Analysis of recent and on-going changes in the EU CBAM-Design

Assessment of impacts of the EU-CBAM on selected sectors and economy wide overall macroeconomic development.

A report for UNITAR & UNDP

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Deliverable 1 (Part I) Analysis of recent and on-going changes in the EU CBAM-Design

Deliverable 3 (Part II) Assessment of impacts of the EU-CBAM on selected sectors and economy wide /overall macroeconomic development.

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PART I: Rationale and the proposed designs of the EU CBAM

1. Rationale of the CBAM and recent international developments

The European Green Deal has strengthened the EU's level of climate ambition by aiming to achieve climate neutrality in the European Union by 2050. The EU's comprehensive portfolio of climate-policies consists of several interrelated core elements: The Emissions Trading System (EU ETS), the EU's Carbon Border Adjustment Mechanism (EU CBAM) and the green finance frameworks (taxonomy). Complimentary and currently in the making is a new (GREEN) EU trade strategy, which shall further integrate EU trade policy within the union's economic priorities as reflected in the Green Deal.

The enhanced climate ambition within the EU increases the asymmetry with climate efforts outside the EU, which in turn increases the risk of carbon leakage and the loss of competitiveness for European producers whose costs rise along with the EU's scale of climate abatement.

On 14 July 2021, the European Commission (EC) has published its proposal for a regulation on establishing a carbon border adjustment mechanism, which suggest the coverage and timeline for implementation of the EU CBAM. The European Parliament (EP) released on 21 December, 2021 the DRAFT REPORT on the proposal for establishing a carbon border adjustment mechanism. The EP document calls on a much broader coverage and a more rapid implementation of the measures than the initial proposal put forward by the EC. The most recent proposal was put forward by the Economic and Financial Affairs Council (ECOFIN) on 15 March 2022. The last proposal contains new specifications, but does not differ significantly from the first two. The EC will review the report of the EP as well as the proposal of the ECOFIN and may consider certain elements and comments it contains. The ongoing consultation and legislative process will certainly alter the EU CBAM as currently proposed; the publication of the revised version is expected soon.

At all events, the EU CBAM will come into force by January 1st, 2023 and will at least to some extent address the great heterogeneity of climate policies outside the EU. It is expected that more climate ambitious countries will follow the EU's policy response and will impose unilaterally similar consequences. Canada[1] and Japan[2] already announced their plans for similar carbon boarder adjustment initiatives.

The Chinese reactions to the EU proposal are largely constructive and indicate, that the EU may motivate China to accelerate its climate mitigation efforts[3] and that China may set up a similar Chinese CBAM of its own. This would reconfirm the so-called "Brussels effect" – a process of unilateral global regulation caused by the de facto (but not necessarily de jure) extension of EU law beyond its borders through market mechanisms.

[1] https://www.canada.ca/en/department-finance/programs/consultations/2021/border-carbon-adjustments/exploring-border-carbon-adjustments-canada.html

[2] https://ec.europa.eu/commission/presscorner/detail/en/qanda_21_3661 , https://www.edie.net/news/11/EU-and-Japan-seal--green-alliance--in-bid-for-climate-neutrality--2--/

[3] https://merics.org/de/kurzanalyse/eu-china-climate-policy-balancing-cooperation-and-pressure

International organisations like the International Monetary Fund (IMF)[4] and the OECD[5] carried out work to study how CBAM like measures could support international efforts to reduce greenhouse gas emissions (GHG). The communiqué of the G-20 Finance Ministers meeting of 9-10 July 2021 mentions the need for international coordination on carbon pricing mechanisms.

All these efforts could ultimately lead to an establishment of a “climate club”, i.e. a cohort of countries with enhanced climate ambitions. The climate club will comprise a trade regime with (small) trade penalties on non-participants in order to induce a large stable international climate coalition and high levels of greenhouse gas abatement.

The October 31, 2021 “Joint EU-US Statement on a Global Arrangement on Sustainable Steel and Aluminium”[6] could be understood as a first step towards the climate club, as both sides are negotiating a global arrangement to address high carbon intensity and global overcapacity in the respective industries.

In 2022, Germany will preside the “G-7” and the newly formed government announced to put on the agenda the initiative of founding an international climate club open to all countries with a uniform minimum carbon price and a joint carbon border adjustment mechanism.

Policy makers in Kazakhstan are increasingly concerned about the forthcoming EU CBAM, as the EU is Kazakhstan’s biggest trade partner, with almost 40% share in its total external trade. Kazakhstan’s exports to the EU are heavily dominated by oil and natural gas which account for more than 80% of the country's total exports.

The remainder of the report discusses the interrelationship between the EU CBAM and the EU ETS. Next, central elements of the three current published proposals published by the EC, the EP, and the ECOFIN, major omissions and gaps in therein are analysed, as well as strategic options at hand for exporters affected by the EU CBAM are listed.

In Part II we analyse potential impacts of the EU CBAM on economic sectors of Kazakhstan, which could be potentially affected by the new regulation. We show that the at this stage of the EU CBAM design, the effects are going to be mild. We clarify our argumentation via two case studies for steel and aluminium exports. The macroeconomic impact is assessed by combining the results out of the newly developed EU CBAM impact assessment tool for Kazakhstan and the macroeconomic CGE-model of Kazakhstan.[7] We find, that due to the current limited coverage of the proposed EU CBAM and the trade and sectoral structure in Kazakhstan, the overall impact until 2035 will be minor. However, this might change, if the scope of CBAM is extended further (e.g., to include energy-related emissions or significantly extend the product coverage) or if the carbon prices in the EU ETS continue to rise. Last but not least, it is not clear how the current war of Russia against Ukraine will impact Kazakhstan external trade with the European Union. Moreover, some sectors or enterprises might be unevenly affected.

[4] https://www.imf.org/-/media/Files/Publications/Staff-Climate-Notes/2021/English/CLNEA2021004.ashx

[5] https://www.oecd.org/sd-roundtable/papersandpublications/RTSD41%20background%20note_FINAL.pdf

[6] https://ec.europa.eu/commission/presscorner/detail/en/IP_21_5724

[7] The macro-economic CGE model for Kazakhstan was used as part of an integrated-hybrid-model for assessing the transition pathway of Kazakhstan to Net Zero Greenhouse Gas Emissions by 2060. The results were later incorporated in the „Doctrine of Carbon Neutrality of the Republic of Kazakhstan until 2060“.

2. The interrelationship between EU ETS and EU CBAM

The EU Emissions Trading System (EU ETS) operates in all EU countries plus Iceland, Liechtenstein and Norway (EEA-EFTA states) and it limits emissions from around 10,000 installations in the power sector and manufacturing industries, as well as airlines operating between these countries. In its present setting, the EU ETS covers around 40% of the EU's greenhouse gas emissions. The EU is considering expanding sectoral coverage of the ETS to achieve its new 2030 targets.

The EU ETS works on the 'cap and trade' principle. A cap is set on the total amount of certain greenhouse gases that can be emitted by the installations covered by the system. The cap is reduced over time so that total emissions fall. Within the cap, installations buy or receive emissions allowances, which they can trade with one another as needed. The limit on the total number of available allowances ensures their value.

After each year, an installation must surrender enough allowances to cover fully its emissions, otherwise heavy fines are imposed. If an installation reduces its emissions, it can keep the spare allowances to cover its future needs or else sell them to another installation that is short of allowances. Trading of allowances brings flexibility and ensures that emissions are cut where there are least costs to do so. A robust carbon price also promotes investments in innovative low-carbon technologies.

Established in 2005, the EU ETS is the world's first international emissions trading system. The EU ETS is also inspiring the development of emissions trading in other countries and regions. The EU aims to link the EU ETS with other compatible systems. Since January 2020, the Swiss ETS is officially linked with the EU ETS.

The EU ETS addresses carbon leakage risks through (i) the free allocation of emission allowances to industrial sectors for direct emissions, as mandated by the ETS Directive (2003/87/EC), as well as through (ii) indirect cost compensation for rising costs of the electricity they consume, whereas the compensation is regulated at the member-state level. Both leakage protection measures are based on predetermined sectoral benchmarks and further limited in their availability as a proportion of the ETS cap or through annual declines set out in the ETS Directive.

But this system of free allocation of emission allowances becomes limited as climate targets increase and the supply of allowances shrinks. The free allocation of allowances also provides for windfall profits for the firms receiving allowances, which in turn pass on the full opportunity costs of the free allowance on to consumers, what ultimately weakens the incentives to reduce GHG emissions domestically.

The EU ETS entered its fourth phase for the period 2021-2030 with enhanced ambitions, ushering in a more rapid decline of the annual emissions cap and more stringent benchmarks for free allocations[8]. The revised ETS Directive (Directive (EU) 2018/410 amending Directive 2003/87/EC) established that the benchmark values shall reflect the technological progress in industrial sectors and in the period from 2021 to 2030 shall be improved by an annual rate 0.2% at minimum and 1.6% at maximum leading by the end of 2025 to total improvements of the benchmarks between 3% and 24% ccompared to the values applicable in the period between 2013-2020 (by the end of 2030, the total improvements should be between 4 % and 32 % respectively).

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

[8] https://ec.europa.eu/clima/news-your-voice/news/adoption-regulation-determining-benchmark-values-free-allocation-period-2021-2025-2021-03-15_en

has 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 80 in December 2021[9], with prices expected to continue climbing.

As domestic firms face higher allowance prices and receive fewer allowances for free, the risk of carbon leakage grows, whereby investment and production shift to third countries with fewer constraints on emissions. Hence, EU domestic producers lose market share to imports from more emissions-intensive competitors. The proposed EU CBAM should be considered as an element of the EU Emissions Trading System, which shall mitigate such risks by applying tariffs to imported goods based on their embedded GHG emissions. Thus, the EU CBAM shall ensure a level playing field for European producers by addressing the challenge of reducing GHG emissions in the EU while at the same time avoiding that these emissions reduction efforts are offset by emissions increase outside the EU.

3. Central Elements of the EU CBAM Proposals

As a part of the “Fit for 55” climate and energy package, the European Commission (EC) issued on 14 July 2021 its proposal for a regulation establishing a Carbon Border Adjustment Mechanism (further on: EC-proposal)[10]. The European Parliament (EP) published on 21 December, 2021 its draft report on the EC proposal of CBAM (Further: EP-proposal).[11] The most recent proposal was put forward by the Economic and Financial Affairs Council (ECOFIN) on 15 March 2022[12].

The main characteristic features of the EC, the EP and the ECOFIN proposals of the EU CBAM regulation are outlined in Table 1. If a core feature of the proposed regulations is designed in the same way among all three proposals, a single description is provided to add more clearance (cells combined).

[9] https://public.eex-group.com/eex/eua-auction-report/emission-spot-primary-market-auction-report-2021-data.xlsx
[10] https://ec.europa.eu/info/sites/default/files/carbon_border_adjustment_mechanism_0.pdf
[11] https://www.europarl.europa.eu/doceo/document/ENVI-PR-697670_EN.pdf
[12] https://data.consilium.europa.eu/doc/document/ST-7226-2022-INIT/en/pdf

Table 1. Main elements of the proposals for the EU CBAM regulation put forward by the EC, the EP and the ECOFIN

Topic	Proposal of the European Commission	Proposal of the European Parliament	Proposal of ECOFIN
Trade flows covered	Only imports to the EU are covered. No export rebates are foreseen. The free allocation of EU ETS allowances to European exporters will be gradually phased out by **2035**.	Only imports to the EU are covered. No export rebates are foreseen. The free allocation of EU ETS allowances to European exporters will be gradually phased out by **2028** (already in **2025 for cement**).	Only imports to the EU are covered. No export rebates are foreseen. The free allocation of EU ETS allowances to European exporters will be gradually phased out. *(The timeline, however, is not clearly determined.)*
Countries affected	Countries that are part or linked to the EU ETS are exempted. Countries imposing a carbon price at least equivalent to the price resulting from the EU ETS on products subject to the EU CBAM may be granted exemption.		
Sectors and products covered	Five sectors will be initially covered: **aluminium, cement, electricity, fertilizers, steel.** The covered products (a detailed list is provided in Annex 1) include both primary materials ('simple' goods) and semi-manufactured goods that use primary materials as inputs. Exemptions may be provided for imports of electricity from countries fulfilling certain conditions (e.g., renewable energies). The European Commission can extend the list of sectors and products through delegated acts.	Eight sectors will be initially covered: **aluminium, cement, electricity, fertilizers, steel, hydrogen, organic chemicals, plastics.** In this extended scope, organic chemicals and plastics refer to large product groups, whereby EU-ETS benchmarks are only available for a few products: • Adipic acid; • Styrene; • Phenol / acetone; • Ethylene oxide / Ethylene glycols; • Vinyl chloride monomer (VCM); • S-PVC; • E-PVC. The covered products (a detailed list is provided in Annex 1) include both primary materials ('simple' goods) and semi-manufactured goods that use primary materials as inputs.	Five sectors will be initially covered: **aluminium, cement, electricity, fertilizers, steel.** The covered products (a detailed list is provided in Annex 1) include both primary materials ('simple' goods) and semi-manufactured goods that use primary materials as inputs. The original product list is extended with several articles of iron or steel and of aluminium. **CBAM will apply to imports above 150 EUR per consignment.** Exemptions may be provided for imports of electricity from countries fulfilling certain conditions (e.g., renewable energies). The European Commission can extend the list of sectors and products through delegated acts.

		Exemptions may be provided for imports of electricity from countries fulfilling certain conditions (e.g., renewable energies). The European Commission can extend the list of sectors and products through delegated acts.	
Emissions covered	EU CBAM's coverage is framed by the sectors and emissions covered by the EU ETS. Only direct CO2e emissions (Scope 1) will be covered, including emissions attributed to covered goods and those embedded in input goods deemed to be within the system boundaries of the production process. Indirect emissions from electricity (Scope 2) are not covered, though a review will make recommendations in 2026 on whether to include these going forward.	EU CBAM's coverage is framed by the sectors and emissions covered by the EU ETS. Direct CO2e emissions (Scope 1) will be covered, including emissions attributed to covered goods and those embedded in input goods deemed to be within the system boundaries of the production process. **Indirect emissions from electricity (Scope 2) will be covered.** The indirect emissions account for electricity consumed within the system boundaries of the production process. The determination of embedded emissions per MWh of electricity is the same as for electricity imports by the EU, but no methodology or default values are provided for the determination of electricity consumption per tonne of covered goods.	EU CBAM's coverage is framed by the sectors and emissions covered by the EU ETS. Only direct CO2e emissions (Scope 1) will be covered, including emissions attributed to covered goods and those embedded in input goods deemed to be within the system boundaries of the production process. Indirect emissions from electricity (Scope 2) are not covered, though a review will make recommendations in 2026 on whether to include these going forward.
Instrument	"Notional ETS" without an emission cap, whereby importers of covered products have to surrender CBAM certificates (priced on the basis of EU ETS allowances) equal to the embedded emissions in their imports minus the free allocation benchmark in the EU-ETS. The free allocation benchmark will be reduced by the CBAM factor, as determined by the implementation timetable. The number of certificates to be surrendered can be described by the following formula: (see formula below)		

$$Certificate\ amount = Import\ volume\ \times (Embedded\ emissions - Free\ allocation\ \times CBAM\ Factor)$$

Price setting / implementation timetable	The level of adjustment payment will mirror the average auction price of EU ETS allowances each week[13]. Crediting of policies in the country of origin will only recognize explicit carbon pricing policies (e.g., a carbon tax or ETS), with prices paid deducted from the total prices assessed for the EU-CBAM. During the **first three years (2023-2025)** the CBAM will be in its transition phase, whereas the data and information from importers will be collected, but no financial adjustments will be made. CBAM factor will be equal to 100 %. **From 2026 onwards, the CBAM factor will decrease by 10 percentage points each year until reaching 0 % in 2035**, indicating full carbon pricing of both domestic and imported goods.	The level of adjustment payment will mirror the average auction price of EU ETS allowances each week[13]. Crediting of policies in the country of origin will only recognize explicit carbon pricing policies (e.g., a carbon tax or ETS), with prices paid deducted from the total prices assessed for the EU-CBAM. During the **first two years (2023-2024)** the CBAM will be in its transition phase, whereas the data and information from importers will be collected, but no financial adjustments will be made**. The CBAM factor will be equal to 100 % in 2023 and 2024, 90 % in 2025, 70 % in 2026, 40 % in 2027, and reach 0 % in 2028. For cement, free allocation will be ceased / CBAM will be implemented to 100% already in 2025.**	The level of adjustment payment will mirror the average auction price of EU ETS allowances each week[13]. Crediting of policies in the country of origin will only recognize explicit carbon pricing policies (e.g., a carbon tax or ETS), with prices paid deducted from the total prices assessed for the EU-CBAM. During the **first three years (2023-2025)** the CBAM will be in its transition phase, whereas the data and information from importers will be collected, but no financial adjustments will be made. CBAM factor will be equal to 100 %. **From 2026 onwards, the CBAM factor will mirror the principles applied in the EU ETS for the free allocation of allowances.** *(The last statement is not precisely formulated in the proposal.)*
Determination of embedded emissions for products:	Based on actual emissions at installation level verified by accredited verifiers, with fall-back default values set at the average emission intensity of each exporting country for each of the goods, increased by a mark-up (to be determined in implementing acts). When reliable data for the exporting country cannot be applied for a type of goods, the default values shall be based on the average emission intensity of the 10 per cent worst performing EU installations for that type of goods[14]. During the initial transitional phase (2023-2025 in versions of the EC and the ECOFIN, 2023-2024 in the proposal of the EP), where importers may not yet be able to produce the data required on actual emissions, default values could also apply.		
Determination of embedded emissions for electricity:	Based on third country-specific default values that correspond to the average CO2 emission factor in tonnes of CO2 per MWh of price-setting sources in the third country. Where the third country-specific default values have not been determined, the calculation will be based on a **default value set at the average CO2 intensity of electricity produced by fossil fuels in the EU**.		

[13] The average price for the week December 13-17, 2021 was about 80 Euro/t of CO2e.

[14] The data are obtained from the sector benchmarks already established for the sector 10% best performing installations.

	A different (lower) default value can be established for a third country that demonstrates, based on reliable data, that the average CO2 emissions factor of price-setting sources in the country is lower than the default value that represents the CO2 emissions factor from EU fossil fuel-based generation. If a set of certain conditions are collectively met (e.g. declarant has concluded a power purchase agreement with a producer of electricity located in a third country), a declarant can opt for declaring actual emissions.		
Effect on the free allocation of EU ETS allowances to European exporters	The EU CBAM will replace gradually and stepwise until 2035 the free allocation of EU ETS allowances to exporters in the covered sectors. To allow producers, importers and traders to adjust to the new regime, the reduction of free allocation will mirror the gradual phase-in of the EU CBAM. Sectors covered by the CBAM will eventually stop receiving free allocation. The Commission proposes a 10-year transition period before free allocation is fully phased-out. **The share of free permits for the sectors affected will still be 100 % in 2025, and will gradually decline by 10 percentage points each year to reach zero in 2035.** During the period when free allocation is maintained, the EU CBAM will only apply to those emissions above the free allocation received by domestic producers. The methodology for calculating the reduction in the number of CBAM certificates to be surrendered by importers to reflect free allocation will be determined by implementing acts.	The EU CBAM will replace gradually yet rapid stepwise until 2028 the free allocation of EU ETS allowances to exporters in the covered sectors. To allow producers, importers and traders to adjust to the new regime, the reduction of free allocation will mirror the gradual yet rapid phase-in of the EU CBAM. Sectors covered by the CBAM will eventually stop receiving free allocation. The Parliament proposes a **6-year transition period before free allocation is fully phased-out. The share of free permits for the sectors affected will still be 100 % until 2024, and will decline to 90 % in 2025, 70 % in 2026, 40 % in 2027, and reach 0 % by 31 December 2028.** During the period when free allocation is maintained, the EU CBAM will only apply to those emissions above the free allocation received by domestic producers. The methodology for calculating the reduction in the number of CBAM certificates to be surrendered by importers to reflect free allocation **is laid down in the Annex III to the proposal** and can be supplemented by delegated acts.	The EU CBAM will replace gradually and stepwise until 2035 the free allocation of EU ETS allowances to exporters in the covered sectors. To allow producers, importers and traders to adjust to the new regime, the reduction of free allocation will mirror the gradual phase-in of the EU CBAM. Sectors covered by the CBAM will eventually stop receiving free allocation. (The last formulation is not explicit though.) During the period when free allocation is maintained, the EU CBAM will only apply to those emissions above the free allocation received by domestic producers. The methodology for calculating the reduction in the number of CBAM certificates to be surrendered by importers to reflect free allocation will be determined by implementing acts **with reference to the principles applied in the EU ETS for the free allocation of allowances**.

4. Omissions and gaps of the EU CBAM proposals

The current proposals of the EU CBAM contain several weaknesses, which increase the likelihood that it will be either of little effectiveness, or it will be altered and supplemented with complementary regulations and policies.

4.1. Focus on imports only

The proposed EU CBAM covers only imports entering into the EU, but not exported EU products sold in foreign markets. Because most European products covered by the EU CBAM are, on average, less carbon intensive than foreign products, the potential loss of EU exports and market share in foreign markets may result in a net increase of global emissions.

The EU CBAM may disrupt existing EU international value chains and increase strategic import dependencies.

The omission to address the issue of export-related leakage from EU increases the strategic options for producers outside the EU and bears the potential to undermine domestic political support for the EU CBAM and EU climate policy. Yet, no straightforward solutions to support the EU exporters exist within the EU CBAM itself, given (i) serious concerns about the WTO-legality of export related exemptions or rebates for exports, and (ii) their potential effect on the overall emission reduction impact of the EU ETS.

The free but declining allocation of allowances to exporters offers only temporary and partial relief, and is no-long-term solution. Complementary policy options will be required, such as adjusted product requirements, Carbon Contracts for Difference[15] (CCfD), support for research, development and demonstration, as well as green public procurement. More important will be efforts for international cooperation to reduce carbon cost asymmetries over the medium- to long-term. None of the discussed options offer strong protection against export-related leakage in the short term, but can help level the playing field between EU exports and foreign products in global markets over time.

4.2. No coverage of indirect emissions and indirect carbon costs (so far)

The EC proposed EU CBAM covers only direct or so-called scope 1 emissions. EU CBAM so far does not cover indirect emissions, which are for example embodied in purchased electricity.[16] The EP proposal suggests inclusion of scope 2 emissions, but is not very specific on the methodology.

In the short term, the pragmatic option is non-coverage of indirect emissions coupled with maintaining the existing regime for compensation for indirect costs. However, this option fails to price the most significant source of imported embedded carbon. Indeed, the production of electricity is covered under the EU ETS and the European producers purchasing carbon-priced

[15] https://www.diw.de/documents/publikationen/73/diw_01.c.758532.de/dp1859.pdf

[16] The terminology used here is slightly different than in the GHG Protocol, where "indirect emissions" are all emissions other than scope 1 emissions. That would include scope 2 emissions embodied in purchased electricity, steam, cooling and heat, and scope 3 which are all other emissions, including transport-related, and those embodied in input goods.

electricity bear the cost of the ETS allowances, while unregulated foreign producers do not face such carbon costs. Indirect emissions constitute a large share, if not the most, of total GHG emissions. In materials production and for electricity-intensive goods such as aluminium (see case study 2 in section 9 of this report), the cost differential is very significant. In short, indirect emissions are the major reason of global divergence between high- and low-carbon production. Other things being equal, this omission of indirect emission in EU CBAM alone poses a serious risk of ineffectiveness of the future EU CBAM regulation to prevent the carbon leakage from the EU.

At the same time, the indirect emission-related cost differential between electro-intensive industries inside and outside EU is, in fact, much larger than just the EU ETS allowance charge (at least in the short run). This is because electricity in the EU is priced on the basis of marginal costs, i.e. the last electricity producer satisfying market demand is setting the price for all electricity suppliers. The so-called “merit order” was introduced to support the deployment of renewable energies. The increase in renewable energy sources has caused a shift in the merit order curve and substituted part of the generation of conventional coal or gas fired thermal plants, which face higher marginal production costs. Indeed, the carbon-related electricity generation face higher marginal cost because the carbon fuels (gas, coal) are more expensive than ‘fuel costs’ of renewable energies (solar, water and wind) as the latter being provided free of charge. This merit order effect along with the priority dispatch of renewables is increasingly pushing conventional power plants outside the market. But as long as renewable and carbon-free electricity produces do not satisfy the entire demand for electricity, the final electricity supplier will be a high-carbon producer, paying also for the EU allowances, which adds a carbon cost to all electricity prices paid by all electricity consumers. This imposes higher electricity costs by producers in other sectors, in particular electricity-intensive producers – the indirect carbon costs. That costs, an artefact of the EU’s marginal-cost pricing system, would not be paid by electricity-intensive producers outside EU, who would eventually pay only for the costs of their direct emissions.

The “merit order artefact” and the high carbon cost would both disappear with the almost complete decarbonisation of power generation in the EU. However, average electricity prices in the EU will remain relatively high, as they will be set on the market covering current and future investment costs in new installation of renewables. With this, the high indirect costs are expected to persist for the domestic EU producers.

This problem of uneven indirect cost is currently addressed through the EU member-states’ aid rules that allow the states to compensate some indirect carbon costs to affected firms. However, such compensation is complex. The assumed indirect electricity-related carbon costs are based on a benchmark product-specific electricity consumption that is set by the most efficient firms. As well, the assumed costs are based on a regional average weighted CO2 intensity of fossil-fuel-based electricity producers in a geographical area, without regard to their proportion of the final electricity mix in that area. The allowed compensation is set to a maximum of 75% of assumed costs at the sectoral level, or at 1.5% of gross value added at the firm level for those firms which are most affected. Member states are free to set compensation below the 75% level, or do not compensate at all.[17]

It seems safe to assume the envisaged EU CBAM review will need to incorporate to some extent indirect emissions as well to at least partially reduce that risk of carbon leakage.

[17] As of the 2020 Carbon Market Report, 13 Member States had approved plans to compensate for indirect carbon costs, with more expressing an interest in doing so.

4.3. Shifting carbon leakage downstream in the value chain

The proposed CBAM designs cover a limited set of four basic material sectors – cement, nitrogen fertilizers, iron and steel, and aluminium – as well as electricity. Within these sectors (other than electricity), coverage extends down the value chain of about 30 proposed covered categories of goods, depending on the proposal (see Annex 1). In the EC proposal, there is a provision for a review in 2026 of the sectors covered, and of the downstream coverage within those sectors, with a view to potentially expanding the list of covered goods.

The suggestion to limit the initial sectoral and goods coverage is put forward in order to set up the EU CBAM technically and administratively as simple as possible in its initial phase, instead as of capturing the entire value chain of imports. Thus, the limited sectoral and product scope will most likely not face major legal challenges, and will not give rise to significant political or diplomatic controversy. However, some of the covered sectors (aluminium, steel) have complex downstream value chains in which trading is dominated by semi-finished and finished products, not all of which are included in the proposed list of covered goods (see Annex 1).

Where these products contain a high share of the carbon-intensive raw material and the processing results in limited value-added, exclusion from the coverage by EU CBAM render the products vulnerable to import substitution at the same level in the value chain, i.e. shifting carbon leakage downstream in the value chain. Expanding EU CBAM's downstream coverage would be effective but might increase complexity, which is not warranted at the start of EU CBAM.

Product standards can address the risk of shifting carbon leakage downstream in the value chain, as they set direct requirements for both imported and domestically produced products.

4.4. Departure from the principle of common but differentiated responsibilities and respective capabilities

Many of the EU's trading partners have raised concerns that the EU CBAM would curtail their exports, thereby potentially impeding their economic development. The exposure and vulnerability of trading partners depends on the current and future emissions intensity in covered sectors, their exports' structure including their degree of dependency on the EU market and their ability to adapt by trade diversification and shifting of trade flows, as well as institutional readiness and capacities to monitor and report product emissions.

In general, the EU CBAM departs from the UNFCCC principle of common but differentiated responsibilities and respective capabilities (CBDR-RC), as it provides no exemptions in its geographic scope for developing countries, and does not include any provisions regarding the use of revenues for climate-related purposes in these countries. So far, most policy options are EU-oriented and do not address concerns regarding impacts elsewhere.

Exemptions from the geographical scope of CBAM are not feasible as they raise legal and circumvention risks: first, any exemption sets incentives for resource shuffling and trans-shipment; second, any exemption of individual countries or groups of countries risks violating Article I of the GATT.

The negative impacts on development of trade partners may be cushioned through revenue sharing. So far, however, the proposal does not provide any principles or provisions regarding the use of revenues for climate-related purposes abroad, but remains in line with prior political direction that revenues accrue to the general EU budget.

4.5. Need for international cooperation on MRV and carbon adjustment

Implementing the EU CBAM and delegated acts will set out complex technical requirements and processes, which will be compliance demanding for importers and foreign producers as well as regulators. Many trade partners already have introduced their own policy and institutional frameworks for emissions monitoring, reporting and verification (MRV) and product carbon footprint determination, which most likely deviate from the requirements under the EU CBAM.

While EU advances, other jurisdictions are also exploring border carbon adjustments. The proliferation of different approaches to border adjustments and MRV more generally has the potential of increasing administrative burden and implementation costs of exporters. Active outreach and communication by the EU are required to avert the gravest legal risks and capacity constraints among trade partners. Any uncoordinated deployment of these complex and controversial instruments would mean a missed opportunity to mitigate legal and diplomatic tensions, and to limit the administrative burden and costs of compliance.

The EU will need to engage with trade partners and other stakeholders in a discussion on common principles and best practices on issues such as objectives, revenue use, policy crediting, etc.

5. Strategic options of exporters for avoiding EU CBAM adjustment payments

5.1. Resource shuffling

It is almost certain, that foreign producers will adjust to the EU CBAM by resource shuffling, i.e. shipping no- or low- emission-intensive production to the EU, while emission-intensive production will be sold elsewhere. Resource shuffling will allow, in fact, to leave domestic production patterns unchanged. Resource shuffling would even increase, when indirect emissions will be covered under the EU CBAM, because indirect emissions vary much more across global producers than direct emissions. In this case resource shuffling could simply be the assertion that the renewable energy portion of the domestic power generation mix is dedicated to the producer exporting to the EU, while carbon-intensive electricity is used for domestic purposes and exports elsewhere. As mentioned above, the current proposal does not cover indirect emissions, but it is widely expected to do so in the future and this will require provisions to address the risk of resource shuffling.

5.2. Trans-shipments

Another option for producers and exporters for circumventing the EU CBAM payments is the trans-shipment of goods. The current EU CBAM proposal designates four countries and five territories as exempt from the EU CBAM, since their ETS is linked to the EU ETS. As long as the exempted countries and regions do not adopt and effectively enforce a robust regime of import charges similar t to the EU CBAM, exporters might ship EU CBAM affected goods first to an exempt country and then forward it to the EU without paying the EU CBAM adjustment.

5.3. Absorption of cost

Most producers will simply absorb the cost of the EU CBAM, because not all their exports are directed to the EU. The smaller the EU share in total exports, the likelier it is, that the producer absorbs the costs of the EU CBAM across the entirety of its production, lowering the price of EU-destined products to account for the EU CBAM costs, and in effect forcing its non-EU exports to cross-subsidize its EU exports. This reaction to EU CBAM is encouraged with the long transition period of ten years and the ten annual ten percentage point increase of the EU CBAM payments. This strategy would allow in the short-term to maintain market share. Cost absorption being essentially dumping, might be addressed by means of existing trade remedy law.

5.4. Strategic use of default values

The determination of embedded GHG emissions for products exported to the EU would require the collaboration with producers and authorities based outside EU. In case such cooperation and exchange of information is not taking place, the EU CBAM proposal states that default values based on the 10 per cent worst performing EU installations for that type of goods will be applied.

It remains to be seen, if a default value of 10 per cent of the worst performing EU installations will be a “bad deal” for the respective producers and provide enough incentives as intended by EU CBAM (see also the case study for the steel industry below). The matter is that producers in the EU are heavily subjected to environmental and climate policy regulation already long time, whereas many producers outside the EU are not regulated in the same way. Therefore, the starting emission-intensity levels of producers differ widely between EU and outside EU. It seems safe to assume that many producers will be operating much worse than the worst 10 per cent of the respective sector installation in the EU in what regards their GHG emissions.

Furthermore, in its benchmarking, the EC uses annual GHG emission reduction rates due to technological evolution; for the steel industry, for example, these rates are in the range of 0,2 per cent to 1,6 per cent, depending on the category. But the deployment of new low carbon or no carbon technologies is mostly driven by research and development and demonstration and requires investors with well-established access to capital markets. Besides, the specific regulation by benchmarks or other frame conditions like the tax system and corresponding rates for annual capital depreciation matter here as well.

This accelerated push of low and no carbon technologies by the EC will and often cannot be pursued by all other producers outside the EU. Hence, the quick and capital-intensive technological advances in the EU will further increase the gaps with the production outside of it. This is especially the case for installations with long designed life spans, like for steel blast furnaces (>20 years), CHP power generation (>30 years) or steam crackers (>40 years).

When producers anticipate that the default values of the worst 10 per cent within EU may be more favourable than reporting the actual values, this may even discourage producers to invest into GHG emissions reduction technologies.

Last but not least, some risk exists, that the use of national default values for GHG intensity of production might also face trade law challenges.

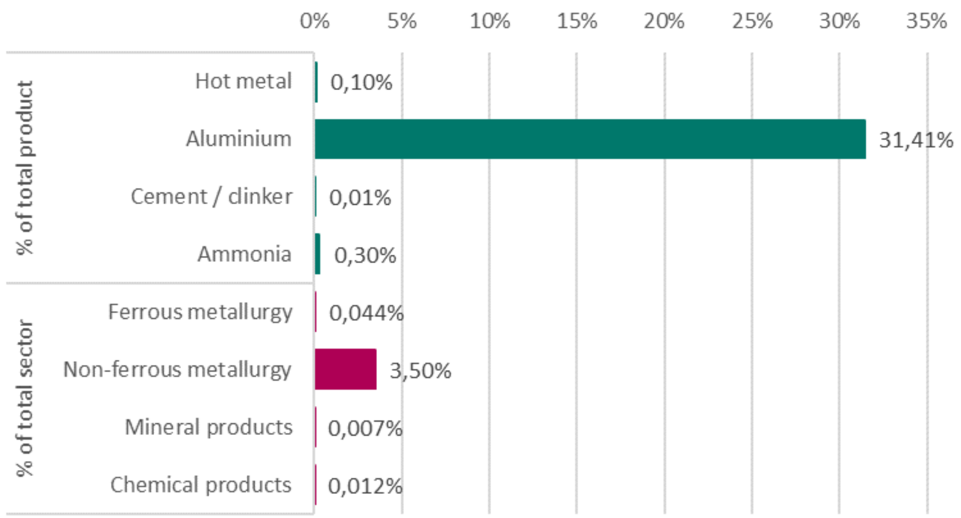
PART II:
Assessment of impacts of the EU CBAM on economic sectors and the economy wide overall macroeconomic development of Kazakhstan

6. EU CBAM product coverage and the related exports from Kazakhstan to the EU

The three EU CBAM proposals published by the EC, the EP and the ECOFIN differ in their product coverage. While the EC proposal is limited to five sectors, the EP proposal went further to include hydrogen, organic chemicals and plastics (and articles thereof) as well. These product groups include more than 100 different products[18], but for organic chemicals just eight product specific benchmarks are established in the EU ETS, while in plastics only two benchmarks are communicated. This limits the applicability of the extended product range of the EP proposal. The ECOFIN proposal also keeps the list of sectors limited to five, but extends the proposed coverage by the EC with few more categories of metallurgical products (ferrous and non-ferrous). The detailed list of products and the respective coverage by three proposals is presented in Annex 1.

Considering the Kazakh production and export figures for the year 2019, the proposed EU CBAM benchmarks would affect exports of aluminium the most, while all other products have shown only marginal export volumes to the EU, see Figure 1.

Figure 1. Exports of CBAM-covered goods to the EU as a share of total product and total sector exports



Note: The data is indicative as the classification of production statistics does not fully correspond to statistics of international trade. Hot metal is the EU-ETS benchmark for pig iron, which is used for iron and steel products here (data used do not include tanks and reservoirs which are expressed in number of items in the production

[18] http://www.wcoomd.org/-/media/wco/public/global/pdf/topics/nomenclature/instruments-and-tools/hs-nomenclature-2017/2017/0629_2017e.pdf?la=en

statistics). Corresponding sectors are: hot metal – ferrous metallurgy; aluminium – non-ferrous metallurgy; cement / clinker – mineral products; ammonia – chemical products.

Source: own calculations based on data for 2019 from UN Comtrade database

The low export volumes of these products from Kazakhstan are not surprising. Cement, fertilizers and ammonia are bulky and heavy goods with a low value per weight ratio. Thus, such products are sensitive to transportation costs. The long distances of more than 2.600 km overland transport from production sites for example in Rudny (Rudnensky Cement) or Aktau (KazAzot) in Kazakhstan to European Union prevent such exports.

For the analysis of sectoral effects, in particular the expected volume of CBAM payments (nominal as well as in relation to various sectoral statistics), we used a tool which has been developed for this purpose and programmed in Microsoft Excel.

Tool for calculation of EU CBAM-allowances

In order to calculate the expected volume of CBAM payments for different sectors of the economy the consultants developed a new tool that allows an interactive impact estimation. The tool covers only two CBAM proposals, the EC and the EP, which were available at the time of its development and the related programming work (February 2022).
The tool provides high flexibility as to product coverage, expected carbon price as well as underlying export and revenue data. The tool and the documentation were offered in addition to this report.

7. Assumptions underlying the assessment of sectoral CBAM allowances

Several assumptions used for the analysis have to be clarified here. Note, for all tradable products, the respective CBAM payments depend on (1) emission intensity of covered production processes, (2) carbon prices and (3) export quantities (physical volumes). To these three deterministic parameters the following assumptions were applied.

(1) **Emission intensities** consist of embedded emissions out of which the free allocations benchmarks in the EU ETS are subtracted. According to the proposals, the following scheme is taking into analysis:

Table 2. The phase-out of free allocations schedule in the EC and EP proposals

CBAM Proposal	Phase-out timeline of free allocations
EC proposal	2026-2035: –10 % annually
EP proposal	2025: 90%, 2026: 70%, 2027: 40%; 2028: 0%

(2) **The carbon price in the EU ETS**, future development of which is uncertain, is analysed according four different price schedules / scenarios

Table 3. Scenarios of carbon price development

Price scenario	Price level	Notes
Constant price	100 USD / t CO_2e	Constant level, corresponds to the average EEX spot price of January and February 2022
Rising price	2023: 93.71 USD / t CO_2e 2035: 204.03 USD / t CO_2e	A linear trend starting from the carbon price corresponding to the 2022 average so far[19] and finishing with 250 USD / t CO_2e in 2040, corresponding to the IEA Net Zero report[20]

(3) For the **expected future exports** of the CBAM products from Kazakhstan, no official projections are available. Therefore, the export volumes and structure were analysed using the trade data for 2019, which was the last stable year before the COVID-19 pandemics and the resulting economic crisis. For the future projections the export volumes were assumed to be constant (although the tool allows for testing other assumptions about exports dynamic by products). One might argue that the default assumption of constant export volumes is too strict. This, however, is justified by the following two considerations: Firstly, the share of exports affected by the EU CBAM in total sectoral exports is very small, and changes to export assumptions will have very limited impacts on the sector as a whole. Secondly, in the macroeconomic model CBAM payments relative to exports are used, a measure that depends on unit value of the respective product and not on the export volume per se (due to specification of the model). Only a massive change in export structure towards or away from trade with the EU could have a significant impact on results, which, based on past trends, is seen as highly improbable.

In the next section we discuss the potential impact of the CBAM on sectors of the Kazakh economy based on the results from the tool. In order to clarify the intuition behind the results for metallurgy, we provide two deep-dive case studies to illustrate in details the reasoning and argumentation of the obtained results.

8. Assessment of EU CBAM payments by sectors of the Kazakh economy

The small volumes of affected exports are also reflected in the volumes of expected CBAM payments. As shown in **Fehler! Verweisquelle konnte nicht gefunden werden.**, payments for CBAM certificates in the aluminium sector can range from 7.3 million USD to almost 40 million USD per year at full CBAM implementation. For the other three goods, however, the payments do not exceed a million USD even at high carbon price levels.[21]

[19] EEX spot prices between January 21 and March 8, 2022. Data before January 21, 2022 were no longer available at the time of analysis.

[20] https://www.iea.org/reports/net-zero-by-2050

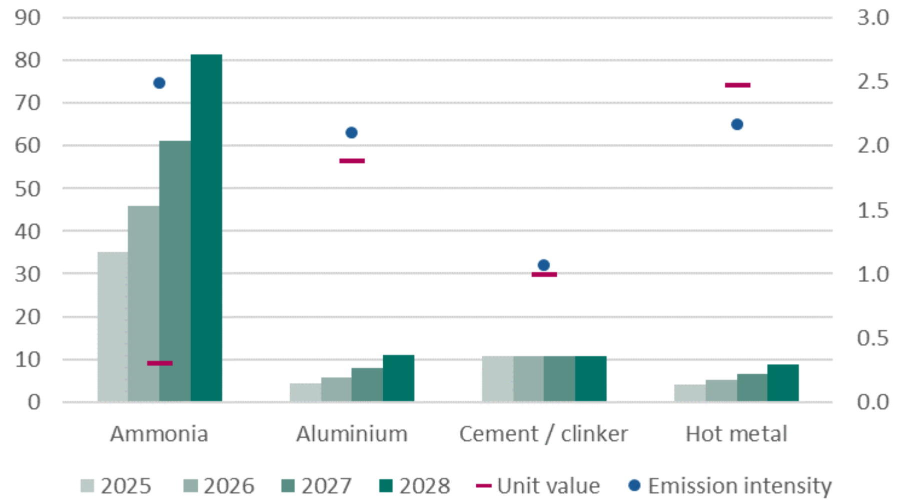
[21] Note that Table 4 only shows the EC version of CBAM but is representative also of the EP proposal. The CBAM payments in 2025 in the EP proposal are almost the same as in 2026 in the EC proposal. A minor difference is due

Table 4. The assessed CBAM payments in the two scenarios, EC proposal, million USD

	Constant price		Rising price	
	2026	**2035**	**2026**	**2035**
Aluminium	7.30	19.23	8.87	39.46
Ammonia	0.11	0.25	0.13	0.52
Cement / clinker	0.000	0.001	0.000	0.002
Hot metal	0.07	0.14	0.08	0.29

The picture looks very differently, however, when the value of the affected traded products is considered. **Fehler! Verweisquelle konnte nicht gefunden werden.** illustrates the scale of expected CBAM payments in relation to the value of exports to the EU for each of the four goods (using the constant price scenario, EP proposal as an example) and compares it to their unit value[22] and emission intensity. By far the largest relative payments occur for ammonia exports (fertilizers). The expected CBAM payments reach the level comparable to the whole export value, when CBAM is fully implemented. The reason is, ammonia is a product with a very low unit value (about 30 US cent per kg) and high emission intensity.

Figure 2. CBAM payments as a share of exports to the EU at constant carbon price scenario, EP proposal
% (left axis), unit value, USD / kg, and emission intensity, t CO_2e / t product (right axis)



Source: own calculations using the CBAM impact estimation tool and statistical data

In contrast, aluminium and iron (hot metal), which have only slightly lower emission intensity, are characterized by significantly higher value. Therefore, carbon price accounts for a much smaller share of the overall product value, which cushions the CBAM effect. As a result, even at full implementation expected CBAM payments will constitute 9-11% of the export value.

to the timeline of free allocation benchmark in 2026. The CBAM payments in 2028 in the EP proposal, which is the first year of full CBAM implementation, are the same as in 2035 in the EC proposal. The only exception is for the rising price scenario, where the increasing carbon price leads to lower CBAM payments in 2028 under the EP proposal, despite full CBAM implementation.

[22] Unit value is calculated as a ratio of export value (in USD) to export volume (in kg).

As a middle case, cement has the lowest emission intensity among the four products, which significantly reduces the CBAM payments. But it is also characterized by rather low unit value, which puts it next to aluminium and iron in terms of relative CBAM payments.

This comparison highlights that exports of higher-value goods have a potential to cushion the negative impacts of CBAM. Such suggestion should be, however, taken with caution due to a potential extension of CBAM.

The proposal of the European Parliament suggests including Scope 2 (indirect) emissions already in the early phase of CBAM. Although it is not yet clear how energy consumption will be benchmarked, the effect of such extension on energy-intensive goods can already be illustrated with an indicative example of aluminium.

According to the Kazakh standards and European estimations, producing a tonne of aluminium requires about 15 MWh of electricity[23]. Based on the European average emission intensity of electricity from fossil fuels,[24] the benchmark Scope 2 intensity of aluminium would be in the range between 8.056 to 10.13 tCO2eq. per t aluminium, which is about four times or higher the direct (Scope 1) emissions. This would drive CBAM payments to some 100 million USD annually at full CBAM implementation, or 58% of the total value of Kazakh exports to the EU. For more details see case study 2 in section 9.

Thus, an important aspect of reducing the effects of an extended CBAM is decarbonizing the energy supply and setting up the monitoring and verification of emissions in the power system as well as production processes.

9. Intuition behind the obtained results: case studies for the metallurgical sectors

Case study 1: EU benchmarks for Kazakh steel producers?

The European steel is among the largest supporters of the introduction of the EU CBAM. Currently European steel industry receives free allocations under the EU ETS on the basis of five product benchmarks: coke, sinter, hot metal, electric arc furnace-EAF carbon steel, EAF high alloy steel (plus the fuel and heat fall back benchmarks for those processes that are not covered by the above product benchmarks).

The update of benchmark values for the years 2021 – 2025 of phase 4 of the EU ETS were published by the EC in October 2021[25]. The benchmarks by product category, the best 10 per cent performers and the EU median for the years 2016/2017 are reported by the EC as well. The figures of the 10 per cent worst performing installations in the EU are own estimated. The benchmarks of relevance for steel are presented in Table 5 below. The table also shows first rough average benchmark estimations for Kazakhstan, which are based on the figures

[23] Kazakhstan: Decree of Ministry of investment and development Nr. 394 from 31.03.2015, https://adilet.zan.kz/rus/docs/V1500011319
EU: European Aluminium, https://www.european-aluminium.eu/media/3241/07-10-2021-european-aluminium-1pager-indirect-emissions-vs-costs.pdf
[24] Estimation based on Eurostat data.
[25] https://ec.europa.eu/clima/system/files/2021-10/policy_ets_allowances_bm_curve_factsheets_en.pdf

reported in the National GHG Inventory of Kazakhstan. Because electric arc furnaces (EAF) are not used in steel production in Kazakhstan, the EAF benchmarks are not of relevance here. Because no figures of GHG released during coke production in Kazakhstan could be obtained so far, no estimate is reported for coke either.

Table 5. The EU benchmarks in the ferrous metallurgy and the corresponding assessed benchmarks in Kazakhstan

EU Benchmark (BM)	EU 2013-2020 BM	EU 2021-2025 BM	EU performers (2016/2017)			CBAM	Kazakhstan	
	t CO2e/ t product	t CO2e/ t product	top 10%	median	worst 10% estimate	coverage	t CO2e/ t product (2019)	total production, 1000 t (2019)
Coke	0,286	0,217	0,144	0,237	0,51	yes	n.a.	2605
Sinter	0,171	0,157	0,163	0,242	0,42	yes	1,627	5551
Hot metal	1,328	1,288	1,331	1,443	2,167	yes	2,237	7339
pig iron	-	-	-	-	-	yes	3,098	3209
steel (BF)	-	-	-	-	-	yes	1,577	4131
EAF carbon steel	0,283	0,215	0,209	0,276	0,626	yes	n.a.	n.a.
EAF high allow steel	0,352	0,268	0,266	0,36	0,586	exempt	n.a.	n.a.

Note: The table has been copied from a German version of the Microsoft-Excel table, where coma is used in decimal numbers to distinguish an integer. The same applies to all tables within this case study.

Probably, the best approximation shown here is the one for sinter. The 10 per cent worst performers in the EU report 0.420 t of CO2 equivalent per tonne of sinter produced, while for Kazakhstan the average reported figure are 1.627 t of CO2e per tonne of sinter. The gap of 387 % is very large.

Because of uncertainties regarding the underlying figures for the hot metal benchmark, the category is for Kazakhstan further differentiated into pig iron and steel produced in blast furnaces (BF). The aggregated benchmark value for Kazakhstan is with 2.237 t CO2e per tonne of product still worse, but not far away, from the potential default value of 2.167 t CO2e per tonne of product. If blast furnace steel alone is considered, the Kazakh average of 1.577 t CO2e per tonne of steel would be worse the EU median for hot metal of 1.443 t CO2e per tonne of product, but better than the default value.

For a quick cross verification of the estimated average GHG emissions levels for ferrous-metallurgical production in Kazakhstan, we analysed the company-level data presented in the ArcelorMittal Sustainability Report for 2019 of the metallurgical plant in Temirtau[26]. The reported GHG emissions of the Steel Division in Temirtau amounted 15.2 Mt CO2[27], what corresponds to an average value of 4.52 t CO2eq. per tonne of crude steel. This would be well above the EU hot metal benchmark. Apparently the total GHG emission volume is reported for the whole production cycle, including coke, sinter, pig iron and steel. If sinter and pig iron are accounted separately, the average GHG emissions stood at 1.62 t CO2 per tonne of product, which puts Arcelor Mittal close to the estimated Kazakh average indicator of GHG emissions.

In short, the sinter process in ferrous metallurgy in Kazakhstan are apparently significantly more energy intensive and have a large gap compared to steel production in the EU, while the other estimated benchmarks would be for steel exports from Kazakhstan to the EU only of minor concern.

[26] https://www.arcelormittal.kz/reports/CR/csr_2019.pdf

[27] See Outcome 6: Responsible energy use that helps create a lower carbon future, key indicators, Steel Division in Sustainability Report 2019.

The total production of hot metal as qualified under the product classification of the EU CBAM amounted in 2019 in Kazakhstan to 7.339.345 tonnes, as showed in Table 6 below.

Table 6. Export destinations of Kazakhstan's ferrous metallurgy in 2019

Kazakhstan (2019)	hot metal total production	ferrous metallurgy total exports	of which exports to:								
			EU27	UK	EFTA	China	USA	Canada	South Korea	CIS	RoW
tonnes	7.339.345	2.870.047	658	40	17	312.573	2.343	7	70.175	2.447.005	37.229
% of total exports		100%	0,02%	0,00%	0,00%	10,89%	0,08%	0,00%	2,45%	85,26%	1,30%

Total ferrous metallurgy exports accounted for 2.875.047 t, of which 11 per cent were sold to China, and 2 per cent to Korea, while the major export destination was the CIS with a share of 85 per cent in total exports. Total ferrous metallurgy exports towards EU reached just 658 t or 0.02 per cent of total exports. When checking the foreign trade statistics of Kazakhstan for the combined nomenclature code as specified in annex 1 of the EU CBAM proposal for iron and steel[28] no exports at all could be identified. Based on the assumptions that past directions and volumes of trade would remain unchanged, the EU CBAM would be of no relevance for Kazakhstan.

However, the past patterns in international steel trade are greatly misleading for 2022 onwards because of tectonic changes on the steel markets. In the past, Russia with a trade volume of 6 billion US dollar in 2020 was the largest exporter of iron and steel products to the EU-27. In 2020 the second largest supplier of iron and steel to EU-27 was Ukraine with a trade volume of 4.8 billion US dollar.

Because of the Russian war against in Ukraine most Western countries implemented financial sanctions against Russia and sanctions against a group of Russian individuals, among them the owners of the large metallurgical companies in Russia. For Western firms no trade is possible with those firms. Furthermore, many Western firms, even those which are not facing sanctions, are redirecting their supply chains away from Russian sources. This will reduce significantly Russian export volumes to EU-27.

There will be little to no exports from Ukraine to the EU-27 for the foreseeable future because of the massive war destruction of the Ukrainian steel industry and the postponement of production during active warfare in the remaining but so far non-affected steel works. After the war and because of massive destruction the domestic demand in Ukraine will most likely absorb the entire volume of domestic production for the upcoming years. Very likely that for a long period Ukraine will turn into a net importing position for ferrous metallurgical products.

Because the supply from both Russia and Ukraine will significantly drop steel prices in EU-27 are expected to increase. At the same time, due to Western economic sanctions and the sharp devaluation of the Russian rouble, in combination with the massive shortage of foreign currency in Russia, it is already clear that Russia will massively dump its produce on markets still open for Russian exports. This is the case in Kazakhstan. Kazakh producers will hardly be able to compete in this situation with Russian producers on the domestic, Chinese and Central Asian markets. However, Kazakh producers are not sanctioned by EU and thus could reorient their exports to EU-27 and other Western customers. But in order to do so Kazakh steel exports will need to deal with the EU CBAM.

[28] This corresponds to SITC codes 72 /except 7202,7204/, 7301, 7302, 7303 00, 7304-7309.

The issue of carbon border adjustment will also gain more prominence for steel exporters from Kazakhstan, when in the near future larger customers of Kazakh iron- and steel exports like Korea, Canada, Japan and the USA would join the EU in creating a carbon club.

Case study 2: Impact of EU CBAM on aluminium exports from Kazakhstan to the EU

The European aluminium industry receives free allocation under the EU ETS on the basis of two product benchmarks: primary aluminium and pre-bake anodes. The benchmark values are presented in Table 7 below.

Table 7. The EU benchmarks in production of aluminium and the corresponding assessed benchmarks in Kazakhstan

EU Benchmark (BM)	EU BM 2013-2020	EU BM 2021-2025	EU performers (2016/2017)			Kazakhstan		
	t CO2e/ t of product	t CO2e/ t of product	top 10%	median	worst 10% estimate	t CO2e/ t product (2019)	total output, 1000 t (2019)	exports to EU, 1000 t (2019)
Aluminium production*	1.66	1.58	1.63	1.78	2.33	7.63	263.07	92.58
Prebaked anodes	0.32	0.31	0.32	0.40	0.51	n.a.	n.a.	n.a.
Primary aluminium	1.51	1.44	1.48	1.60	2.10	n.a.	263.07	92.58

Only one company is producing aluminium in Kazakhstan – the Kazakhstan Aluminium Smelter JSC (KAS) in Pavlodar, which belongs to the top ten of the world's 200 largest aluminium enterprises. The Kazakh benchmark value for aluminium production is calculated using the figures of GHG emissions from aluminium production as stated in the national inventory report of Kazakhstan for the years 2019 and the volume of aluminium production as reported by the firm for the same year. Further, we assume that 450 kg of pre-baked anodes are necessary for producing 1 t of aluminium (see Annex 2: Recent methodological changes in estimating aluminium benchmark).

The estimated benchmark value for Kazakhstan with 7.63 t of CO2 emissions per tonne aluminium produced exceeds by far the 10 per cent worst performers in the EU emitting 2,33 t of CO2 emissions per tonne aluminium produced. This difference is significant, not least because in 2019 about 32 % of aluminium exports from Kazakhstan were shipped to the EU. The monetary value of total aluminium exports in 2019 reached 555 million US dollar, of which the EU accounted for 174 million US dollar. The Kazakhstan Aluminium Smelter JSC reported for 2019 earnings before interests, taxes, depreciation and amortisation (EBITDA) of 248 million US Dollar.

Table 8. Kazakhstan Aluminium Smelter JSC (2019)

total production 1000 t (2019)	exports to EU, 1000 t (2019)	Export value, mn USD (2019)	EU export value, mn USD (2019)	EBITDA, mn USD (2019)
263.07	92.58	555.04	174.34	248.00

Similar to the drastic changes in the steel market, the trade patterns of aluminium of the recent past do not provide much guidance for 2022 onwards. Until recently, Russia was a major supplier of aluminium to the EU-27 and most Russian aluminium exports were exported to Western countries. The impact of sanction will change this, but it is still not clear to what extent.

However, because no sensible forecasts on future exports can be made right now, we will discuss the potential impact of the EU CBAM on Kazakhstan aluminium exports using the 2019 trade figures and keeping them constant over the next years. The assess CBAM-payments were presented above in Table 4.

The EP proposal aspires to include the indirect (Scope 2) emissions, i.e., those from using electricity for the production of CBAM goods. But the approximation of Scope 2 is challenging. While EU benchmarks on emission intensity of electricity exist, information on (actual or default EU) electricity consumption in production processes is not readily available. Therefore, determination of indirect emissions embedded in imported goods is currently an unresolved issue.

The existing rules that allow the states to compensate some indirect carbon costs related to the energy mix as discussed above (see end of section 4.2) do not provide much guidance here, as the rules take into consideration national and in power generation even regional specifics, while Scope 2 emissions of importers of aluminium from Kazakhstan would need to surrender the allowance payments to EU customs when crossing the border of the Common European Market and not at their destination in a certain region or country.

Nevertheless, we try to approximate Scope 2 (i.e. indirect GHG) emissions embedded in the electricity used in production in Kazakhstan based on the following assumptions. Because the technologies of using pre-baked anodes in aluminium production in Kazakhstan and European Union are rather similar, we estimate the electricity use at 15 – 15,15 MWh/ t of aluminium produced. To obtain the emission intensity of production we multiplied the electricity use with the average emission intensity of power generation, t CO2e/MWh.

We estimate the average Scope 2 GHG emissions intensity for aluminium production in Kazakhstan to be in the range between 8,056 to 10,13 tCO2eq. per t aluminium.

KAS JSC is relying for its aluminium production on coal generated electricity produced in a combined heat and power plant (CHP). We estimate that the GHG emission from the CHP plant are equally assigned to power and heat. Thus, for the scope 2 estimate we use only the 50% share of power generation related GHG emissions of 8.341 t CO2e/t Al. We report the figures for the EU average, keeping in mind that no benchmark is set and thus assume, that the full value of scope 2 emissions will quality for EU CBAM allowances. The parameters are presented in Table 9 below.

Table 9. Parameters for scope 2 emissions assessment

	Kazakhstan, average energy mix, lower bound	Kazakhstan, coal-based, lower bound	Kazakhstan, coal-based, 70% heat	EU average	EU fossil-based average
Average emission intensity, t CO2e/t Al	**8.056**	**8.341**	**10.130**	**3.795**	**8.704**
Electricity use, MWh/t Al	15.15	15.15	15.15	15.00	15.00
Energy intensity of the energy mix, t CO2e/MWh	0.532	0.551	0.669	0.253	0.580

Note: in the "lower bound" calculation, heat and power production are treated equally, which overestimates emissions from heat production (esp. in CHPs) and underestimates emissions from electricity production. In the "70% heat" version, only 70% of heat output are included, to proxy for heat as a "by-product" in CHPs

The estimated results (see table below) show, that in any case, the EC proposal has much smaller implications compared to the EP proposal. This holds for scope 1 emissions, and get more aggravated if Scope 2 emissions like in the EP proposal are considered.

In the EU ETS constant price scenario the CBAM proposals start with an allowance payment of 8.47 million USD in the first year or 3.4 % of the EBITDA of 2019 for Scope 1 (see Table 10 below). Furthermore, in the EP setting the additional payment is due for Scope 2 emissions of 37.763 million USD amounting to a total EU emission allowance of 41.848 million USD. This figure corresponds to 24 % of the EU export value and 16.9 % of the EBITDA reported in 2019.

The results clearly indicate, that if scope 2 emissions are covered under the EU CBAM as well, the allowance payments quickly become prohibitively high. It seems to be clear, that if scope 2 would be included in the EU CBAM, the export of aluminium from Kazakhstan given the present energy mix would not be generating much revenues.

However, as indicated above, no methodology and benchmarks of the future Scope 2 assessments are known yet. Furthermore, we expect, that the Scope 2 emissions will be covered at a later point after the start of the EU CBAM, because to the mentioned above difficulties (section 4.2.)

If the EC proposal will prevail, the continuation of exports to EU might remain feasible. However, the different scenarios indicate already, that a plenty of uncertainties exist, not least with regard to the future variation of the carbon price.

One possible policy response in Kazakhstan to this would be to increase the price for Kazakh GHG emissions in order to keep more of the payments inside the country instead of making transfer payments from Kazakhstan to the EU budget. The such generated funds could be used in Kazakhstan for decarbonisation projects, especially in the power mix in in Kazakhstan. Last but not least, the Kazakhstan Aluminium Smelter (KAS) JSC could reduce the risk of Scope 2 related payments by investing or purchasing more electricity from renewable energy sources.

Table 10. CBAM payments: constant price scenario, European Parliament proposal

	2025	2026	2027	2028	Cumulated transfers 2025-2035
Scope 1 emissions					
million USD	8,473	11,447	15,908	21,857	**210,681**
% of EU export value	5%	7%	9%	13%	-
% of total export value	2%	2%	3%	4%	-
% of 2019 EBITDA	3,4%	4,6%	6,4%	8,8%	-
Scope 2 emissions					
million USD	81,746	81,746	81,746	81,746	**899,202**
% of EU export value	47%	47%	47%	47%	-
% of total export value	15%	15%	15%	15%	-
% of 2019 EBITDA	33,0%	33,0%	33,0%	33,0%	-
Total (Scope 1 + Scope 2) emissions					
million USD	90,219	93,193	97,654	103,602	**1109,884**
% of EU export value	52%	53%	56%	59%	-
% of total export value	16%	17%	18%	19%	-
% of 2019 EBITDA	36,4%	37,6%	39,4%	41,8%	-

10. The macroeconomic impact of the EU CBAM in Kazakhstan

Taking into account sectoral assessment of the current proposals on the EU CBAM, one cannot intuitively expect a significant macroeconomic impact of the future regulation. Nonetheless, to prove the initial intuition, we have integrated the results of the sectoral tool into the latest version of the computable general equilibrium (CGE) model of Kazakhstan, which has been employed for analysing the decarbonisation pathways for the low-emission development strategy (LEDS) of Kazakhstan, currently discussed as the Doctrine of carbon neutrality by 2060.

10.1. Assumption of the macroeconomic model

CGE-KAZ is based on actual economic data of Kazakhstan and describes the macroeconomic development of Kazakhstan, embracing the entire economy and explicitly accounting for interactions between different sectors of production as well as economic agents such as households and the government. The modelling time horizon in this study is limited to 2035, which covers the transition phase of CBAM under both proposals.

The baseline macroeconomic development is calibrated to the most recent forecast on economic growth of the Ministry of National Economy of the Republic of Kazakhstan.

Because the CGE-KAZ was not developed for modelling international trade, the CGE-KAZ model in its present version distinguishes only between Kazakhstan (domestic economy) and “rest of the world” (external sector). Thus, the model in the present setting cannot trace trade diversion from the EU to other countries in case of EU CBAM introduction. Instead, the focus will be on the “gross” effect of reducing overall export attractivity. This approach, however, reduces the level of precision of the modelling outcome, which should therefore be treated with a caution.

Furthermore, CGE-KAZ is based on official national account and input-output data and thus operates with more aggregated sectors than the specific goods covered by CBAM, i.e. aluminium is not assessed separately but as part of the non-ferrous metallurgy sector.

As discussed above, we assume again no changes of future export structures with the share of the Kazakh exports to the EU both in terms of volume and value at constant 2019 levels (i.e. international prices are kept constant). Because of lacking benchmarks and economy wide information on scope 2 emissions we limit our analysis to scope 1 emissions only.

We assume also that the shares of EU CBAM-affected goods in total (CGE-) sector’s exports remain constant at 2019 levels, because economic structures within well-established sectors like metallurgy and mineral production tend to be more rigid and that existing growth projections for these sectors in Kazakhstan do not imply much room for a significant structural shift in the short term.

The overall approach, in integration with the EU CBAM impact estimation tool, is as follows:

1. For the EC and EP proposals of EU CBAM and different price scenarios, the allowance payments as a share of total exports of that product are calculated using the CBAM impact estimation tool.
2. The share of affected product in total exports of the respective CGE sector is calculated and the EU CBAM effect is applied to the sectoral export prices to the proportion of affected goods.
3. In CGE-KAZ, the new export prices are used to measure the impacts of different EU CBAM constellations.

Further, we show the assessed results in terms of projected GDP changes relative to the assumed baseline developments.

10.2. Macroeconomic impact measured in terms of losses to cumulative GDP

As expected, due to the low shares of exports of the EU CBAM-covered products (see also section 6 above) as well as mostly low shares of these products in the respective more aggregated CGE sectors, the overall macroeconomic impact will be apparently rather limited.

Compared with the baseline scenario of no EU CBAM, the loss of cumulative GDP by 2035 is in the range of 0,029% in the low price, EC proposal scenario and up to a maximum of 0,065% in the high price, EP proposal scenario. This corresponds to a cumulative GDP loss of 428 million USD to almost 1058 million USD over the period 2025-2035 (constant USD, no inflation accounted).

Table 11. GDP losses due to the EU CBAM regulation relative to the baseline, in 2025-2035

	Constant carbon prices		Rising carbon prices	
	EC proposal	EP proposal	EC proposal	EP proposal
Year	Cumulative GDP loss, %			
2025	0.000%	-0.001%	0.000%	-0.001%
2026	-0.001%	-0.004%	-0.001%	-0.004%
2030	-0.012%	-0.022%	-0.018%	-0.032%
2035	-0.029%	-0.036%	-0.053%	-0.065%
	Cumulative GDP loss, million (constant 2017 USD)			
2025-2035	428	663	719	1058

Source: Own calculations using the CGE-KAZ model

10.3. Sectoral output impacts

As shown from the export data analysis and CBAM-tool outcome, the CBAM effects vary strongly by sector. In non-ferrous metallurgy the impact is the highest, driven by the combination of strong effects on aluminium and non-negligible share of aluminium in total exports. The sector is projected to loose some of its annual growth, especially in the first years in case of the EP proposal (up to 0.1 %). The output level can be by up to 0.4% lower in 2035, compared to the baseline scenario with no CBAM (Table 12). This corresponds to up to 636 million USD over the period 2025-2035.

Table 12.Cumulative output loss in non-ferrous metallurgy by CBAM scenario, relative to the baseline, in 2025-2035

	Constant carbon prices		Rising carbon prices	
	EC proposal	EP proposal	EC proposal	EP proposal
Year	Cumulative GDP loss, %			
2025	0.000%	-0.085%	0.000%	-0.096%
2026	-0.082%	-0.110%	-0.099%	-0.134%
2030	-0.133%	-0.200%	-0.211%	-0.319%
2035	-0.201%	-0.195%	-0.414%	-0.406%
	Cumulative GDP loss, million (constant 2017 USD)			
2025-2035	281	381	488	636

Source: Own calculations using the CGE-KAZ model

This effect is also reflected up and down the value chain of non-ferrous metallurgy. Upstream, the output in mining of non-ferrous metals (a separate sector from non-ferrous metallurgy in the CGE-KAZ model) can decline by 0.22% in 2035, relative to the baseline. Downstream, the effects are mostly smaller, though the reason for this might be the relatively low use of non-ferrous metals in domestic production. For example, about 90% of aluminium is exported, with only a minor share remaining in the domestic market[29]. Domestically, non-ferrous metals are used actively in very few sectors, e.g., in construction or production of machinery. In the construction sector, the pass-through is indeed almost as high as in the upstream sector of mining. The output can decline by 0.18% in 2035, relative to the baseline. In the machinery sector, on the contrary, a decline of output by 0.05% in 2035, relative to the baseline, can be observed, which is only a minor change.

Unlike non-ferrous metallurgy, the other three sectors – ferrous metallurgy, chemical industry and mineral products – show no systematic reduction in growth and do not allow to provide any statistically robust conclusions. Interesting is that the obtained model results show that, as aluminium-related industries become less attractive, resources flow into the expansion of other sectors. Ferrous metallurgy and chemical production depend very little on the value chain of non-ferrous metallurgy. But being also export-oriented sectors barely affected by the EU CBAM, they might attract expand subsequently due to future capital investment which was prior directed towards aluminium. Therefore, due to the assumption of zero profits and full use of resources (which are classical to the CGE models setting), ferrous metallurgy and chemical industry grow in some years even stronger in the CBAM scenarios than under the baseline developments, though not consistently. Cumulatively, ferrous metallurgy reaches up to 0.1% higher output level by 2035, compared to baseline, chemical industry – up to 0.2%. Thus, the indirect positive effects of resource allocation overweight the negative effects of the EU CBAM. This result is based on the currently proposed product coverage of EU CBAM and the omission to cover scope 2. But, the results, though interesting, are not statistically significant and should be considered with caution.

11. Outlook

The EU CBAM is being advanced to eventually replace current carbon leakage safeguards used by the EU. The EU CBAM is a complex and difficult undertaking with inevitable trade-offs between its potential environmental and economic benefits as well as its technical, legal and political viability. Nevertheless, in the context of uneven global climate ambition and considering the declining amount of free allowances within the EU ETS the proposed EU CBAM appears to be the best tool for addressing the risk of leakage.

However, the designs of the EU CBAM as proposed by the European Commission, the European Parliament and the ECONFIN have several shortcomings, crucial gaps and will not achieve the intended results in full. The EC and ECOFIN proposals coverage of direct (scope 1) emissions for 29 primary materials (‘simple’ goods) and semi-manufactured goods is too narrow. As the EP proposal shows it, the broadening the EU CBAM coverage is technically and administratively demanding. Including the indirect emissions (Scope 2) will trigger another set of critical issues and is not easy to implement on the side of the EU.

Compared to the initial EC proposal, the ECOFIN opted for a new central EU level registry of CBAM declarants (importers) and a minimum threshold which exempts from the EU CBAM obligations consignments with a value of less than €150. However, the last proposal needs additional clarifications in particular the phase-out of the free allowances allocated to industry sectors covered by the EU CBAM.

[29] https://www.kt.kz/rus/economy/kazahstan_nuzhdaetsya_v_alyuminii_vysokogo_peredela_1377910136.html

In its proposal, the ECOFIN noted the importance of greater international cooperation with third countries, including through the establishment, in parallel to the EU CBAM, of a climate club where carbon pricing policies can be discussed and encouraged.

Negotiations between of EC and ECOFIN with the European Parliament are expected to start soon. Nevertheless, the start of the EU CBAM is still set for 1 January 2023.

It is already clear that the EU CBAM will need to be more specific, adjusted and further developed in the future. In order to increase the impact of the EU CBAM, the European Commission will have to undertake additional and complementary measures. Most likely, the currently proposed designs of the EU CBAM, if not the entire measure, will be of a temporary short- to mid-term nature, but it may help to establish a climate club of more climate ambitious countries, adjust and find more efficient (alternative) solutions.

Producers outside the EU will develop plenty of strategies to avoid the impact of the CBAM adjustment payments.

The analysis based on the recent trade directions and past volumes will not provide much guidance for the near future, as the war of Russia against Ukraine will impact strongly international commodity markets. At present, it is not clear to what extent and into which directions international trade will change its course.

The case study for steel production in Kazakhstan showed, that the production in Kazakhstan is quite behind the proposed European benchmark default values. The recourse the default values will be not a so bad deal for Kazakhstan and the EU CBAM as such will apparently not trigger additional GHG abatement of Kazakhstan.

The case study for aluminium and the expected changes in commodity trade may provide Kazakhstan with new EU export opportunities. Again, the default benchmarks are fair enough to continue trading without much adjustment in production. This will certainly change, if the EU would include Scope 2 emissions and find smart ways to address the weaknesses of the measure.

Despite the expected little significance of the EU CBAM, the issue of addressing the climate change remains on the priority agenda of Kazakhstan. The necessary transformation of the Kazakh economy towards net zero carbon emissions until 2060, as declared by the President of Kazakhstan and as proposed in the respective national doctrine, will make much stronger impact on lowering national GHG emissions than the EU CBAM alone or any other non-domestic measures, which Kazakh producers may encounter in the nearest future.

Annex 1: List of goods and GHG covered by the EU CBAM

Product group	EU combined nomenclature (CN) codes		GHG	EC proposal	EP proposal	ECOFIN proposal
Mineral products		Cement				
	2523 10 00	Cement clinkers	CO2	yes	yes	yes
	2523 21 00	White Portland cement, whether or not artificially coloured	CO2	yes	yes	yes
	2523 29 00	Other Portland cement	CO2	yes	yes	yes
	2523 90 00	Other hydraulic cements	CO2	yes	yes	yes
Power		Electricity				
	2716 00 00	Electrical energy	CO2	yes	yes	yes
Chemical products		Fertilisers				
	2808 00 00	Nitric acid; sulphonitric acids	CO2, N2O	yes	yes	yes
	2814	Ammonia, anhydrous or in aqueous solution	CO2	yes	yes	yes
	2834 21 00	Nitrates of potassium	CO2, N2O	yes	yes	yes
	3102	Mineral or chemical fertilisers, nitrogenous	CO2, N2O	yes	yes	yes
	3105	Mineral or chemical fertilisers containing two or three of the fertilising elements nitrogen, phosphorus and potassium; other fertilisers; goods of this chapter in tablets or similar forms or in packages of a gross weight not exceeding 10 kg	CO2, N2O	yes	yes	yes
Except	*3105 60 00*	*Mineral or chemical fertilisers containing the two fertilising elements phosphorus and potassium*		yes	yes	yes
		Chemicals				
	29	Organic chemicals	CO2	no	yes	no
	2804 10 00	Hydrogen	CO2	no	yes	no
		Polymers				
	39	Plastics and articles thereof	CO2, N2O	no	yes	no
Ferrous metallurgy		Iron and Steel				
	72	Iron and steel	CO2	yes	yes	yes
Except	*7202*	*Ferro-alloys*		yes	yes	yes
Except	*7204*	*Ferrous waste and scrap; remelting scrap ingots and steel*		yes	yes	yes
	7301	Sheet piling of iron or steel, whether or not drilled, punched or made from assembled elements; welded angles, shapes and sections, of iron or steel	CO2	yes	yes	yes
	7302	Railway or tramway track construction material of iron or steel, the following: rails, check-rails and rack rails, switch blades, crossing frogs, point rods and other crossing pieces, sleepers (cross-ties), fish- plates, chairs, chair wedges, sole plates (base plates), rail clips, bedplates, ties and other material specialised for jointing or fixing rails	CO2	yes	yes	yes
	7303 00	Tubes, pipes and hollow profiles, of cast iron	CO2	yes	yes	yes
	7304	Tubes, pipes and hollow profiles, seamless, of iron (other than cast iron) or steel	CO2	yes	yes	yes
	7305	Other tubes and pipes (for example, welded, riveted or similarly closed), having circular cross-sections, the external diameter of which exceeds 406,4 mm, of iron or steel	CO2	yes	yes	yes
	7306	Other tubes, pipes and hollow profiles (for example, open seam or welded, riveted or similarly closed), of iron or steel	CO2	yes	yes	yes
	7307	Tube or pipe fittings (for example, couplings, elbows, sleeves), of iron or steel	CO2	yes	yes	yes
	7308	Structures (excluding prefabricated buildings of heading 9406) and parts of structures (for example, bridges and bridge-sections, lock[1]gates, towers, lattice masts, roofs, roofing frameworks, doors and windows and their frames and thresholds for doors, shutters, balustrades, pillars and columns), of iron or steel; plates, rods, angles, shapes, sections, tubes and the like, prepared for use in structures, of iron or steel	CO2	yes	yes	yes
	7309	Reservoirs, tanks, vats and similar containers for any material (other than compressed or liquefied gas), of iron or steel, of a capacity exceeding 300 l, whether or not lined or heat-insulated, but not fitted with mechanical or thermal equipment	CO2	yes	yes	yes
	7310	Tanks, casks, drums, cans, boxes and similar containers, for any material (other than compressed or liquefied gas), of iron or steel	CO2	yes	yes	yes
	7311	Containers for compressed or liquefied gas, of iron or steel	CO2	yes	yes	yes
	7326	Other articles of iron or steel	CO2	no	no	yes
Non-ferrous metallurgy		Aluminium				
	7601	Unwrought aluminium	CO2, PFCs	yes	yes	yes
	7603	Aluminium powders and flakes	CO2, PFCs	yes	yes	yes
	7604	Aluminium bars, rods and profiles	CO2, PFCs	yes	yes	yes
	7605	Aluminium wire	CO2, PFCs	yes	yes	yes
	7606	Aluminium plates, sheets and strip, of a thickness exceeding 0,2 mm	CO2, PFCs	yes	yes	yes
	7607	Aluminium foil (whether or not printed or backed with paper, paper-board, plastics or similar backing materials) of a thickness (excluding any backing) not exceeding 0,2 mm	CO2, PFCs	yes	yes	yes
	7608	Aluminium tubes and pipes	CO2, PFCs	yes	yes	yes
	7609 00 00	Aluminium tube or pipe fittings (for example, couplings, elbows, sleeves)	CO2, PFCs	yes	yes	yes
	7610	Aluminium structures (excluding prefabricated buildings of heading 9406) and parts of structures (bridges and bridge-sections, towers, lattice masts, roofs, roofing frameworks, doors and windows, their frames and thresholds for doors, balustrades, pillars and columns); aluminium plates, rods, profiles, tubes and the like, made for use in structures	CO2, PFCs	no	no	yes
	7611 00 00	Aluminium reservoirs, tanks, vats and similar containers, for any material (other than compressed or liquefied gas), of a capacity exceeding 300 litres, whether or not lined or heat-insulated, but not fitted with mechanical or thermal equipment	CO2, PFCs	no	no	yes
	7612	Aluminium casks, drums, cans, boxes and similar containers (including rigid or collapsible tubular containers), for any material (other than compressed or liquefied gas), of a capacity not exceeding 300 litres, whether or not lined or heat insulated, but not fitted with mechanical or thermal equipment	CO2, PFCs	no	no	yes
	7613 00 00	Aluminium containers for compressed or liquefied gas	CO2, PFCs	no	no	yes
	7614	Stranded wire, cables, plaited bands and the like, of aluminium, not electrically insulated	CO2, PFCs	no	no	yes
	7616	Other articles of aluminium	CO2, PFCs	no	no	yes

Annex 2: Recent methodological change in estimating the benchmark for aluminium production in Kazakhstan

The actual emission intensity of aluminium production in Kazakhstan is significantly higher than the benchmarks set for the Kazakhstan National ETS:

	Estimated benchmark based on National inventory report	**National ETS benchmarks**
Total with PCFs, t CO_2-eq / t aluminium	7.628	n.a.
Carbon dioxide only, t CO_2 / t aluminium	5.118	1.671
Aluminium production, t CO_2 / t aluminium	*1.861*	*1.492*
Pre-bake anodes, t CO_2 / t anodes	*7.238*	*0.397*

The estimated benchmarks for aluminium production and pre-baked anodes are both based on the assumption, that 450 kg anodes are necessary for producing 1 t of aluminium.

The major difference between the estimated benchmark and the ETS is related to the emission levels associated with pre-bake anodes.

The national ETS benchmarks were derived from the reporting of ETS-covered installations for 2013-2015. The data in the National Inventory Report (NIR), on the contrary, are collected every year and are technically more recent and precise. The NIRs are submitted to UNFCCC and are subject to external review by international experts on every submission.

According to information obtained from Zhasyl Damu JSC, responsible for the NIRs in Kazakhstan, the 2020 review revealed that emissions from volatile resin substances and kiln load firing for pre-bake anodes were missing in the calculation and so most recent a significant methodological change was necessary in estimating CO2 emissions from aluminium production in the NIR. Subsequently, the whole time series for 1990-2019 was recalculated, resulting in significantly higher emission levels than previously reported.

For comparison, the original NIR for 2014 (submitted in 2016) declared emissions corresponding to 1.841 t CO2 / t aluminium, while the most recent 2021 submission of Common Reporting Format (CRF) table (structured data tables corresponding to NIR and in each year's submission including data from 1990 onwards) reports the emission factor of 5.109 t CO2 / t aluminium for 2014, closely corresponding to the 2019 data.

Note that pre-defined benchmarks, like the ones for the Kazakhstan National ETS, are irrelevant for EU CBAM. The CBAM payment will be based on EU default values, unless reliable and verifiable data exist on actual emissions. Therefore, in the context of the CBAM discussion, relying on the NIR / CRF data appears as a more suitable approach.