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The EU's Carbon Border Adjustment Mechanism (CBAM): Potential Impact on Kazakhstan's Economy

Analysis and Recommendations

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Content

Executive Summary

In 2023, the European Union (EU) introduced the Carbon Border Adjustment Mechanism (CBAM) to level the playing field between European producers subject to increasing carbon pricing under the Emissions Trading System (ETS) and exporters of certain emission-intensive products from outside the EU. Starting in 2026, the regular phase of CBAM will require European importers of cement, fertilizers, steel products and aluminium as well as electricity and hydrogen to pay a levy based on the emissions embedded in their products. This will bring changes to the EU market: countries and companies exporting low-carbon products will gain a competitive advantage compared to those who export carbon-intensive products. To minimize CBAM costs and avoid losing competitiveness, EU trade partners have two options: introduce a national carbon price that will be deducted from the CBAM levy or decarbonize the production of CBAM-affected products.

The EU is the main trading partner of Kazakhstan. While the country's exports to the EU are dominated by mineral products (mostly fossil fuels), it also exports items that fall under CBAM. This analysis evaluates the potential impact of CBAM on the Kazakh economy, including affected sectors and enterprises, based on export volumes and estimates of emission intensities. It also calculates potential CBAM costs for the affected sectors and compares Kazakhstan's emission intensity with that of other top exporters to the EU in order to assess potential changes in competitiveness and to examine the readiness of Kazakh enterprises and government policies for CBAM. Finally, the analysis offers recommendations for better preparation for the regular phase of CBAM.

The findings suggest that three sectors in Kazakhstan will be significantly affected by CBAM: aluminium, steel and iron, and fertilisers. Fertiliser exports face the highest impact due to their high emissions intensity and strong EU market dependency (around 10% of CBAM-related exports). Steel and ferrochrome exporters, with lower EU market exposure (3% of CBAM-related exports), are likely to be less affected but will face challenges in expanding their market share due to carbon-intensive production. Aluminium exporters, selling more than 40% of their CBAM-affected products to the EU, may maintain short-term competitiveness due to relatively low direct emissions (Scope 1), but their position could weaken if indirect emissions (Scope 2) are included in CBAM in the future.

Kazakh enterprises recognize the challenge. All companies in this analysis monitor emissions for at least their key products and continuously extend its scope. However, only few have developed decarbonization strategies or planned significant changes to key production processes except for limited energy efficiency measures.

Several measures can enhance CBAM readiness of the affected Kazakh enterprises: Companies should align existing monitoring, reporting, and verification (MRV) practices with international and EU standards. They should develop enterprise-specific decarbonization strategies encompassing both immediate energy efficiency measures and long-term plans to decarbonize production processes. Steel, ferrochrome, and aluminium producers can increase metal recycling as a quick, cost-effective way to reduce emissions. The fertiliser industry could consider upgrading waste gas treatment from nitric acid production to meet international standards. International knowledge exchange and cooperation will help with implementing those measures.

The Kazakh government has established a foundation for its climate policy, joining international climate agreements, adopting a 2060 carbon neutrality strategy, and introducing a national ETS (KAZ ETS). To further support exporters, it could reform the KAZ ETS to set an effective carbon price for products affected by CBAM. Unlike the CBAM levy, the revenue from the KAZ ETS would stay within the country and could be reinvested in decarbonization projects. The roadmaps within the national carbon neutrality strategy that are currently under development should outline clear pathways for the sectors covered by CBAM, while targeted incentives, such as grants and other financing tools for renewable energy and decarbonization efforts, could drive industrial decarbonization. Strengthening the policy framework for renewable energy expansion and developing a coal phase-down strategy will be the foundation for meeting Kazakhstan's climate goals and maintaining international competitiveness.

Introduction

In 2023, the European Union (EU) introduced the Carbon Border Adjustment Mechanism (CBAM) which will complement the EU Emissions Trading System (EU ETS) by imposing a carbon price on several emission-intensive products imported to the EU. This aims to create a level playing field for European products that are subject to carbon pricing within the EU ETS and products exported from countries with no carbon pricing. With the beginning of the CBAM regular phase in 2026, exporters from non-EU countries will be confronted with a new reality on the EU market which may lead to gains or losses in competitiveness, depending on the carbon footprint of their products.

This analysis investigates the expected impact of CBAM on Kazakhstan. The EU is Kazakhstan's biggest overall trading partner, as the destination for 37% of total Kazakh exports in 2023, representing 28% of its total trade. While the current Kazakh exports to the EU are dominated by mineral products (mostly oil and gas), the country also exports several products covered by CBAM. In order for affected exporters and the Kazakh government to be able to better prepare for the beginning of the regular CBAM phase, it is important to better understand how CBAM functions, analyse to what extent Kazakh exports will be affected, and assess the implications for the respective enterprises, sectors and the overall economy. This analysis addresses these questions and formulates recommendations to increase CBAM readiness.

Chapter 1 explains the rationale behind CBAM as well as its interconnection with the EU ETS. It presents products, emission scopes, and GHG gases covered by the regulation and outlines the timeline for its introduction. Since some important parameters of the CBAM regulation are yet to be specified (e.g. in complementary delegated acts), Chapter 1 touches upon possible future adjustments. **Chapter 2** analyses potential CBAM impacts on the Kazakh economy. Based on export statistics and data on emission intensities of CBAM products, it identifies which sectors and enterprises will be affected and estimates the impact of CBAM on their future competitiveness on the EU market. It also provides some rough assessments of possible macroeconomic effects of CBAM. **Chapter 3** analyses the current readiness of the affected enterprises for CBAM, which is closely linked to their decarbonisation efforts. It also formulates some recommendations for the Kazakh exporters and government to prepare for CBAM.

1 What is CBAM and how does it work

The EU Carbon Border Adjustment Mechanism (CBAM) is designed to create a level playing field for European producers obligated to buy emission allowances under the EU Emissions Trading System (ETS) and their non-European competitors. It will replace free allocation[1] as the primary instrument for carbon leakage protection. By putting an equal price on the greenhouse gases (GHG) embedded in carbon intensive goods entering the EU, it is meant to push EU industry to decarbonisation whilst avoiding carbon leakage. It is also meant to incentivise emission reductions by third-country exporters and, thereby, contribute to a reduction of global carbon emissions in line with the Paris Agreement.

CBAM currently covers a limited number of products, emissions and scopes (Table 1). The list can be expanded to cover additional products. For this purpose, it will be subject to a review prior to the start of the regular phase of CBAM in 2026. The review will include a timetable setting out a possible inclusion of further products by 2030.

Table 1 Products, emissions and scopes covered by the EU CBAM

Products[2]	Greenhouse gases	Emissions covered[3]
Cement, incl. various types of it and cement clinkers	CO_2	Direct and indirect
Electricity	CO_2	Direct and indirect
Nitrogen-based fertilisers	CO_2 and N_2O	Direct and indirect
Iron and steel, incl. alloys and some final products like railway infrastructure, pipes, building structures, containers, screws and bolts	CO_2	Direct
Aluminium, incl. some final products like plates and sheets, pipes, building structures, containers, wires and cables	CO_2 and perfluorocarbons (PFC)	Direct
Hydrogen	CO_2	Direct

Source: European Parliament and Council of the European Union. (2023). Regulation (EU) 2023/956 of the European Parliament and of the Council of 10 May 2023 establishing a carbon border adjustment mechanism

The EU CBAM Regulation[4] came into force in May 2023, initiating a two-year transition phase that started on October 1st, 2023. During this period, which at the time that this report was published was still ongoing, EU importers of the relevant raw materials and goods from third countries must submit quarterly reports detailing the emissions associated with these products. Correspondingly, non-European exporters must provide information on their emissions to their EU trade partners. No financial obligations arise during the transition phase.

From the beginning of the regular phase on January 1st, 2026, European importers of CBAM goods must be authorised as CBAM declarants to submit quarterly CBAM reports (statistics on imported goods and embedded emissions, carbon price in the exporting country) as well as to acquire and surrender CBAM certificates for the embedded emissions. The price of certificates will be calculated depending on the average auction price of EU ETS allowances of the previous week. CBAM will

[1] The EU ETS obliges installations and operators covered under the scope of this system to buy an allowance for each tonne of CO_2eq emitted. While allowances are predominantly sold in auctions, companies receive some allowances for free. Free allocation is mostly available to companies in the manufacturing industry that are at risk of carbon leakage, i.e. can be forced to move their production to non-EU-countries with no carbon pricing and, thus, lower production costs.
[2] For Combined Nomenclature codes of the products under CBAM see Annex I of the CBAM regulation (Regulation (EU) 2023/956)
[3] Direct emissions are emissions resulting from the production process within the system boundaries referred to in the implementing act adopted pursuant to Article 7(7) of the CBAM Regulation (Scope 1); indirect emissions are emissions resulting from the production of electricity consumed in the production processes of goods within the system boundaries (Scope 2).
[4] European Parliament and Council of the European Union. (2023). *Regulation (EU) 2023/956 of the European Parliament and of the Council of 10 May 2023 establishing a carbon border adjustment mechanism.*

be phased in gradually in an inverse proportion to the phase-out of EU ETS free allowances.[5] As a result, it will be fully implemented by 2034. CBAM puts a price on carbon emissions but does not apply any decreasing cap on them. As CBAM is not a market, carbon certificates are neither tradeable nor bankable and they are cancelled as soon as they are surrendered for compliance.

While the future obligation to buy CBAM allowances and the corresponding financial burden concerns EU importers (third-country exporters are only obliged to provide their European trade partners with necessary information on embedded emissions), CBAM can have a significant influence on the competitiveness of non-EU-exporters on the EU market. Low-carbon products that will be less affected by the CBAM levy (or not affected at all) will gain a competitive advantage while producers of carbon-intensive products will be faced with a choice between reducing or redirecting EU exports or lowering their carbon intensity.

CBAM applies to all countries outside the EU ETS[6], including Kazakhstan. According to the CBAM regulation, there are two ways for EU trading partners to (partially) avoid it:

- Article 2 (6): If a trading partner has implemented a domestic carbon price in the relevant sectors, this price will be deducted from the CBAM levy. In order to completely avoid CBAM, such a carbon pricing system would need to be established by 2025, and the carbon price should correspond to the current price of EU ETS allowances.
- Article 2 (7): If a country's electricity market is integrated with the EU's and fulfils a set of additional criteria, such as a carbon price on electricity, this country will be exempt from the CBAM levy on electricity. Due to the geographic distance and subsequent absence of electricity exports, this option is not relevant for Kazakhstan.

Another option that is not mentioned in the CBAM regulation, but which is implied and indirectly encouraged by it, is the decarbonisation of electricity generation and industrial production. Decarbonisation would allow to decrease the actual embedded emissions, which would result in a lower CBAM levy and a better market position.

In February 2025, the European Commission adopted a new package of proposals (so-called "Omnibus package") to simplify some of the existing requirements for European businesses, including CBAM.[7] One of the key proposals is to exempt enterprises importing less than 50 tonnes of CBAM goods per year from any obligations under the regulation. The aim is to reduce administrative burden for small importers who, according to the European Commission, account for only around 1% of embedded emissions in the imported CBAM goods. In order to ensure the effectiveness of CBAM, the Commission proposed to complement the exemption with high penalties for non-compliance (e.g. artificially splitting imports). Furthermore, the threshold can be adjusted as a result of regular review. While Kazakhstan exports several dozens of CBAM products, only few of them register with export volumes below the threshold of 50 tonnes.

Another important proposal of the European Commission is to postpone the start of purchasing CBAM allowances to February 2027 and of surrendering them to August 31st of each year starting from 2027. While the proposal does not exempt European importers from purchasing and surrendering CBAM allowances for 2026 (this will have to happen in 2027), it would give them more time to adjust. All in all, the adoption of this proposal would not mean that the beginning of the regular CBAM phase is postponed. It will also not significantly affect third-country exporters. They will still be obliged to submit the data on emission factors and still be faced with changes in competitiveness on the EU market.

The abovementioned and other proposals less relevant for this report are going to be discussed and, in case of consensus, adopted by the EU Parliament and Council by the end of 2025. For this reason, they are out of scope of this analysis.

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[5] The reduction rate for free allowances, according to the EU ETS, is as follows: 2026: 2.5 %; 2027: 5 %; 2028: 10 %; 2029: 22.5 %; 2030: 48.5 %; 2031: 61 %; 2032: 73.5 %; 2033: 86 %; and 2034: 100 %.

[6] In addition to the EU member states, Iceland, Norway, Liechtenstein and Switzerland are exempted from CBAM as they have either adopted the EU ETS or linked their own ETS to it.

[7] European Commission. (2025). *Proposal for a Regulation of the European Parliament and of the Council amending Regulation (EU) 2023/956 as regards simplifying and strengthening the carbon border adjustment mechanism.*

2 Analysis of CBAM's impact on Kazakhstan

This chapter analyses a potential impact of CBAM on the economy of Kazakhstan. First, it identifies the affected sectors based on the current export statistics. Further, it investigates the potential impact of CBAM on each identified sector based on the share of the EU exports in its total exports and the carbon footprint of the exported products. Finally, it provides estimates of possible macroeconomic effects of CBAM.

2.1 Framework of the analysis and assumptions

The sectoral and macroeconomic analysis is based on several key assumptions:

1) No change in product categories covered by CBAM

The list of CBAM products might be expanded following the review at the end of the transition phase in 2026. However, it is not yet clear whether it will happen and, if yes, which additional products will be put on the list.

2) Constant export volumes of the CBAM products to the EU

It is assumed that the share of the share of CBAM exports in total Kazakh exports will remain constant at 2023 levels. Economic structures within well-established sectors like the ones covered by CBAM tend to be rather rigid. Furthermore, existing growth projections for these sectors in Kazakhstan do not imply much room for a significant structural shift in the short to mid-term.

3) Emission factors based on both actual values reported by companies (where possible) and estimated values are to remain constant in the period covered.

Where the actual values are not available, the Kazakhstan-specific values from a technical report[8] by the Joint Research Centre (JRC)[9] are used. For iron and steel products (excluding ferrochrome) the values for a country with similar production routes and energy mix (Serbia) are used as an approximation.

The electricity mix of Kazakhstan is also assumed to remain at its current level. Based on the current decarbonisation targets[10], this seems a warranted assumption.

4) Two ETS price scenarios: Constant Price Scenario and Rising Price Scenario.

The Constant Price Scenario can be considered a baseline scenario in the context of this analysis. It assumes the CBAM price (which is directly linked to EU ETS prices) to remain at the average level of 100 US dollars per tonnes CO_2eq (USD/t CO_2eq) between 2026-2034. This assumption is based on the approach pursued by the World Bank when calculating the CBAM exposure index.[11]

The Rising Price Scenario is deemed to be more realistic. It is based on the forecasts by ETS experts, who predict a steady increase of the EU ETS price over the next decade.[12] The only consultancy that has provided a forecast until 2035 so far is

[8] Vidovic, D., Marmier, A., Zore, L., & Moya, J. (2023). *Greenhouse gas emission intensities of the steel, fertilisers, aluminium and cement industries in the EU and its main trading partners.*
[9] The science and knowledge service of the European Commission
[10] The Kazakh National Decarbonization Strategy for achieving carbon neutrality by 2060 assumes that up until 2040 the reduction in greenhouse gas emissions will be minimal.
[11] The World Bank explains in a supplementary technical note that it decided to calculate its CBAM exposure index based on the price of 100 USD/t CO_2eq since it represents the range of recent European Union Allowance (EUA) futures trading (as of June 2023).
[12] Carbon Pulse (2024): EU Carbon Market Analysis.

BloombergNEF[13], which predicts the ETS price to reach 194 euros per tonne of CO_2eq in 2035. The Rising Price Scenario is therefore based on a linear intrapolation between 2024 and 2035 (Table 2).

Table 2 Expected EU-ETS allowance prices in the Rising Price Scenario

Year	2024	2025	2026	2027	2028	2029
Expected ETS price [EUR/t CO_2eq]	65	77	88	100	112	124
Year	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**
Expected ETS price [EUR/t CO_2eq]	135	147	159	170	182	194

Source: Own calculation based on BloombergNEF. (2024): *EU ETS Market Outlook 1H 2024: Prices Valley Before Rally.*

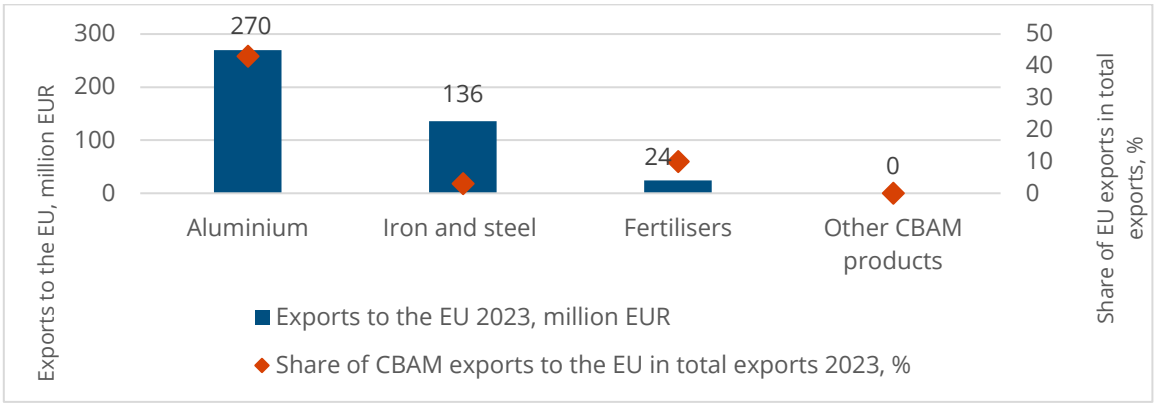
2.2 Sectoral perspective

Considering the exports of Kazakhstan to the EU over the past several years, CBAM would to a certain extent affect the Kazakh steel, aluminium, and fertiliser sectors. The other CBAM products are not currently being exported to the EU (**Fehler! Verweisquelle konnte nicht gefunden werden.**). However, this may change.

In 2024, the country published its first hydrogen strategy until 2030[14] that sets the goal of producing 25,000 tonnes of hydrogen by 2030 (with the share of green hydrogen of at least 50%[15]). According to the strategy, 60% of the produced hydrogen is to be exported to "partner countries". In 2022, the European project developer SVEVIND signed an investment agreement for a project to install a wind park of 40 GW and an industrial park of electrolysers of 20 GW in South-West Kazakhstan to produce up to 2 million tonnes of hydrogen annually. The investment decision is expected to be made in 2026.

Despite the new regulatory basis and the first plans, there are some concerns as to whether these export goals can be achieved within such a short timeframe, despite the lack of infrastructure, considerable geographic distance, and a slow uptake of the global market for green hydrogen.[16] There are also voices in favour of using green hydrogen for domestic purposes instead, e.g. in steel or ammonia production.[17][18] For these reasons, (green) hydrogen is not included in the scope of this analysis.

Figure 1 Exports of CBAM products to the EU and their share in Kazakh total exports of these products



Source: Own calculation based on statistics from Eurostat and UN Comtrade

[13] BloombergNEF. (2024). *EU ETS Market Outlook 1H 2024: Prices Valley Before Rally.*
[14] Ministry of Energy of the Republic of Kazakhstan. (2024). *Concept for the Development of Hydrogen Energy in the Republic of Kazakhstan until 2030.*
[15] The strategy mentions the possibility of producing blue hydrogen based on the country's natural gas resources and CCS technology, but there are no specific production or export goals in this regard.
[16] Commonspace. (2024). *Analysis: Kazakhstan Has to Balance its Green Hydrogen Mega Project with Domestic and Ecological Concerns.*
[17] Asian Development Bank. (2024). *Toward a Hydrogen Economy in Kazakhstan.*
[18] Carnegie Endowment for International Peace. (2024). *Kazakhstan and the EU: Hydrogen Technology Cooperation.*

2.2.1 Aluminium

Aluminium production in Kazakhstan

In Kazakhstan, there is only one aluminium producer – "Kazakhstan Aluminium Smelter JSC" (KAS), which is responsible for all aluminium produced and exported by the country and is part of the ERG group. The enterprise ranks among the top 200 aluminium producers in the world and its parent company belongs to the top ten largest suppliers of traded alumina globally.

Since 2010, when KAS launched the second stage of production, aluminium production volumes have remained largely stable, fluctuating between 210,000 and 260,000 tonnes per year.[19] Kazakhstan produces primary aluminium electrolytically by the Hall-Héroult process (as do all aluminium producers in the world). The carbon anodes are consumed in the process, causing most of the direct emissions. The anodes can be produced in a separate anode plant ('pre-baked') or in the smelter, using the older Söderberg technology. In Kazakhstan, all carbon anodes are 'pre-baked', which is a newer technology causing lower PFC emissions.

According to the National Greenhouse Gas Inventory Report (NIR) 1990 – 2022 of Kazakhstan[20], the emissions of the enterprise have been incrementally decreasing from 961,000 tonnes CO_2eq in 2010 to 440,000 tonnes CO_2eq in 2021.[21] In recent years, the ERG group, which KAS belongs to, has made first steps towards decarbonisation, including establishing a decarbonisation centre and adopting a decarbonisation strategy until 2050. The latter includes the goal of reducing the carbon intensity of aluminium, ferroalloy and agglomerate production by 30% by 2035[22]. The company has already started to introduce automatised emission monitoring for its key products and is also taking into account possible developments of the Kazakh national emission trading system (KAZ ETS) in its investment decisions. The decarbonisation process of ERG is focused on improving the efficiency of production processes and reducing the use of electricity from coal through building up its own renewable electricity generation capacity.

CBAM impact on the aluminium sector of Kazakhstan

Given the export volumes to the EU as well as their share in total exports, the aluminium sector is going to be significantly affected by CBAM. The aluminium exports to the EU constitute 43% of the total exports of this material by Kazakhstan (in 2023). Kazakhstan mostly exports unwrought aluminium that is further processed in the EU (99% of aluminium exports under CBAM in 2023). Intermediary and final products constitute a negligible share of exports.

According to the study by the EU Joint Research Centre, the Kazakh emission factors of unwrought aluminium are comparable to the emission factors of the EU member states if only Scope 1 is taken into account. If Scope 2 emissions are included, the Kazakh emission factors are up to three times higher (Figure 2). As CBAM currently only covers Scope 1 for aluminium, Kazakhstan stands to gain a slight advantage in competitiveness in comparison to the US and China. Their Scope 1 emission factors are slightly higher than the average aluminium imported into the EU.

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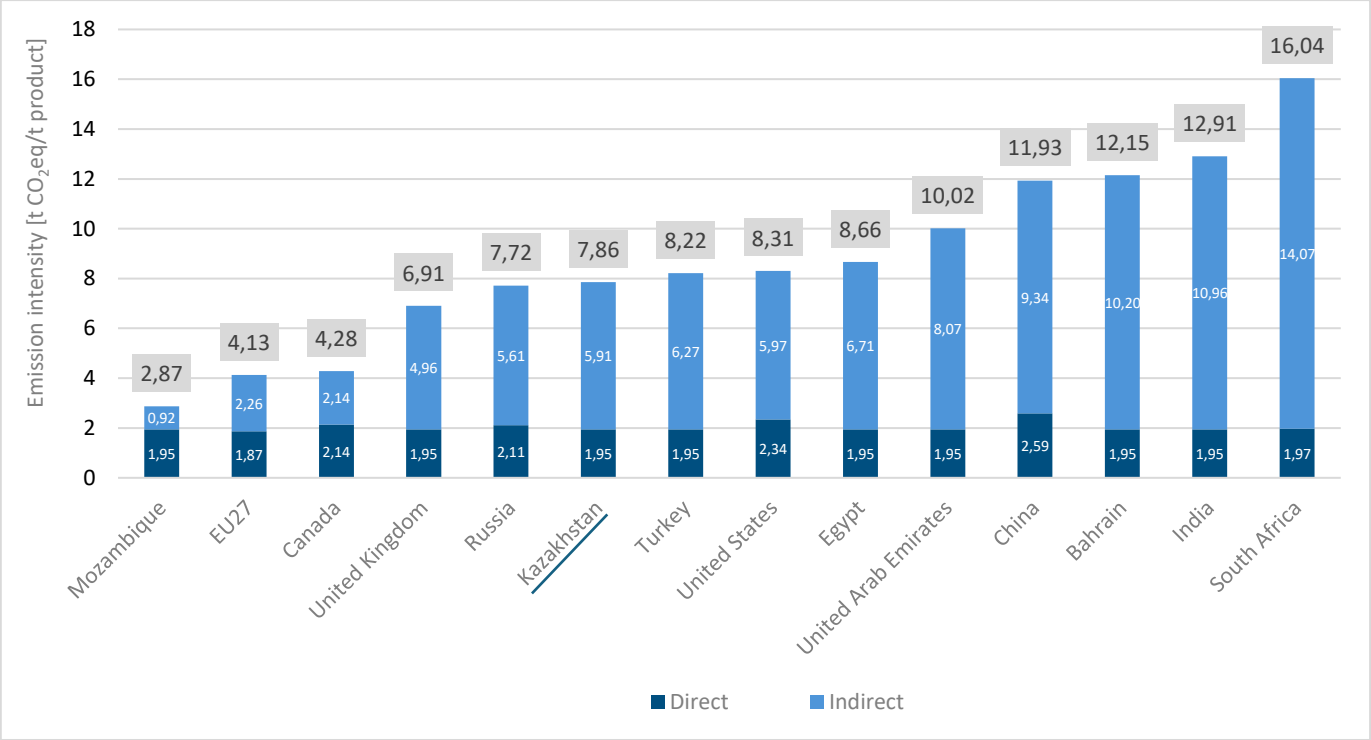
[19] Ministry of Ecology and Natural Resources of the Republic of Kazakhstan & JSC «Zhasyl Damu». (2023). *National Report on the Inventory of Anthropogenic Emissions and Greenhouse Gas Removals (1990-2022).*

[20] Ibid.

[21] The report points out that the emission trend was adjusted in 2021 when the actual data on the duration of the so-called "anode effect" (responsible for the largest part of direct emissions from the aluminium production) was used for the first time instead of the previously used default values. The adjustment led to a significant emission reduction (e.g. by 45% in 2020) and the reversion of the previously rising trend.

[22] ERG. (2023). *Sustainability report.*

Figure 2 GHG emission intensity of the top aluminium exporters to the EU for CN code 7601 - unwrought aluminium



Source: Own illustration based on Vidovic, D., Marmier, A., Zore, L., & Moya, J. (2023). *Greenhouse gas emission intensities of the steel, fertilisers, aluminium and cement industries in the EU and its main trading partners.*

However, if Scope 2 were to be included in the CBAM scope in the future, it would deteriorate Kazakhstan's positions on the EU market. Table 3 shows that the CBAM costs would increase fourfold if Scope 2 were included. In this case, the share of the CBAM costs would rise from 5% (only Scope 1) to 21% (Scopes 1 & 2) of export product value in 2030 (Rising Price Scenario).

Table 3 Potential CBAM costs (million EUR) for Kazakh aluminium exports (Constant and Rising Price Scenarios)

	Constant Price Scenario		Rising Price Scenario	
	Scope 1	**Scopes 1 and 2**	**Scope 1**	**Scopes 1 and 2**
2026	0.5	2.1	0.5	1.8
2030	10.3	41.5	13.9	56.1
2034	21.2	85.5	38.6	155.7
Total costs 2026 - 2034	**86.8**	**350**	**137.2**	**553.2**

Source: Own calculation based on the export statistics from Eurostat and data on emission factors from Vidovic, D., Marmier, A., Zore, L., & Moya, J. (2023). *Greenhouse gas emission intensities of the steel, fertilisers, aluminium and cement industries in the EU and its main trading partners.*

Some experts predict a further increase in Kazakh exports due to dramatic geopolitical and geoeconomic changes connected to Russia's aggression against Ukraine. Until recently, Russia was the biggest exporter of aluminium to the EU-27, accounting for 18.6% of EU aluminium imports in 2019[23]. The sanctions have already led to a dramatic drop in imports from Russia to 6% of EU aluminium imports in 2023[24]. Unlike Kazakhstan, Russia used to export semi and final products to the EU.

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[23] Vidovic, D., Marmier, A., Zore, L., & Moya, J. (2023). *Greenhouse gas emission intensities of the steel, fertilisers, aluminium and cement industries in the EU and its main trading partners.*

[24] FAZ. (2024). *New sanctions package: Europe should do without Russian aluminum.*

To (at least partly) substitute Russia as the ex-top aluminium exporter, Kazakhstan will have to both shift the focus towards exports of semi and final products and at least maintain its relatively low carbon footprint.

2.2.2 Steel and iron

Iron and steel production in Kazakhstan

In Kazakhstan, there is only one enterprise that produces steel and iron. It also produces the coal, coke and sinter required for its own steel production. Between 2004 and 2023, the enterprise was owned by the international steel corporation ArcelorMittal. In 2023, a state-owned direct investment fund Qazaqstan Investment Corporation (QIC) acquired the enterprise and rebranded it as Qarmet.[25]

The enterprise produces predominantly primary steel through the blast furnace route, with a negligible share of secondary steel (0.01% in 2021[26]). Between 2011 and 2021, primary steel production has been fluctuating between 3.5 and 4.8 million tonnes per year.[27]

According to the latest NIR, there has been no significant reduction in the direct emissions from steel production between 2011 and 2021. The fluctuation of the emissions between 400,000 and 600,000 tonnes CO_2eq can be attributed to the changes in production volumes. In the coming years, this trend might change: The new owner of Qarmet has initiated several projects to modernise production to increase its social, ecological, and climate standards. One of these projects is aimed at substituting fuel oil, liquified gas and partly coal with natural gas.[28] The enterprise has already started the construction of a pipeline with a capacity of 1.2 billion m^3 per year of natural gas which will enable direct supplies. According to the company's management, a partial switch to natural gas is planned for as early as the second half of 2025. After the project is fully implemented, the company's emissions are expected to decrease by 30%.[29]

Apart from steel, Kazakhstan produces ferroalloys, especially ferrochrome, which also fall under the scope of CBAM. Ferrochrome is produced by "TNC Kazchrome" JSC, which is part of the ERG group of companies and one of the world's largest producers of chrome alloys. The company specialises in high-carbon ferrochrome, while also producing refined ferrochrome, silicon and manganese alloys. Between 2018 and 2023, the production of ferrochrome remained at the level between 1.2 and 1.5 million tonnes. According to the company's annual reports, there was a sudden surge in direct emissions in 2022 (3.9 million tonnes CO_2eq in 2022 against 1.1 million tonnes CO_2eq in 2021) that persisted in 2023[30]. Since there has been no dramatic increase in production volumes, it can be assumed a new calculation method for emissions was employed.

As already mentioned, the ERG group of companies, which Kazchrome also belongs to, has increased its decarbonisation effort in recent years. Kazchrome itself started to calculate its carbon footprint in 2022. So far, its decarbonisation measures have been focusing on energy efficiency measures (e.g. modernisation of the existing smelters and installing new, more efficient ones) and renewable energy projects. In 2024, the company started the construction of a wind power plant with a capacity of approximately 150 MW (Khromtau-1 Wind Power Plant), which is scheduled for commissioning in late 2025.[31] Some of the energy generated is going to be used to cover the enterprise's growing energy demand.

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[25] ArcelorMittal. (2024). *ArcelorMittal completes sale of ArcelorMittal Temirtau.*
[26] Midrex Technologies, Inc. (2023). *World Direct Reduction Statistics 2023.*
[27] Ministry of Ecology and Natural Resources of the Republic of Kazakhstan & JSC «Zhasyl Damu». (2023). *National Report on the Inventory of Anthropogenic Emissions and Greenhouse Gas Removals (1990-2022).*
[28] KazTAG. (2024). *Qarmet to partially switch to gas by the second half of 2025.*
[29] BES Media. (2024). *Qarmet's transition to natural gas to reduce emissions by 30%.*
[30] Kazchrome. (2018-2023). *Annual reports.*
[31] InBusiness.kz. (2024). *ERG Group to build new wind energy station in Aktobe region.*

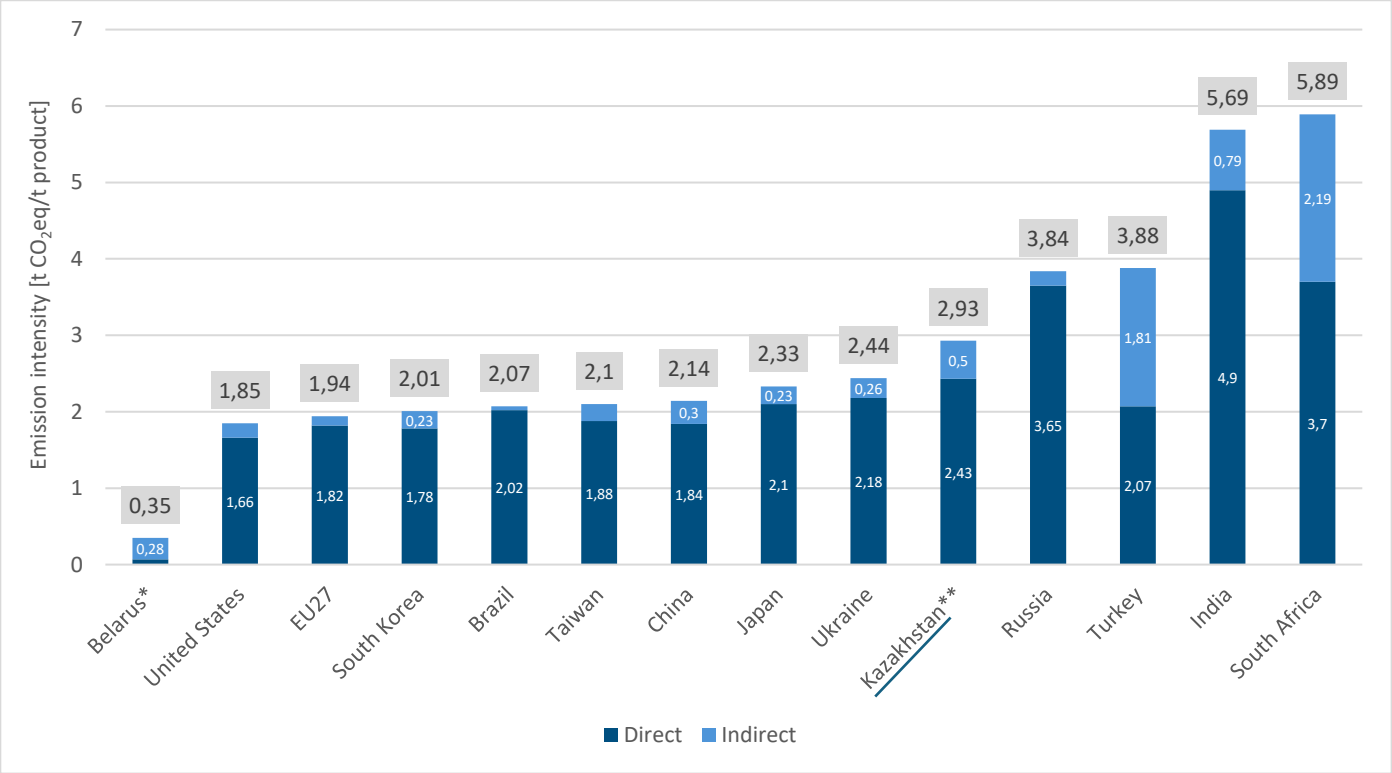
CBAM impact on the iron and steel sector of Kazakhstan

In the context of CBAM, Kazakhstan mostly exports hot-rolled products of non-alloy steel, including flat-rolled products, bars, rods and wires (47% of the CBAM-related iron and steel exports to the EU in 2023) as well as ferrochrome (45% of those exports).

Since Kazakhstan does not belong to the top iron and steel exporters to the EU (it accounts for less than 1% of EU imports), the report by the Joint Research Centre does not include its country-specific emission factors. To provide a rough estimate of possible CBAM costs, we pursued a double approach: Where relevant data on Kazakhstan was available (for ferrochrome), country-specific values were calculated. Where it was not available, the JRC values for Serbia were used. The country is similar to Kazakhstan in terms of the key parameters relevant for identifying emission factors: steel industry structure, production routes and electricity mix.[32]

The calculations show that in terms of the most exported steel products, Kazakhstan belongs to the countries with the highest emission intensity (Figure 3, Figure 4). The likely cause is a relatively low share of secondary steel production combined with the predominance of the blast furnace production route for primary steel and a coal-dominated electricity mix.

Figure 3 GHG emission intensity of the top iron and steel exporters to the EU for CN code 7208 - Iron or non-alloy steel; flat-rolled products of a width of 600mm or more, hot-rolled, not clad, plated or coated



*Belarus has only low-carbon secondary steel production
**Values based on the ones for Serbia from the JRC report

Source: Own illustration based on Vidovic, D., Marmier, A., Zore, L., & Moya, J. (2023). *Greenhouse gas emission intensities of the steel, fertilisers, aluminium and cement industries in the EU and its main trading partners.*

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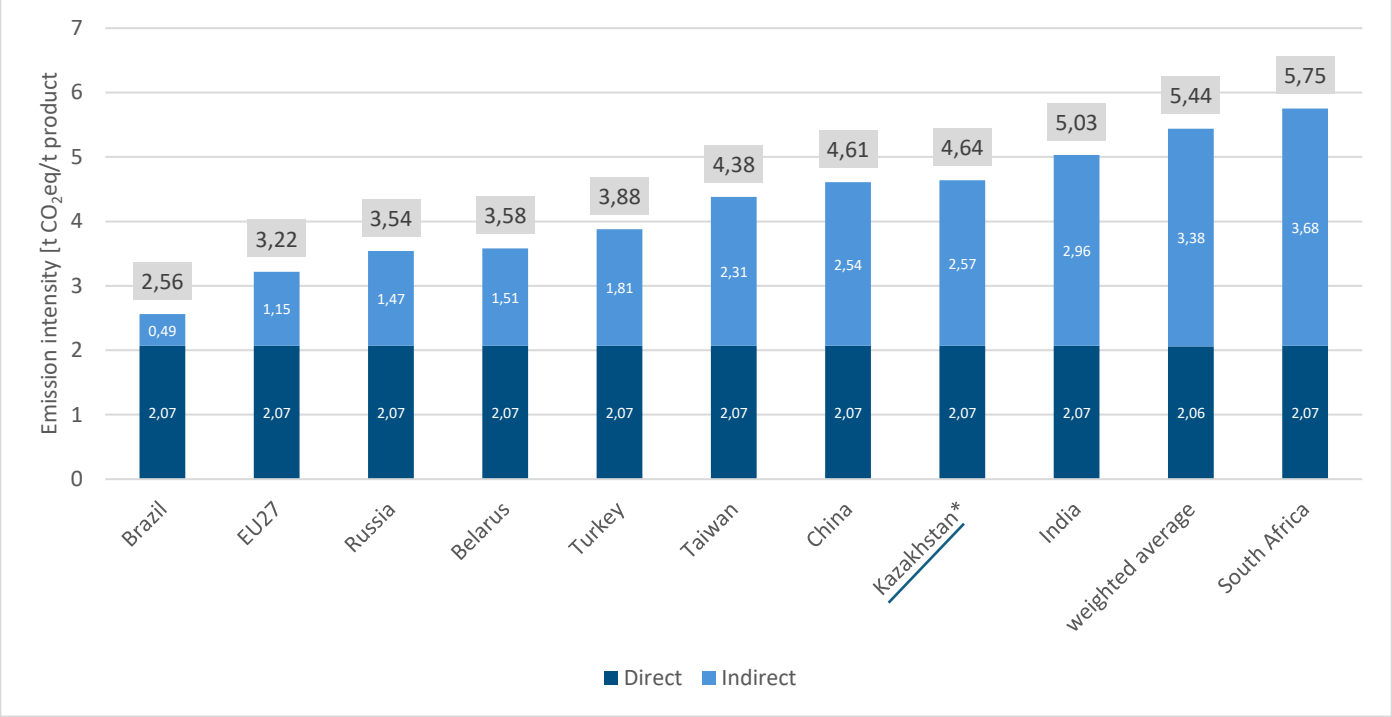
[32] Like Kazakhstan, Serbia also produces predominantly primary steel through the blast furnace and blast oxygen furnace route. Secondary steel production plays a bigger role in the total production than in Kazakhstan, but its share is still comparably low (21% in 2023). Both countries have a significant share of coal in their electricity mix (more than 60%), which accounts for relatively high emissions in their electricity generation. For the remaining 40%, Kazakhstan relies on other fossil fuels and renewable energy sources to a comparable extent. Serbia covers the remaining demand predominantly with hydropower as well with minor shares of wind power, biofuels, and natural gas.

Figure 4 GHG emission intensity of the top iron and steel exporters to the EU for CN code 720241, 720249 – Ferrochrome



*Actual values based on the annual reports of "TNC Kazchrome" JSC

Source: Own illustration based on Vidovic, D., Marmier, A., Zore, L., & Moya, J. (2023). *Greenhouse gas emission intensities of the steel, fertilisers, aluminium and cement industries in the EU and its main trading partners.* and Kazchrome. (2018-2023) *Annual reports.*

The share of CBAM costs in the export value of the Kazakh iron and steel (including ferrochrome and other alloys) might reach 7% (Constant Price Scenario) or 10% (Rising Price Scenario) in 2030. If Scope 2 emissions are included, the share rises to 12% and 16% correspondingly. Currently, exports to the EU constitute only 3% of Kazakhstan's total exports (2023), so that CBAM is not likely to have a significant impact on Kazakh producers. However, this trend might change because of the aforementioned geopolitical shifts and changes in EU import value chains.

In 2020, Russia was the largest exporter of iron and steel products to the EU-27 with a trade volume of 6 billion USD, followed by Ukraine with a volume of 4.8 billion USD. The Russian war in Ukraine has led to economic sanctions against Russian steel companies, increased demand for steel in the Ukrainian domestic market as well as led to damage to Ukrainian steel plants. This has caused a drop in both countries' steel exports to the EU. Whereas some experts expected Kazakhstan to redirect more exports to the EU, there has yet been no sign of such a trend.[33] Still, it cannot be excluded that Kazakhstan might try to increase its steel exports to the EU to gain at least some part of the Russia's market share, in which case it has to proceed with the current decarbonisation projects to improve its competitiveness.

2.2.3 Fertilisers

Fertiliser production in Kazakhstan

In Kazakhstan, there are several enterprises producing fertilisers that fall under the scope of CBAM. The two biggest of them are JSC "KazAzot" and LLP "Kazphosphate". JSC "KazAzot", which was established in 2005, and uses three Soviet-era chemical plants as a production platform. It produces gaseous and liquid ammonia, nitric acid (concentration of 46%), ammonium nitrate and other complex nitrogen-based mineral fertilisers. Since 2005, the production volumes of ammonia and nitric acid

[33] Based on the Eurostat statistics for Kazakh steel and ferroalloy exports to the EU in 2023

have been continuously growing and reached 260,000 and 334,000 tonnes respectively in 2021. The GHG emissions have been growing proportionately to the growth in production.

In 2023, the company published its first sustainability report[34] which states that its primary goal is to ensure the company's compatibility with the requirements of CBAM. In the report, the company provides a detailed overview of climate-related risks, its current GHG emissions and mitigation measures. The enterprise has already created some minor solar and wind power capacities (which are reported to have generated a mere 32 MWh of power in 2023) and started a tree planting project. It is also considering several CCU measures, including capturing CO_2 with algae which could be later used as fodder in animal husbandry and fishery. The strategy, including regular emission monitoring and first mitigation measures, presents a first step towards reducing the carbon footprint of the enterprise.

LLP "Kazphosphate" is a leading Kazakh producer of phosphorous fertilisers, including mixtures with nitrogen that fall under CBAM.[35] In 2023, the enterprise produced approx. 515,000 tonnes of fertilisers. In 2025, the launch of a second production line is planned which will allow the enterprise to increase its production volume to 1 million tonnes. The company exports around 60% of its production volume. According to the data submitted by the enterprise to the state emissions registry[36], the enterprise emitted approx. 141,900 tonnes CO_2eq in 2023.[37] No information on energy saving and climate protection activities of the enterprise is publicly available.

Impact of CBAM on Kazakhstan's fertilisers sector

Ammonia production is the most energy-intensive stage of fertiliser production and accounts for 90% of energy consumption in the production of fertilisers globally, mostly due to production of hydrogen from natural gas or coal. In Kazakhstan, the production of ammonia and nitric acid (produced by reacting ammonia and oxygen) is the largest source of GHG emissions (CO_2 and N_2O, respectively) not only in fertiliser production, but in the whole chemical industry.[38] Both chemicals are used to produce ammonium nitrate, which constitutes a third of the CBAM-related exports of Kazakhstan. The other two thirds include primarily complex fertilisers (containing nitrogen and phosphorus) and a minor share of ammonia. In total, Kazakhstan exports around 10% of CBAM-related fertilisers to the EU.

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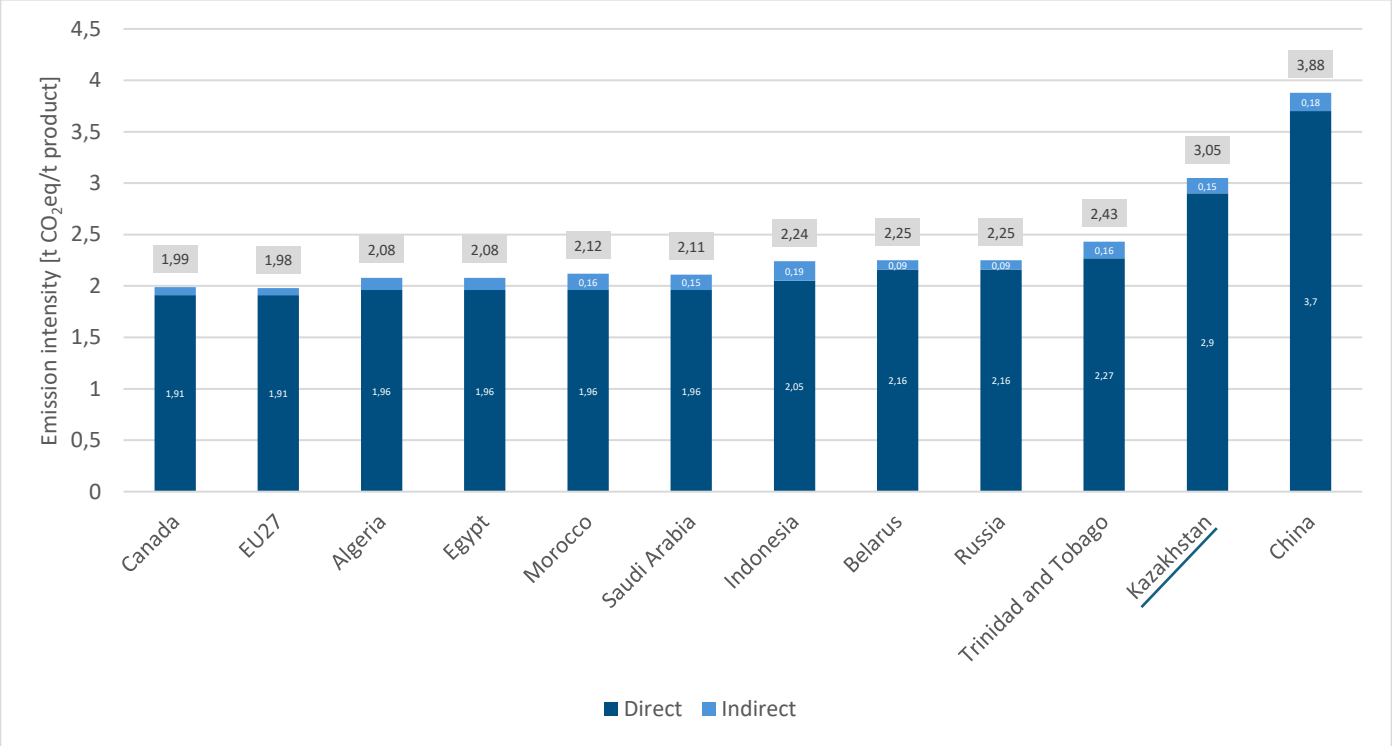
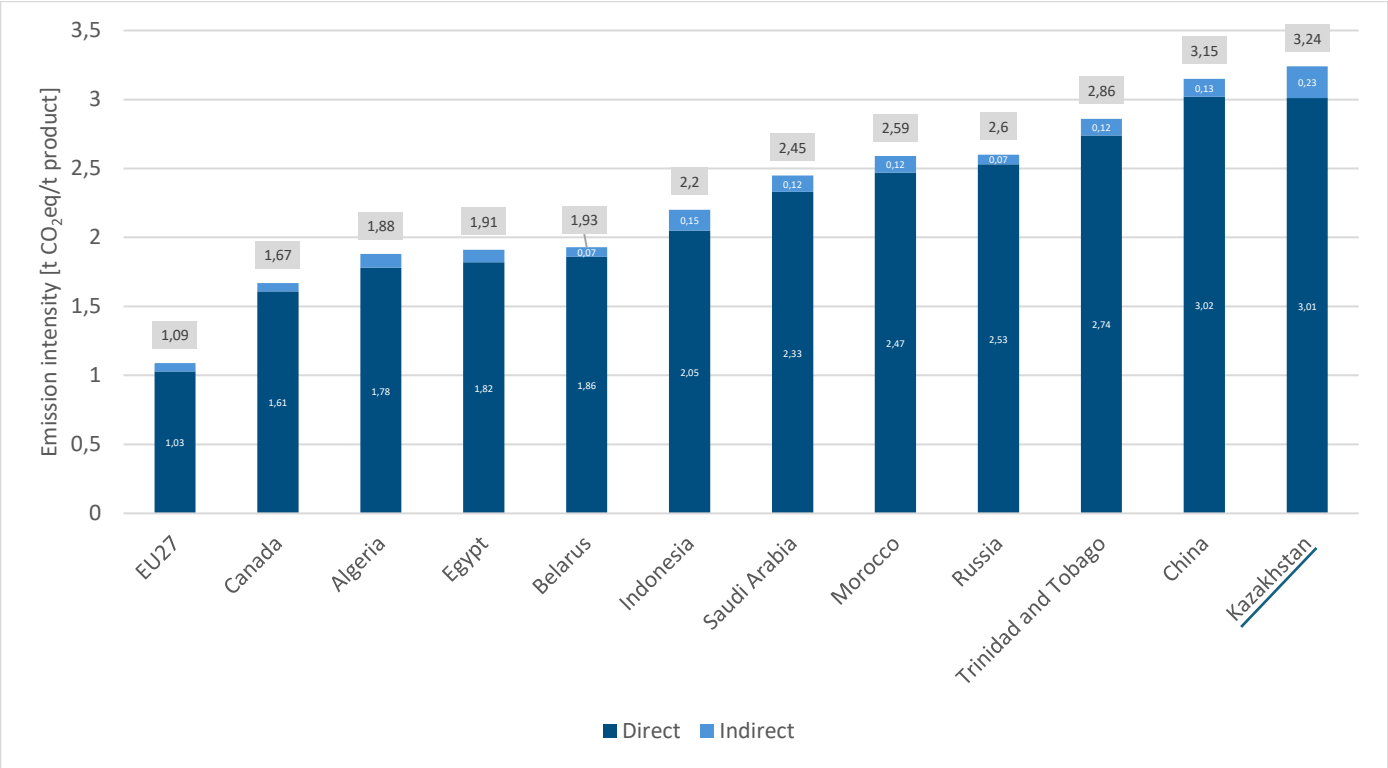
[34] KazAzot. (2023). *Sustainability Report 2023.*
[35] CN Codes 310551 and 310559
[36] Kazphosphate. (2023). *Report for the national Emissions release and transfer registry.*
[37] Own calculation based on the emission data for CO_2, N_2O and CH_4 and Global Warming Potential (GWP) 100.
[38] Ministry of Ecology and Natural Resources of the Republic of Kazakhstan & JSC «Zhasyl Damu». (2023). *National Report on the Inventory of Anthropogenic Emissions and Greenhouse Gas Removals (1990-2022).*

Figure 5 GHG emission intensity of the top exporters of fertilisers to the EU for CN code 2814 – Ammonia; anhydrous or in aqueous solution



Source: Own illustration based on Vidovic, D., Marmier, A., Zore, L., & Moya, J. (2023). *Greenhouse gas emission intensities of the steel, fertilisers, aluminium and cement industries in the EU and its main trading partners.* and KazAzot. (2023). *Sustainability Report 2023.*

Figure 6 GHG emission intensity of the top exporters of fertilisers to the EU for CN code 310230 – Fertilisers, mineral or chemical; nitrogenous, ammonium nitrate, whether in aqueous solution or not



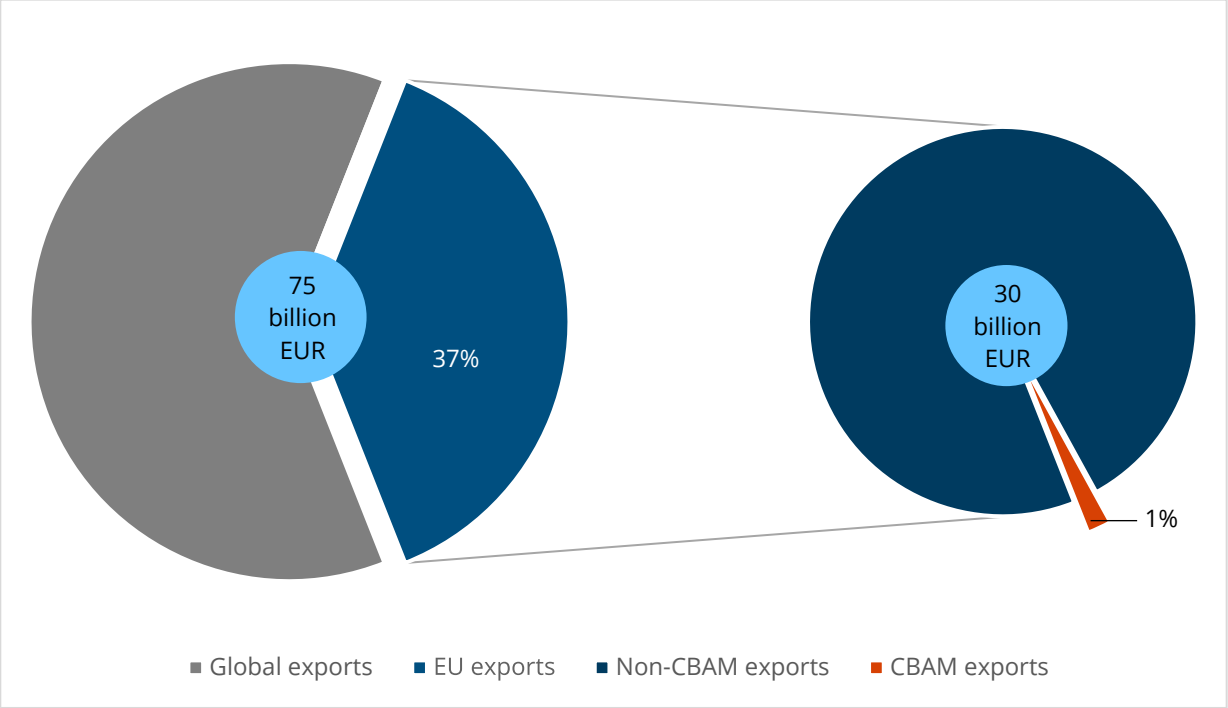
Source: Own illustration based on Vidovic, D., Marmier, A., Zore, L., & Moya, J. (2023). *Greenhouse gas emission intensities of the steel, fertilisers, aluminium and cement industries in the EU and its main trading partners* and KazAzot. (2023). *Sustainability Report 2023.*

So far, KazAzot has only published the emission intensity of its ammonia and ammonium nitrate production. For ammonia, Kazakhstan has the highest emission intensity after China whose ammonia production is based on coal (Figure 5). For ammonium nitrate, Kazakhstan even slightly surpasses China due to the higher indirect emissions (Figure 6). By 2030, the share of CBAM costs in the export value of fertilisers can reach 25% (Constant Price Scenario) to 34% (Rising Price Scenario).

2.3 Macroeconomic perspective

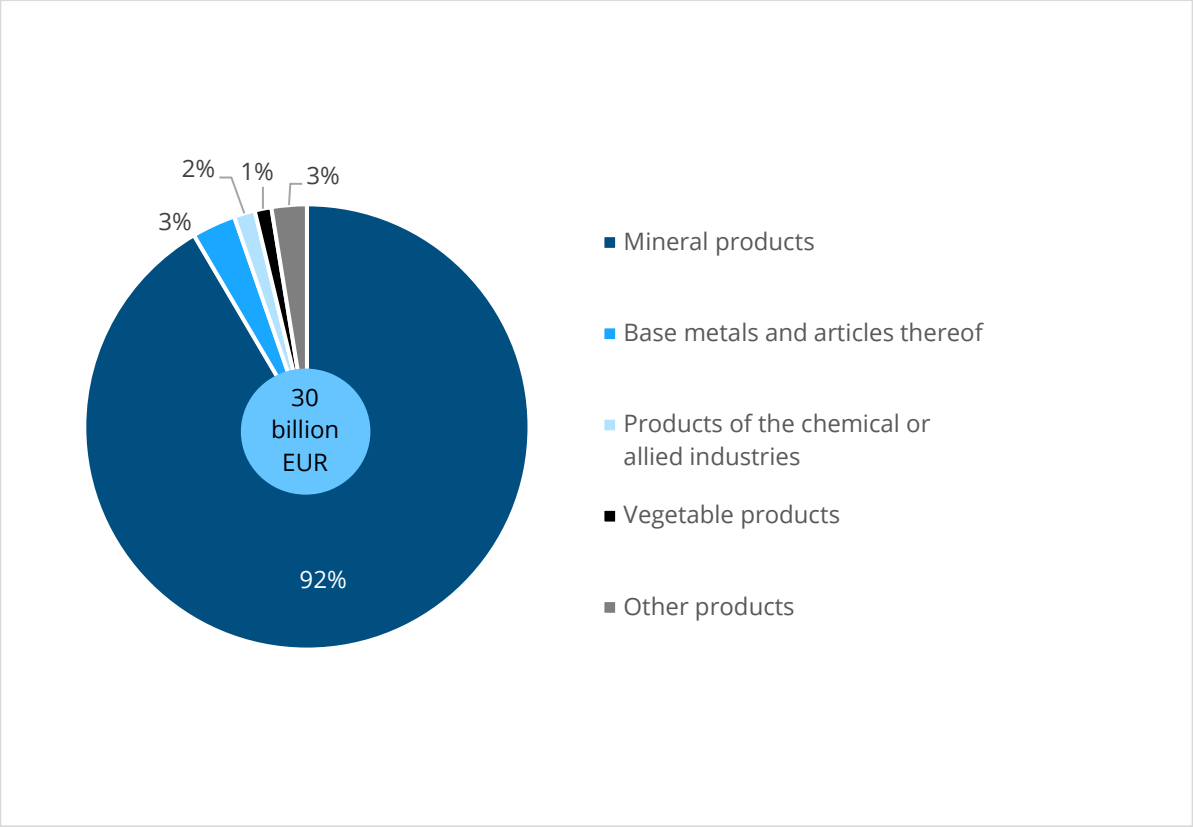
To provide a rough assessment of the macroeconomic impact of CBAM on the Kazakh economy, we looked at the current share of CBAM products in Kazakhstan's exports to the EU, its total exports, and as a percentage of GDP. Whereas the exports to the EU constitute a significant share of Kazakhstan's total exports (37% in 2023), the CBAM exports account for only 1% of the EU exports (Figure 7). This can be explained by the fact that Kazakhstan's exports to the EU are dominated by mineral products, especially oil and gas (Figure 8). Non-CBAM exports, especially those of oil and gas, constitute 11% of Kazakhstan's GDP in 2023. Compared to this, CBAM exports play a rather insignificant role (Figure 9).

Figure 7 Share of EU exports in total exports and share of CBAM exports in EU exports of Kazakhstan (%, 2023)



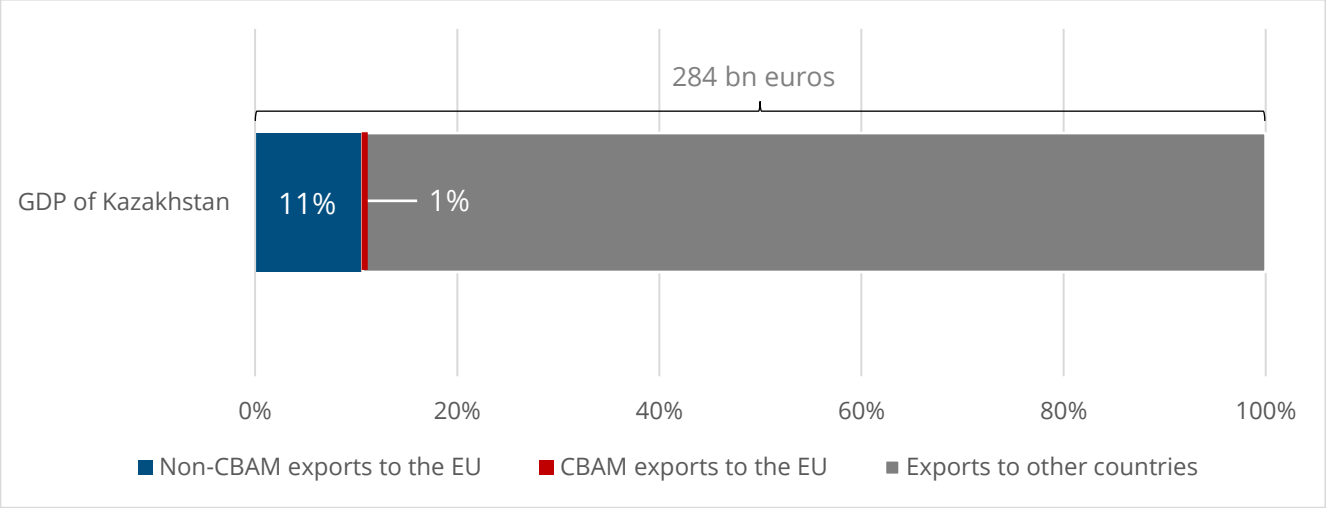
Source: Own illustration based on export statistics from Eurostat and UN Comtrade

Figure 8 Total exports of Kazakhstan to the EU by category (%, 2023)



Source: Own illustration based on European Commission. (2024). *European Union, Trade in goods with Kazakhstan.*

Figure 9 Share of Kazakhstan's CBAM and non-CBAM exports to the EU in the country's GDP (%, 2023)



Source: Own illustration based on GDP and export statistics from the Kazakh Office for National Statistics and UN Comtrade

Considering the aforementioned statistics, one cannot intuitively expect CBAM to have a significant macroeconomic impact on Kazakhstan. A study by the United Nations Institute for Training and Research (UNITAR) confirms this assumption.[39] The authors integrated the estimates of CBAM costs in the CGE-KAZ macroeconomic model that is based on real economic data and official projections and used to estimate how Kazakhstan's economy might respond to changes in policy, technology or

[39] UNITAR. (2022). *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.*

other external factors.[40] It has to be noted that the results of the UNITAR modelling have to be taken with caution since some of its key assumptions differ from the assumptions made in this analysis.[41]

Based on the calculations within the CGE-KAZ model, the overall impact of CBAM on the Kazakh economy is going to be very limited. Compared with the baseline scenario of no EU CBAM, the cumulative GDP loss of approximately 0.029% to 0.053% by 2035 is expected. This corresponds to a cumulative loss of 428 million USD to 719 million USD over the ten-year period from 2025 to 2035 (constant USD, no inflation accounted) (Table 4).

Table 4 GDP losses due to EU CBAM relative to the baseline, in 2025-2035

	Constant CBAM/ETS price of 100 dollars per t CO_2eq	Rising CBAM/ETS price[42]
Year	**Cumulative GDP loss, %**	
2026	-0.001%	-0.001%
2030	-0.012%	-0.018%
2035	-0.029%	-0.053%
	Cumulative GDP loss, million (constant 2017 USD)	
2025-2035	428	719

Source: Own illustration based on UNITAR. (2022). *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.*

While the UNITAR modelling suggests that the direct impact of CBAM on Kazakhstan's GDP will be minimal, it is important to acknowledge several uncertainties and potential indirect effects. Not all macroeconomic consequences of CBAM can be fully estimated, particularly as the EU could tighten the CBAM regulation in the future. Beyond direct costs, CBAM could also entail significant opportunity costs, as Kazakh products could face barriers to expanding their market share in Europe if they do not lower their emissions. Additionally, Kazakhstan's exposure to EU climate regulations extends beyond CBAM itself. New EU directives, such as the Corporate Sustainability Reporting Directive (CSRD) and the Corporate Sustainability Due Diligence Directive (CSDDD) will increase scrutiny on carbon footprints, even for non-CBAM sectors. At the same time, Europe's continued efforts to decarbonise could reduce demand for oil and gas imports, shifting economic importance to other potential Kazakh exports. These factors suggest that CBAM's long-term implications for Kazakhstan's trade and competitiveness in the European market may be more significant than initial GDP estimates indicate.

[40] 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.

[41] Some key differences: Minor exports of cement are part of the modelling, only Scope 1 emissions are covered for all products, the emission intensity of aluminium is considerably higher than the one calculated in this analysis (7.63 t CO_2eq/ t product), the export statistics comes from 2019.

[42] The scenario is based on the IEA Net Zero Report that assumes that the ETS price will reach 204.03 USD / t CO_2eq by 2035.

3 Assessment of CBAM Readiness and Recommendations

This Chapter summarises the findings of Chapter 2 and analyses the current state of decarbonisation by the Kazakh enterprises affected by CBAM, which indicates their CBAM readiness. It also investigates strategies and policies of the Kazakh government that can be instrumental in avoiding the possible negative impact of CBAM on the competitiveness of the affected enterprises on the EU market. Furthermore, it formulates recommendations for both the Kazakh enterprises and government regarding preparations for the start of the regular phase of CBAM.

3.1 Kazakh enterprises

As demonstrated in Chapter 3, the impact of CBAM in its current form on Kazakhstan's overall economy is expected to be limited. However, it can have a considerable influence on the affected sectors and enterprises. The export of fertilisers is most likely to be significantly affected due to a considerable share of exports going to the EU and the high emission intensity of Kazakhstan's producers. The exporters of steel and ferrochrome, who are less dependent on the EU market, are likely to be less affected, but their carbon-intensive production will be an obstacle in increasing their market share. Aluminium exporters are likely to retain or slightly gain competitiveness for the time being. However, if Scope 2 emissions are included in CBAM in the future, their market position is likely to deteriorate significantly.

Most affected enterprises are aware of the challenge. Both the ERG group of enterprises (which Kazakhstan Aluminium Smelter and Kazchrome belong to) and KazAzot explicitly mention CBAM in their corporate reports as an important factor affecting their climate and energy strategy. All affected enterprises[43] employ regular emission monitoring for several of their key products and are consistently extending its scope. At the same time, only Kazakhstan Aluminium Smelter and Kazchrome appear to have a decarbonisation strategy (at least at the level of their mother company ERG).

As far as concrete decarbonisation measures are concerned, most affected enterprises have primarily focused on improving energy efficiency, including the introduction of certificated energy and environmental management systems and modernising their production facilities. However, only few enterprises have planned or implemented changes to their key production processes which are responsible for the majority of their direct emissions. Regarding Scope 2 emissions, only ERG is implementing significant projects to develop renewable energy capacity which could enable decarbonisation of its energy consumption. Table 4 summarises the aforementioned findings.

Table 5 Overview of the progress of Kazakh enterprises concerned by CBAM in terms of decarbonisation ("+": present; "+ -": partly present; "-": absent)

	Kazakhstan Alu-minium Smelter JSC	Qarmet	Kazchrome	KazAzot	Kazphosphate
Regular emission monitoring	**+**	**+**	**+ -** At least for high-carbon ferrochrome, refined ferrochrome and silicon alloys	**+ -** So far only for ammonia and ammonium nitrate	**+-** Not clear if there is emissions monitoring for separate products

[43] For Kazphosphate, no data is available

Decarbonisation strategy	**+ -** At the level of the group of companies ERG	**-**	**+ -** At the level of the group of companies ERG	**-**	No data available
Energy and environmental management system	**+** ISO 50001, 14001	**+ -** ISO 14001	**+** ISO 50001, 14001	**+ -** ISO 14001, ISO 50001 certification is ongoing	**+-** ISO 14001
Energy efficiency projects	**+**	**+**	**+**	**+**	No data available
Projects targeted at decarbonisation of the most emission intensive production processes (Scope 1)	**-**	**+-** Partial switch from coal and oil to natural gas	**-**	**-**	No data available
Renewable energy projects (Scope 2)	**+ -** There are plans on the ERG level	**-**	**+** Wind energy park	**+ -** Minor projects	No data available

Source: Own analysis based on the websites as well as annual and sustainability reports of the enterprises

Companies should consider the following steps in order to secure their competitiveness on the European market:

- Expand and refine emission monitoring, reporting, and verification (MRV) to align with international and EU requirements to ensure compliance during the CBAM transition phase and beyond. This will also lay the foundation for company-specific decarbonisation strategies. Several documents, including the JRC report cited in this analysis, can provide guidance for calculating direct emissions in line with CBAM requirements. In addition, the EU will adopt further implementing acts on MRV by 2026 with the beginning of the regular phase of CBAM (according to Article 7 of the CBAM regulation).
- Further advance energy efficiency projects. Energy efficiency is a no-regret option that allows to reduce not only energy consumption and emissions, but also energy costs. A first step can be to introduce energy management systems or conduct energy audits to identify and act on energy saving potentials.
- Develop and implement enterprise-specific decarbonisation strategies. This includes defining emission reduction goals (in line with the Kazakh 2060 Carbon neutrality strategy) and medium- to long-term measures for transforming production processes and expanding renewable energy generation. An effective strategy demonstrates commitment to decarbonisation, outlines an emission reduction path and proposes concrete measures, strengthening the case for domestic and international investment.
- Actively participate in international knowledge exchanges and cooperations to stay informed about best practices on emission monitoring and reduction.
- For steel, ferrochrome and aluminium: As CBAM considers only emission intensities and doesn't discriminate between primary and secondary materials, increasing the share of recycling is the fastest way to lower emissions and therefore CBAM costs. Compared to primary materials, switching to recycled steel and aluminium can lower emissions by 80% or over 90%, respectively. For almost complete mitigation of emissions, coal-based blast furnaces and fossil electricity sources need to be replaced by hydrogen and fossil-free electricity, respectively.
- For fertiliser production: A relatively fast to implement measure could be to upgrade waste gas treatment from nitric acid production to international standards in order to mitigate N_2O emissions. To achieve more significant

reductions, fossil hydrogen feedstock needs to be substituted by renewable “green” hydrogen or low-carbon “blue” hydrogen (based on natural gas combined with carbon capture and storage (CCS)).

3.2 Kazakh government

In recent years, the Kazakh government has laid the basis for a comprehensive energy and climate policy. In 2023, it adopted its first national Carbon neutrality strategy until 2060. The strategy outlines current energy consumption and emissions in key sectors, including industry, and provides a brief overview of central decarbonisation technologies, such as direct reduction of iron (DRI) for steel production or carbon capture and storage (CCS) for cement. In 2024, the government began developing a roadmap with sector-specific measures to achieve the net-zero goal.[44]

As a signatory of the UNFCCC, Kyoto Protocol and Paris Agreement, Kazakhstan follows its obligation to regularly submit its Nationally Determined Contribution (NDC)[45] and National Inventory Reports (NIR)[46]. The latter provides emissions data for key economic sectors and motivates enterprises to monitor and report direct emissions.

Kazakhstan has long prioritised energy efficiency in its industrial policy, successfully decoupling GDP growth from the growth in energy intensity.[47] Kazakhstan has also made some limited progress in expanding renewable energy, which are however slowed down by low energy tariffs and lack of secondary legislation and implementing measures. In 2018, the country introduced auctions to determine tariffs for RES projects. Auction-based power purchase agreements (PPAs) allow for prioritised dispatching and guaranteed sales to a designated centralised buyer. As a result, Kazakhstan met its goal of generating 3% of power from wind and solar by 2020, rising to 5% in 2023. 8% of electricity in 2023 were generated from hydropower. Still, the absence of a comprehensive plan to phase down coal power and plans to build several new coal power plants and develop coal chemistry are expected to keep coal generation at current levels until 2035, making decarbonisation of the energy system appear unlikely.[48]

Since 2013, Kazakhstan has been operating a national emission trading system (KAZ ETS), covering sectors such as electricity, oil and gas, mining, and energy-intensive industries, including those covered by CBAM. Enterprises emitting over 20,000 tonnes CO_2 per year are obliged to buy allowances for each tonne emitted. The number of total allowances is capped based on emissions of previous years, decreasing linearly by 1.5% per year. While the KAZ ETS shares structural similarity with the EU ETS, there are two significant differences, which limit its effectiveness: First, high emission caps lead to low market liquidity and low CO_2 prices, reducing investment incentives and public revenue. Second, 98 to 99% of allowances are allocated for free, with the remaining 1 to 2% being traded at approximately 1 dollar per tonne of CO_2.[49] While KAZ ETS allows enterprises to get acquainted with emission monitoring, reporting, and allocation processes, its current form is not sufficient to significantly reduce CBAM costs or stimulate decarbonisation efforts. However, a 2024 agreement between the Kazakh Ministry of Environmental Protection and the International Bank for Reconstruction and Development (IBRD) aims to improve the system’s effectiveness, raising hopes for future improvements.

Table 6 Comparison of the EU and Kazakh ETS

	EU ETS	KAZ ETS
Year of introduction	2005	2013, reintroduced in 2018 after a break
Sectors covered	Energy sector, energy-intensive industry, aviation, shipping	Energy sector, energy-intensive industry
Emissions covered	CO_2, N_2O, PFCs	CO_2

[44] KazEnergy. (2025). KazEnergy discusses the implementation of the Carbon Neutrality Strategy by 2060.
[45] Ministry of Ecology and Natural Resources of the Republic of Kazakhstan. (2023). Updated Nationally Determined Contribution of the Republic of Kazakhstan to the global response to climate change.
[46] Ministry of Ecology and Natural Resources of the Republic of Kazakhstan & JSC «Zhasyl Damu». (2023): National Report on the Inventory of Anthropogenic Emissions and Greenhouse Gas Removals (1990-2022).
[47] International Energy Agency (IEA). (2022). Kazakhstan 2022.
[48] Agora Energiewende. (2024) Enabling a just coal transition in Kazakhstan.
[49] EY. (2024). Carbon regulation: Global best practices and their applicability in Kazakhstan. Overview of research findings.

Enterprises affected	Defined based on industry benchmarks for emissions intensity	Enterprises emitting into the atmosphere more than 20,000 t CO_2/year
Mechanism	Cap and trade (linear coefficient of annual emission limit reduction of 2.2%). Free allocation of allowances for sectors at risk of shifting production (carbon leakage)	Cap and trade (linear annual reduction of 1.5% between 2021 and 2025) and free allocation of quota to all businesses. Legislation provides for trading of a small share of quotas (1-2%)
Allowance price	65 EUR/tCO_2eq (average price in 2024)	~1 dollar/t[50]

Source: Own analysis based on European Commission. (2024). *About the EU Emissions Trading System (EU ETS)* and Republic of Kazakhstan. (2012). *Law of the Republic of Kazakhstan No. 77-V of December 19, 2012, "On State Regulation of Greenhouse Gas Emissions."*

To support Kazakh enterprises in preparing for CBAM, the Kazakh government should consider following steps

- To cushion the impact of CBAM in the short- to mid-term, a reform of the national ETS is highly advisable. A combination of a lower emission cap, a higher share of allowances traded and a higher price (or at least two of these three adjustments) would allow to avoid costs caused by CBAM. Revenues earned through KAZ ETS would stay in the country, as opposed to CBAM fees, which would be levied by the EU. They should be reinvested in decarbonisation projects, as envisaged by the KAZ ETS regulation.
- MRV of emissions under KAZ ETS must be fully compatible with the requirements of the EU ETS and CBAM in order to allow enterprises to use actual emissions to calculate emission intensity instead of relying on default values, which in some sectors might be less favourable. One crucial step would be to expand the emission scope to include N_2O and PFCs.
- The roadmap for the decarbonisation strategy, which is currently under development, should provide detailed pathways for sectors covered by CBAM. Ideally, it will outline decarbonisation scenarios, including key technologies (direct iron reduction with natural gas or low-emission hydrogen for steel industry, CCS for cement industry, low-emission hydrogen for ammonia production) and transformation costs, and specify policy and financial support measures for the transition.
- The government should encourage the development of metal recycling by introducing suitable incentives and infrastructures. This could include mandatory recycling targets, building recycling facilities and establishing waste separation or scrap metal collection systems. This would aid companies in increasing the recycling share of their production and thereby reducing the carbon footprint of their products.
- Since energy and ETS costs are currently too low to encourage decarbonisation, the government should provide external support through a combination of measures. These can include grants for energy efficiency and decarbonisation projects, incentives to implement renewable energy projects as well as financing instruments for low-carbon investments.
- To enable the industry transition, it is crucial to decarbonise the currently coal-based energy system. This requires a comprehensive policy framework to enable renewable energy expansion and develop a coal phase-down plan.

[50] Informburo.kz. (2024). *The carbon emission fee will increase in Kazakhstan.*

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Annex

Table 7 Kazakh exports of aluminium to the EU under CBAM (in tonnes per year) and emission factors of the respective products (in t CO_2eq/ t product)

Product CN Code	Description	Production volume[51] (2023, t/y)	Emission factor[52] (t CO_2eq/t product)		
			Direct	Indirect	Total
7601	Unwrought aluminium	108,293.70	1.95	5.91	7.86
7603	Aluminium powders and flakes	-	2.06	6.10	8.16
7604	Aluminium bars, rods and profiles	526.90	2.18	6.39	8.57
7605	Aluminium wire	-	2.18	6.32	8.50
7606	Aluminium plates, sheets and strip, of a thickness exceeding 0,2 mm	-	2.41	6.63	9.04
7607	Aluminium foil (whether or not printed or backed with paper, paperboard, plastics or similar backing materials) of a thickness (excluding any backing) not exceeding 0,2 mm	-	2.41	6.63	9.04
7608	Aluminium tubes and pipes	0.50	2.18	6.44	8.62
76090000	Aluminium tube or pipe fittings (for example, couplings, elbows, sleeves)	-	2.18	6.44	8.62
7610	Aluminium structures (excluding prefabricated buildings of heading 9406) and parts of structures (for example, bridges and bridge-sections, towers, lattice masts, roofs, roofing frameworks, doors and windows and their frames and thresholds for doors, balustrades, pillars and columns); aluminium plates, rods, profiles, tubes and the like, prepared for use in structures	21.10	2.18	6.44	8.62
76110000	Aluminium reservoirs, tanks, vats and similar containers, for any material (other than compressed or liquefied gas), of a capacity not fitted with mechanical or thermal equipment exceeding 300 litres, whether or not lined or heat-insulated, but	-	2.41	6.63	9.04
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	-	2.41	6.63	9.04
76130000	Aluminium containers for compressed or liquefied gas. Collapsible tubular containers	-	2.41	6.63	9.04
7614	Stranded wire, cables, plaited bands and the like, of aluminium, not electrically insulated	-	2.18	6.32	8.50
7616	Other articles of aluminium	2.10	2.32	6.50	8.82

[51] Based on Eurostat statistics

[52] Based on values calculated for Kazakhstan in Vidovic, D., Marmier, A., Zore, L., & Moya, J. (2023). Greenhouse gas emission intensities of the steel, fertilisers, aluminium and cement industries in the EU and its main trading partners.

Table 8 Kazakh exports of steel and iron to the EU under CBAM (in tonnes per year) and emission factors of the respective products (in t CO_2eq/ t product)

Product CN Code	Description	Production volume[53] (2023, t/y)	Emission factor[54] (t CO_2eq/t product)		
			Direct	Indirect	Total
26011200	Agglomerated iron ores and concentrates, other than roasted iron pyrites	-	0.11	0.04	0.15
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	-	2.43	0.5	2.93
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	772.80	2.43	0.50	2.93
730300	Tubes, pipes and hollow profiles, of cast iron	-	2.33	0.63	2.96
7304	Tubes, pipes and hollow profiles, seamless, of iron (other than cast iron) or steel	494.20	2.38	0.53	2.91
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	179.00	2.43	0.50	2.93
7306	Other tubes, pipes and hollow profiles (for example, open seam or welded, riveted or similarly closed), of iron or steel	326.7	2.39	0.51	2.90
7307	Tube or pipe fittings (for example, couplings, elbows, sleeves), of iron or steel	42.2	2.26	0.62	2.89
7308	Structures (excluding prefabricated buildings of heading 9406) and parts of structures (for example, bridges and bridge-sections, lock-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	630.4	2.56	3.15	5.71
730900	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	8.20	2.43	0.50	2.93
7310	Tanks, casks, drums, cans, boxes and similar containers, for any material (other than compressed or liquefied gas), of iron or steel, of a capacity not exceeding 300 l, whether or not lined or heat-insulated, but not fitted with mechanical or thermal equipment	682.30	2.43	0.50	2.93
731100	Containers for compressed or liquefied gas, of iron or steel	36.60	2.43	0.50	2.93
7318	Screws, bolts, nuts, coach screws, screw hooks, rivets, cotters, cotter pins, washers (including spring washers) and similar articles, of iron or steel	21.90	2.41	0.76	3.17
7326	Other articles of iron or steel	272.20	2.43	0.50	2.93
72	Iron and steel	-	-	-	
7201	Pig iron and spiegeleisen in pigs, blocks or other primary forms	-	2.26	0.37	2.63
7202	Ferro alloys	-	-	-	-

[53] Based on Eurostat statistics

[54] For all product categories but ferrochrome, the values for Serbia from Vidovic, D., Marmier, A., Zore, L., & Moya, J. (2023). Greenhouse gas emission intensities of the steel, fertilisers, aluminium and cement industries in the EU and its main trading partners. were used. The country is similar to Kazakhstan in terms of the key parameters relevant for identifying emission factors: steel industry structure, production routes and electricity mix.

Product CN Code	Description	Production volume[53] (2023, t/y)	Emission factor[54] (t CO_2eq/t product)		
			Direct	Indirect	Total
720211	Ferro-manganese	-	-	-	-
720219		-	-	-	-
720241	Ferro-chromium[55]	38,466.70	2.07	2.57	4.64
720249		2,569.00	2.07	2.57	4.64
72026000	Ferro-nickel	1,221.70	3.48	6.28	9.76
7203	Ferrous products obtained by direct reduction of iron ore and other spongy ferrous products, in lumps, pellets or the like; iron having a minimum purity of 99.94%, in lumps, pellets or similar forms	67.4	1.62	0.12	1.74
7205	Granules and powders, of pig iron, spiegeleisen, iron or steel	-	2.34	0.46	2.8
7206	Iron and non-alloy steel in ingots or other primary forms (excluding iron of heading no. 7203)	-	2.43	0.50	2.93
7207	Iron or non-alloy steel; semi-finished products thereof	-	2.43	0.50	2.93
7208	Iron or non-alloy steel; flat-rolled products of a width of 600mm or more, hot-rolled, not clad, plated or coated	17,200.40	2.43	0.50	2.93
7209	Iron or non-alloy steel; flat-rolled products, width 600mm or more, cold-rolled (cold-reduced), not clad, plated or coated	3	2.43	0.50	2.93
7210	Iron or non-alloy steel; flat-rolled products, width 600mm or more, clad, plated or coated	484.2	2.43	0.50	2.93
7211	Iron or non-alloy steel; flat-rolled products, width less than 600mm, clad, plated or coated	-	2.43	0.50	2.93
7212	Iron or non-alloy steel; flat-rolled products, width less than 600mm, clad, plated or coated	379	2.43	0.50	2.93
7213	Iron or non-alloy steel; bars and rods, hot rolled, in irregularly wound coils	8,805.30	2.43	0.50	2.93
7214	Iron or non-alloy steel; bars and rods, not further worked than forged, hot-rolled, hot drawn or hot-extruded, but including those twisted after rolling	11,892.20	2.43	0.50	2.93
7215	Iron or non-alloy steel; bars and rods, n.e.c. in chapter 72	-	2.43	0.50	2.93
7216	Iron or non-alloy steel, angles, shapes and sections	0.4	2.43	0.50	2.93
7217	Wire of iron or non-alloy steel	2,153.10	2.43	0.50	2.93
7218	Stainless steel in ingots or other primary forms; semi-finished products of stainless steel	1,572.70	2.25	2.44	4.69
7219	Stainless steel; flat-rolled products of width of 600mm or more	-	2.26	2.45	4.71
7220	Stainless steel; flat-rolled products of width less than 600mm	-	2.26	2.45	4.71
7221	Stainless steel bars and rods, hot-rolled, in irregularly wound coils	-	2.26	2.45	4.71
7222	Stainless steel bars and rods, angles, shapes and sections	1.60	2.25	2.44	4.69
7223	Stainless steelwire	-	2.25	2.44	4.69
7224	Alloy steel in ingots or other primary forms, semi-finished products of other alloy steel	-	2.31	0.57	2.88
7225	Alloy steel flat-rolled products, of a width 600mm or more	-	2.32	0.59	2.91
7226	Alloy steel flat-rolled products, of a width of less than 600mm	-	2.32	0.59	2.91
7227	Steel, alloy; bars and rods, hot-rolled, in irregularly wound coils	-	2.32	0.59	2.91
7228	Alloy steel bars, rods, shapes and sections; hollow drill bars and rods, of alloy or non-alloy steel	196.3	2.31	0.57	2.88
7229	Wire of other alloy steel.	-	2.32	0.57	2.89

[55] The emission factors are own calculations based on Kazchrome. (2018-2023) Annual reports.

Table 9 Kazakh exports of fertilisers to the EU under CBAM (in tonnes per year) and emission factors of the respective products (in t CO_2eq/ t product)

Product CN Code	Description	Production volume[56] (2023, t/y)	Emission factor[57] (t CO_2eq/t product)		
			Direct	Indirect	Total
2814	Ammonia; anhydrous or in aqueous solution[58]	3,426.60	2.90	0.15	3.05
3102	Fertilizers; mineral or chemical, nitrogenous	-	-	-	-
310210	Fertilizers, mineral or chemical; nitrogenous, urea, whether or not in aqueous solution	-	1.78	0.12	1.90
310280	Fertilizers, mineral or chemical; nitrogenous, mixtures of urea and ammonium nitrate in aqueous or ammoniacal solution	52.50	1.28	0.06	1.34
310240	Fertilizers, mineral or chemical; ammonium nitrate with calcium carbonate or other inorganic non-fertilizing substances, mixtures thereof	-	1.77	0.06	1.83
310221	Fertilizers, mineral or chemical; nitrogenous, ammonium sulphate	-	0.86	0.09	0.95
310230	Ammonium nitrate, whether or not in aqueous solution[59]	20,159.50	3.01	0.23	3.24
310229	Fertilizers, mineral or chemical; nitrogenous, other than ammonium sulphate	-	-	-	-
310290	Fertilizers, mineral or chemical; nitrogenous, other kinds including mixtures not specified in the foregoing subheadings	17.70	-	-	-
310260	Fertilizers, mineral or chemical; nitrogenous, double salts and mixtures of calcium nitrate and ammonium nitrate	-	1.87	0.08	1.95
310250	Fertilizers, mineral or chemical; nitrogenous, sodium nitrate	-	3.99	0.07	4.06
280800	Nitric acid; sulphonitric acids	-	2.56	0.05	2.61
283421	Nitrates; of potassium	-	1.82	0.06	1.88
310510	Fertilizers, mineral or chemical; in tablets or similar forms or in packages of a gross weight not exceeding 10kg	-	-	-	-
310520	Fertilizers, mineral or chemical; containing the three fertilizing elements nitrogen, phosphorus and potassium	65.90	1.23	0.11	1.34
310551	Fertilizers, mineral or chemical; containing nitrates and phosphates	13,073.40	1.29	0.11	1.40
310559	Fertilizers, mineral or chemical; containing the two fertilizing elements nitrogen and phosphorus, other than nitrates and phosphates	22,345.90	1.29	0.11	1.40
310590	Fertilizers, mineral or chemical; n.e.c. in heading no. 3105	-	-	-	-

[56] Based on Eurostat statistics

[57] For all product categories but ammonia (2814) and ammonium nitrate (310230) the emission factors reflect the weighted average from Vidovic, D., Marmier, A., Zore, L., & Moya, J. (2023). Greenhouse gas emission intensities of the steel, fertilisers, aluminium and cement industries in the EU and its main trading partners. The emission factors for ammonia and ammonium nitrate are calculated based on KazAzot. (2023). Sustainability Report 2023.

[58] The emission factors for this product category are calculated based on KazAzot. (2023). Sustainability Report 2023.

[59] The emission factors for this product category are calculated based on KazAzot. (2023). Sustainability Report 2023.

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