of ETS inclusion. This would not only expand the scope of mitigation action and thus help China achieve its mitigation targets, but also bring revenues for low-carbon investment and facilitate industrial decarbonization. Linking China's national ETS with the EU ETS may be ideal from the standpoint of reducing leakage risks but would be infeasible in the short term and, therefore, should be recognized as a long-term response measure.

More ambitious carbon pricing in China would be the ideal response measure from a mitigation point of view, not only for both countries but for climate policy on a global level, and therefore any approach that maximizes this potential should be pursued. Robust carbon pricing in both regions would send a strong signal to the rest of the world that carbon pricing is a decarbonization policy of choice in the decades ahead, which would help to catalyze such policies in other jurisdictions and provide strong momentum toward a global carbon price.

7.6 Engagement between EU and trading partners on compliance

Additionally, the EU should engage directly with China and other trading partners on key issues of compliance, including emissions monitoring. This should include efforts at capacity building to enhance understanding of the requirements among exporters in China. Engaging with trading partners will also help dispel misinformation and misunderstandings about how the EU CBAM would work and to which sectors it would apply.

7.7 Engagement between EU and China on climate policy

Lastly, the EU and China should engage in bilateral dialogue on measures of shared interest in industrial decarbonization and developments in Chinese climate policy that would reduce exposure to the EU CBAM. The challenge of deep decarbonization, which requires industrial transformation, is too great to be addressed by a single instrument that seeks to address carbon leakage. The EU and China should therefore further discussions on less contentious parts of this challenge, including cooperation on technology development and deployment. At the same time, this dialogue should enhance the EU's understanding of Chinese climate policy – beyond the national and pilot ETSs – and its future direction. These discussions may also

assist Chinese policymakers in understanding how future climate policy developments would reduce exposure to the EU CBAM.

Additionally, China could further prepare itself for the EU CBAM by enhancing the climate policy capacity of key industrial sectors. Accurate and reliable emission data are the foundation for exporters to engage proactively with the EU CBAM. Therefore, China should formulate or improve emission accounting guidelines for all the CBAM-related sectors; establish a sound monitoring, reporting, and verification system; and develop a carbon disclosure system in line with international standards. Measures to encourage R&D in key low-carbon technologies, e.g. carbon capture, utilization, and storage (CCUS), hydrogen-based steelmaking, etc., and promoting their large-scale commercial application could also be among China's long-term policy strategies and would become one of the most powerful tools available to address the EU CBAM.

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