

T.C.
TURKISH-GERMAN UNIVERSITY
INSTITUTE OF SOCIAL SCIENCES
INTERNATIONAL FINANCE DEPARTMENT

EU'S CARBON BORDER ADJUSTMENT MECHANISM
AND ITS IMPACT ON TÜRKİYE'S EXPORTS TO THE
EU

MASTER'S THESIS

Üsame Güner

ADVISOR

Prof. Dr. Elif Nurođlu

ISTANBUL, July 2023

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208106009

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I hereby declare that this thesis is an original work. I also declare that, I have acted in accordance with academic rules and ethical conduct at all stages of the work including preparation, data collection and analysis. I have cited and referenced all the information that is not original to this work.

Üsame Güner

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Firstly, I express my gratitude to my advisor, Prof. Dr. Elif Nurođlu, who, throughout the process of writing this thesis, not only broadened my horizons with her guidance and recommendations but also provided constructive support, enabling me to navigate this journey efficiently.

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ÖZET

AB'NİN SINIRDA KARBON DÜZENLEME MEKANİZMASI VE TÜRKİYE'NİN AB İHRACATINA ETKİSİ

Bu çalışma, AB'nin Yeşil Mutabakat ile getirdiği ticari yükümlülüklerin Türkiye'yi nasıl etkileyeceğini 2018-2021 yılları arasında gerçekleşen Türkiye - AB ticaretini temel alarak göstermeyi amaçlamaktadır. Çalışmanın odaklandığı ana alan AB'nin Yeşil Mutabakat hedeflerini uygulamada en önemli enstrümanlardan biri olan Sınırdaki Karbon Düzenleme Mekanizması'nın Türkiye'nin AB'ye olan ihracatına etkisinin analiz edilmesidir. Sınırdaki Karbon Düzenleme Mekanizması ile AB, ithalat yaptığı ülkelerden gelen demir-çelik, alüminyum, gübre, elektrik, çimento ve hidrojenin üretimi ve ithalatı neticesinde ortaya çıkan karbon emisyonlarının faturalandırılmasını amaçlamaktadır. Bu çalışmada Türkiye'nin AB ile ticaret hacmi ele alınarak Türkiye-AB ticaret dengesi ürün bazlı olarak analiz edilmiş, AB'nin Emisyon Ticaret Sistemi hakkında ayrıntılı bilgi verilerek, Sınırdaki Karbon Düzenleme Mekanizmasının getireceği yükümlülükler incelenmiştir. Çalışma bulgularına göre SKDM'ye tabi ürünler Türkiye'nin AB'ye yaptığı toplam ihracatının yaklaşık %10,5'ini oluşturmaktadır. SKDM özellikle elektrik, gübre ve çimento sektörlerinde Türkiye'nin ihracat maliyetlerini önemli ölçüde artıracaktır.

Anahtar Kelimeler: Avrupa Yeşil Mutabakatı, Sınırdaki Karbon Düzenleme Mekanizması, Türkiye-AB Ticareti, Karbon emisyon maliyeti

ABSTRACT

EU'S CARBON BORDER ADJUSTMENT MECHANISM AND ITS IMPACT ON TÜRKIYE'S EXPORTS TO THE EU

This study aims to demonstrate how trade obligations imposed by the EU's Green Deal will affect Türkiye, based on Türkiye-EU trade data from 2018 to 2021. The main focus of this study is to analyse the impact of the Carbon Border Adjustment Mechanism (CBAM), one of the key instruments for implementing the EU's Green Deal objectives, on Türkiye's exports to the EU. With the CBAM, the EU aims to bill carbon emissions resulting from the production and import of goods in iron and steel, aluminium, fertilisers, electricity, cement and hydrogen sectors. In this study, Türkiye's trade volume with the EU has been taken into account, and the product-based analysis of the Türkiye-EU trade balance has been conducted. In this study, detailed information about the EU Emission Trading System has also been provided and the obligations of the Carbon Border Adjustment Mechanism were explained. Our results indicate that the products subject to CBAM account for approximately 10.5% of Türkiye's total exports to the EU. CBAM will significantly increase export costs for Türkiye, especially in the electricity, fertiliser, and cement sectors.

Keywords: European Green Deal, Carbon Border Adjustment Mechanism, Türkiye-EU Trade, carbon emission cost

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LIST OF ABBREVIATIONS

CBAM	:	Carbon Border Adjustment Mechanism
CU	:	Customs Union
EC	:	European Commission
EEC	:	European Economic Community
EGD	:	European Green Deal
ETS	:	Emissions Trade System
EU	:	European Union
FAO	:	Food and Agriculture Organization of the UN
FTA	:	Free Trade Agreement
GHG	:	Greenhouse gases
NIR	:	National Inventory Report
STIC	:	Standard International Trade Classification
TURKSTAT	:	Turkish Statistical Institute
UCC	:	Union Customs Code
UN	:	United Nations
USA	:	United States of America
WTO	:	World Trade Organization

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1. INTRODUCTION

In a world where everybody aims to express themselves via various types of communication, trade may be the most important tool that states use in order for their voice to be heard. One state's efforts for trading with another state may also seem as its' ambition to augment their citizens' welfare.

In today's world, countries are increasingly interdependent on each other while striving to protect their economic interests and provide a better world for their citizens. Consequently, combining forces to achieve economic success becomes meaningful for nations. The European Union (EU), along with its member states, is working towards creating a better world for its citizens, emphasizing the importance of sustainable economy and digital transformation. Türkiye, being a country with a significant trade volume with the EU and having strong ties like the Customs Union (CU) and EU membership process, considers the EU's social, political, and economic perspectives crucial.

The European Green Deal (EGD) reflects the EU's most significant concerns by aiming to reduce greenhouse gas emissions that harm the environment. The Carbon Border Adjustment Mechanism (CBAM) is envisioned as a tool to apply the EU's emission trading system to imports, raising awareness among trading partners. As a result, countries with substantial trade volume with the EU, like Türkiye, are likely to be significantly affected by the CBAM.

Türkiye has expressed how it might be influenced by the EU's policies and what policies it can formulate in response to the "Green Deal Action Plan". Sectoral studies and ongoing efforts with sector representatives are being conducted to understand the impact of CBAM on Türkiye. These studies are essential as they take into account Türkiye's current production and emission values within the framework of the EGD and its obligations.

This study aims to highlight the significance of commerce in achieving the EU's Green Deal objectives and to present the sectoral effects of CBAM on Türkiye, considering Türkiye's historical ties and trade volume with the EU. The objectives, policies, and relationship with digital transformation aspect of the European Green Deal are elaborated. Moreover, detailed information on the EU's CBAM is provided. Thus, in this study, the main questions I sought the answer are: (1) What is the share of products that are subject to the CBAM in Türkiye's total exports to the EU? (2) How high are the emissions from the production of these CBAM products? (3) What are the associated costs for these emissions if the CBAM is applied?

In the analyses conducted in this thesis, it was seen that the products falling under the scope of the CBAM have been observed to constitute a significant portion, approximately 10% of Türkiye's total exports to the EU. Based on previous data, it was predicted that sectors such as electricity, fertilizers, and cement, which have high production volumes, will be most affected by the CBAM.

The structure of this thesis is as follows. In Chapter 2, literature review conducted on the subjects of the EGD, EU's Trade and the ETS, which contributes to the preparation of the CBAM infrastructure. In Chapter 3, Türkiye's relation with the EU and its foundational institutions have been presented chronologically. The EU's trade with its trading partners, including the countries with the highest trade volume, and Türkiye's import and export figures have been provided, reflecting the EU's approach to trade and its new trade policies. The trade volume between Türkiye and the EU, as well as the Türkiye-EU trade balance, have been discussed, and a product-based analysis has been presented. In Chapter 4, the EU's CBAM obligations have been explained in detail, and the process of its implementation has been described. Subsequently, an examination of Türkiye's exports to the EU in relation to CBAM obligations has been summarized and associated costs in five sectors were calculated. Finally, the thesis was concluded.

2. LITERATURE REVIEW

2.1. EUROPEAN GREEN DEAL

The EGD is EU's response as growth strategy to climate and environmental challenges that aims to transform the EU into a more prosperous society with a sustainable economy, protect EU's natural capital and eradicate emission of greenhouse gases (GHG) by 2050 (Rayner, Szulecki, Jordan, & Oberthür, 2023).

According to the EU, climate change and natural debasement are existential dangers to Europe and the world (Domorenok & Graziano, 2023). To overcome these challenges, the EGD will change the EU into a resource-efficient and competitive economy, ensuring no net emanations of nursery gasses by 2050 and economic development decoupled from asset use. The EGD will be consisting of EU's objectives such as: *“increasing the EU's climate ambition for 2030 and 2050; supplying clean, affordable and secure energy; mobilising industry for a clean and circular economy; building and renovating in an energy and resource efficient way, accelerating the shift to sustainable and smart mobility; designing a fair, healthy and environmentally-friendly food system; preserving and restoring ecosystems and biodiversity”* (European Commission, 2022a).

The EC has underlined the importance of climate change and demonstrated a long-term goal of attaining carbon neutrality by 2050 (Claeys, Tagliapietra, & Zachmann, 2019). Even though the EU has already begun to modernise and transform the economy with the aim of climate neutrality by reducing its GHG emissions by 23% while the economy grew by 61% between 1990 and 2018, current policies will only decrease GHG emissions by 60% by 2050. Therefore, the Commission has declared an additional target for 2030 to reduce its greenhouse gas emission at least by 50% in comparison with 1990 levels (Almeida, et al., 2023). The Commission proposes to reduce emissions via the growth of the market for zero-and low emissions vehicles, to lead the greener industrial revolution with the aim to renovate 35 million building and create additional green jobs in construction sector thanks to the electrification of the

economy and using renewable energy, to set a benchmark of 49% of renewables in buildings, to increase the share of renewable energy usage as 40% and to increase energy efficiency by reducing energy consumption by 36% - 39% and to be a pioneer for green transition of the world by working with international partners at the United Nation's (UN) COP26 (European Commission, 2022a). In contemplation of decline in GHG emissions worthwhile and in a manner that promotes economic efficiency, the parliament has launched an ETS (Dechezleprêtre, Nachtigall, & Venmans, 2023).

In March 2020, the EC has regulated its Green Deal objectives with European Climate Law in which, by June 2021, the EC shall assess the necessary amendments to its legislation implementing the EU's 2030 target to facilitate achieving emission reductions of 50 to 55% in an economically efficient manner (Woerdman, Roggenkamp, & Holwerda, 2022). The Commission has displayed its commitment to achieving climate objectives by declaring its intention to take significant measures, including adopting legislative proposals, implementing appropriate instruments, and offering incentives to mobilize investments towards its goals; additionally, the EU's collective progress and adaptation will be assessed by September 2023 and every 5 years thereafter. To promote scientific advice on EU's climate targets and aid EU institutions while calculating GHG emissions, a European Scientific Board on Climate Change has been established (Geden, Knopf, & Schenuit, 2023). Additionally, the Commission seeks to promote an inclusive and accessible process at all levels, involving national, regional, and local authorities, along with social partners, academic institutions, the business community, citizens, and civil society to facilitate the exchange of best practices and identify actions contributing to the achievement of the objectives (European Parliament, 2021a).

“Fit for 55” package launched in July 14, 2021 is crucially important for understanding the EU's way to climate neutrality because it has upgraded EU's climate policy framework (Von Homeyer, Oberthür, & Dupont, 2022). The EU has remarked its global leadership by acting against climate change and commitment to work with international partners to maintain a greener, fairer, wealthier world thanks to legislating

diverse policy domains such as economic sectors, climate, energy and fuels, transport, buildings, land use and forestry (European Commission, 2021a).

The EU has planned to cope with pandemic's negative effects and support transition to a greener Europe, the 2021-2027 Multiannual Financial Framework and Next-Generation-EU recovery instrument not only have notable effects EU's climate ambitions within a specified period but also influence the prioritization and tools employed in EU budgetary policies (Kölling & Hernández-Moreno, 2023). Thanks to 2021-2027 Multiannual Financial Framework with €1.211 trillion and Next-Generation-EU recovery instrument with €806.9 billion in current prices (European Commission, 2022b). In "Strategy for Financing the Transition to a Sustainable Economy" the Commission has underlined the importance of financing the transition to sustainability, resilience and contribution to financial sector, promoting consensus for global sustainable financial agenda, SME's wider access to sustainable finance (European Commission, 2021b).

The "Just Transition Fund" has been initiated with the aim of supporting climate action and environmental sustainability, with an overarching goal of allocating 30% of the EU budget to climate goals under Next Generation EU Agenda (Rayner, Szulecki, Jordan, & Oberthür, 2023). Additionally, it seeks to allocate 7.5% of spending under the multi-annual financial framework to biodiversity objectives in 2024, and increase it to 10% of annual spending in 2026 and 2027 (European Parliament, 2021b). The EU has taken further financial steps to reach its objectives such as financing investments related to green technologies, energy and resource efficiency by creating European Green Bonds (European Council, 2022a). Also, the EU has shown its commitment to cope with GHG emissions by supporting developing countries with €23.04 billion in climate finance (European Council, 2022b).

In a world where there is both economically and socially challenging atmosphere, the EU tends to evaluate this transition period toward a greener world as a unique chance to lessen inequality and promote social fairness via a new "Social Climate Fund" that allocate 72.2 billion € between 2025-2032 from the new ETS (Schlacke, Wentzien, Thierjung, & Köster, 2022). Also, the EU's endeavours to foster markets for

decarbonized new technologies and sustainable products, thereby creating sustainable, local, and skilled job opportunities across the EU, are evident through initiatives like “The Innovation Fund”, which supports businesses and SMEs in investing in clean energy (European Commission, 2021a).

The EU is aware that it has a worldwide competitive edge on goods or services that have an increased worth or desirability due to additional features, enhancements, or improvements so-called high value-added products and services (European Commission, 2020a). "A New Industrial Strategy for Europe" has been initiated by the European Commission to address the industrial ecosystem's responsibility of embracing greener and more digital practices to sustain competitiveness on the global stage (Renda, 2021). In this strategy, the EU expressed its aspiration to maintain its position as a leading global innovator in competitive industries, driving the path towards climate-neutrality and shaping the digital future (European Commission, 2020a). The EU aims to safeguard its technological and digital sovereignty, establish itself as the world leader in digital innovation and progress, and establish an all-encompassing Industrial Forum (Alcidi, Baiocco, & Corti, 2021).

The Green Deal Industrial Plan based on four cardinal pillars such as an environment of regulations that is both predictable and simplified, quicker access to ample funding, necessary skills and unrestricted trade to ensure robust supply chains launched in March 2023. Initially, the Commission suggests introducing a Net-Zero Industry Act aimed at supporting the production of crucial technologies within the EU's industrial sector (European Commission, 2023a). The Net-Zero Act will establish clear and practical criteria for identifying strategic net-zero supply chain projects, benefiting all member states by supporting accessible strategic projects, including those spanning multiple countries and regions of varying development levels (Kleimann, et al., 2023). The Act sets an EU target to achieve an annual 50Mt injection capacity for CO₂ storage in strategic sites within the EU by 2030, with contributions from EU oil and gas producers proportionate to their role (European Commission, 2023b).

European Critical Raw Materials Act proposed for ensuring stable and sustainable supply chains for the EU's eco-friendly and digital advancement in March

2023. As the demand for essential raw materials is anticipated to experience a significant rise, Europe largely depends on imports, frequently sourced from third-country suppliers with quasi-monopolistic positions (European Commission, 2023c). Thanks to European Critical Raw Materials Act, the EU aims to diversify its imports on critical raw materials while continuing its EGD objectives (Månberger, 2023).

The EU underlined importance of global engagement and international cooperation toward a greener world and also aware that the risk of carbon leakage which is actively prevented by ETS (European Commission, 2021a). The EU proposed CBAM that presented as a carbon reduction instrument, it will uphold the coherence of EU and worldwide climate policies by diminishing GHG emissions within the EU and on a global scale (Wettestad, 2023). On the other hand, the EU necessitates an improved capability to meticulously evaluate the consequences of climate and energy propositions on partner countries (Dennison & Engström, 2023). In order to counter misunderstandings regarding the intent of EU policies and to shape perceptions of climate change policies, the union must enhance its public diplomacy efforts directed at partner nations (Dennison & Engström, 2023).

The EU is challenging with on the one hand climate-related problems such as increased heat, high of level GHG emissions on the other hand digitalization related problems such as modernisation of supply chains, data privacy and so on. The “twin transition” is a term refers to take into consideration both green and digital transitions as an interdependent process (Rosa, Sassanelli, Urbinati, Chiaroni, & Terzi, 2020). The green transition is an ambition to achieve sustainability, and combat environmental destruction and the digital transition is an ambition to evaluate digital technologies for sustainability and prosperity (Joint Research Centre, 2022). Managing the “twin transition” is a key point for promoting a sustainable, fair and competitive future (Joint Research Centre, 2022). The EU aims to challenge with these problems thanks to its Green Deal and Digital Compass by green and digital transitions and started to use term the “twin transition” (Nuroğlu & Nuroğlu, 2022).

In the European Council's "Strategic Agenda 2019-2024", the Council stressed the importance of establishing a Europe that is climate-neutral, environmentally sustainable, socially just, and equitable (Thieme & Galariotis, 2020). It should effectively address the challenges arising from the green transition, technological progress, and global integration, while also safeguarding Europe's digital autonomy (European Council, 2019). Ursula von der Leyen, expressed that the major twin ecological and digital transitions lie ahead of EU, and their impact will be felt by everyone, regardless of our location or occupation (Leyen, 2020). These transitions will revolutionize the way we travel, design, produce, and consume. Furthermore, they will open up new possibilities for Europe's innovators, entrepreneurs, and industries (Leyen, 2020). The intertwined green and digital transformations will have an impact on all sectors of the EU's economy, society, and industry, as they rely on novel technological advancements, different kind of investment and innovation (European Commission, 2020a). These transitions will lead the emergence of novel products, services, markets and business models (European Commission, 2020a).

The EU's ability to achieve its climate objectives is closely linked to the significance of Europe's digital policies, which are essential in the context of the twin transition. In February 2020, the Commission released the "Shaping Europe's Digital Future" report, highlighting the necessity for a simultaneous green and digital transformation and outlining three primary objectives such as "*technology that works for people*", "*fair and competitive economy*" and "*an open, democratic and sustainable society*" to maintain EU's twin transitions (European Commission, 2020b).

2.2. EU'S TRADE POLICY

The EU holds the title of being the world's leading exporter and is an attractive option for exports for countries outside the EU. The EU offers lucrative opportunities for international trade with a vast consumer base and a unified market governed by common standards (Biedenkopf, Dupont, & Torney, 2022), while also holding exclusive authority as a collective entity to lead trade issues and negotiate international trade deals following the World Trade Organization (WTO) standards. (European Union, 2022a). The EU's all-encompassing trade strategy covers trade in commodities and services, as well as foreign direct investment (Pelkmans, 2020), with the additional implementation of mechanisms to ensure trade defence and facilitate market access, primarily to shield EU enterprises from trade barriers (Dür, Eckhardt, & Poletti, 2020). It also boosts trade by lowering tariffs and providing support programs (European Union, 2022a).

EU's exports to third countries are free and there is no restriction even though there are protective and consultative rules while exporting to other countries (European Parliament and of the Council, 2015). The protective measures are taken by the EC when there are exceptional developments on products, may the member state ask for aid or EC realise the importance of the situation (Herrmann & Trapp, 2023). In order to take protective measures, EC may request detailed data from the member state (European Parliament and of the Council, 2015). The EC may make the export of a good subject to the production of an export authorization in order to avoid a crisis situation occurring owing to a shortage of vital supplies (European Union, 2022b). Also, exports to specific nations or exports from specific EU regions may be subject to the restrictions, nevertheless, commodities that are presently en route to the EU border however, will be unaffected (European Union, 2022b). For example, during the COVID-19 outbreak, personal protective equipment, irrespective of its origin within the EU, necessitated authorization from the competent authorities of EU member countries for its export to non-EU destinations, with the exception of countries belonging to the European Free Trade Association for a limited period of time (European Commission, 2020c).

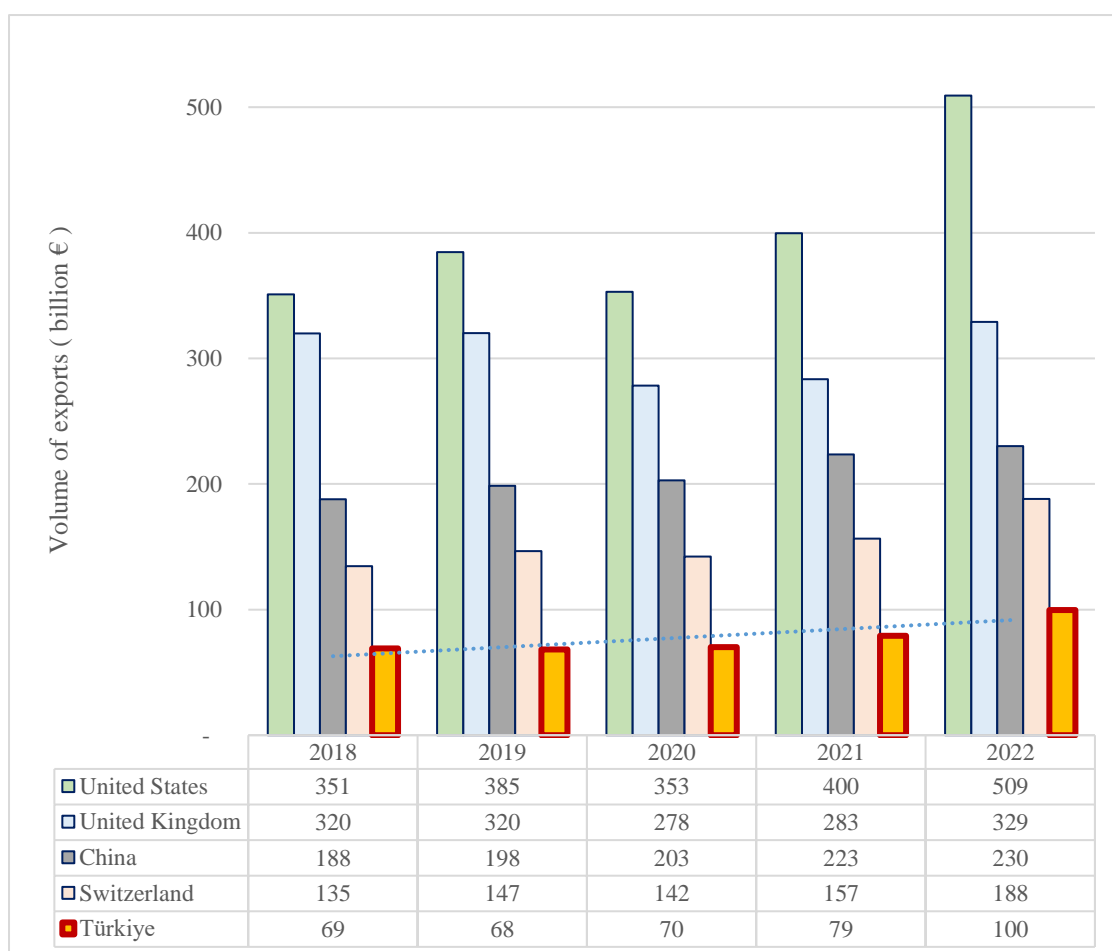


Figure 2. 1: EU's top five export partners
Source: (Eurostat, 2022)

In 2022, among €2.59 trillion total exports, United States of America (USA) has obtained the first place as export partner with 509 billion euros with 20,2% share of EU's exports; UK, China, Switzerland and Türkiye's export volumes were 329, 230, 188 and 100 billion euros as 13,1%, 9,1%, 7,5% and 4% of EU's exports respectively (Eurostat, 2022a). Additionally; Japan, Norway, South Korea, Russia and Mexico are EU's other important export partners with €72, €68, €60, €55 and €49 billion volume of exports.

The EU implements regulations for administering quotas on imports from foreign countries, promptly allocating them among applicants using specified methods, such as traditional trade flows or a "first come, first served" approach, with the allocation process being officially notified through publication in the Official Journal of the EU (European Union, 2008). There are specific rules for the various systems of quota administration, for instance, a specific portion of the quota is reserved as a priority for traditional importers or exporters, meaning those who can demonstrate previous importation into or exportation from the EU of the product specified in the quota and the EC determines the entitled quantity for these importers or exporters until the quota is fully utilized, which constitutes the process of quota allocation (European Union, 2008).

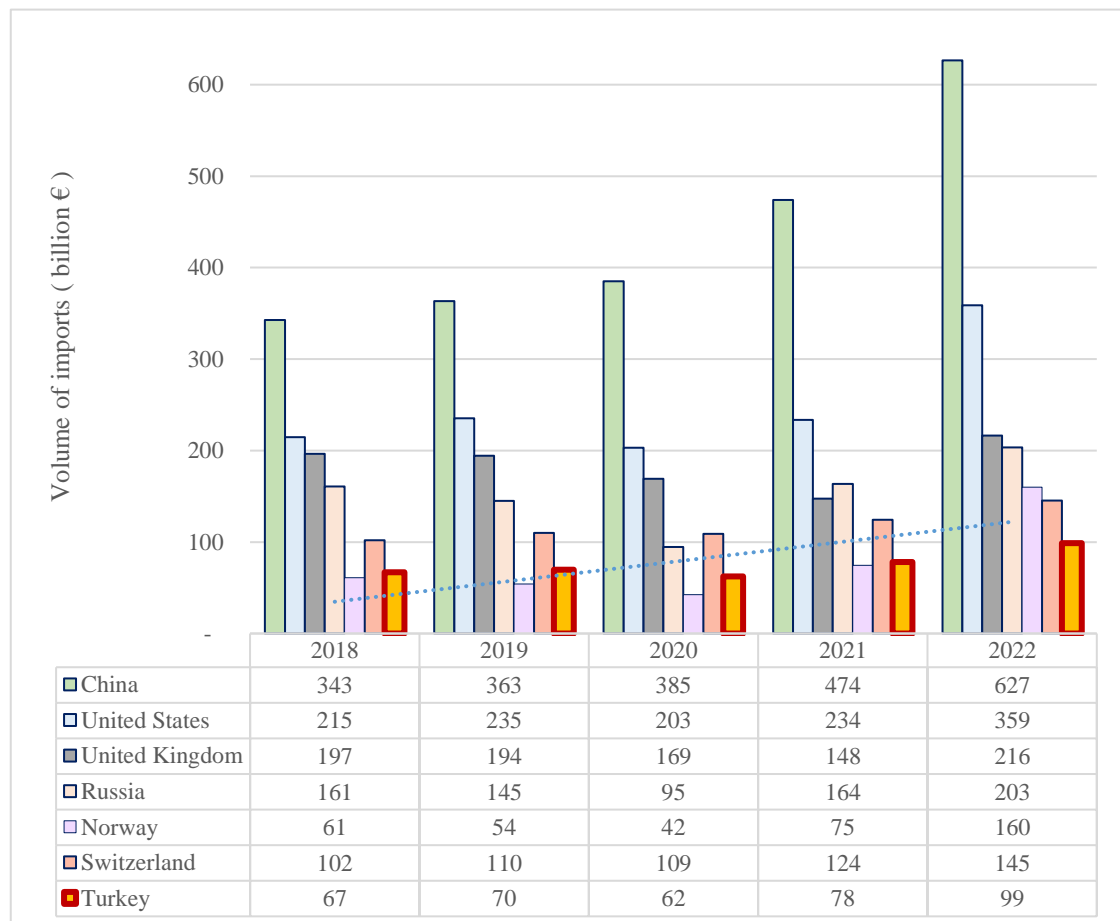


Figure 2. 2: EU's main import partners
Source: (Eurostat, 2022)

In 2022, among €2.99 trillion, China (except Hong Kong) has obtained the first place as import partner with €627 billion and 21% share of EU's exports; USA, UK, Russia, Norway, Switzerland and Türkiye's shares in EU's imports volumes were €359, €216, €203, €160, €145 and €99 billion and 12%, 7,2%, 6,8%, 5,4%, 4,9% and 3,3% of the EU's imports respectively (Eurostat, 2022a). Also, South Korea, Japan and India are EU's other important import partners with 72, 70 and 68 billion euros volume of imports (Eurostat, 2022a).

The EU can use its rights granted by international trade agreements by applying trade policy measures (European Union, 2014). For instance, it can suspend or withdraw its commitments under a global economic deal to address violations of global trade rules by non-EU countries (European Union, 2014). The EU can also seek legal recourse and negotiate fair arrangements that restore benefits for EU businesses (European Union, 2014). Additionally, the EU can take measures to rebalance commitments in accordance with economic agreements when non-EU countries change the treatment of goods from the EU (European Union, 2014). This can happen through temporary trade defence measures or long-term adjustments to tariff concessions (European Union, 2014).

To shield the EU's advantages, the EC can take on carrying out acts to adjust its exchange strategy reaction to the activities of the non-EU country concerned (European Union, 2014). Accessible exchange strategy measures are suspending levy concessions and forcing new or expanded traditions obligations; presenting or expanding quantitative limitations (amounts) on imports or commodities of products; halting privileges or benefits and presenting specific limitations in public acquisition (European Union, 2014).

The guideline lays out the Union Customs Code (UCC), setting out the basic principles and methods material to merchandise brought into or removed from the region of the European Union, adjusted to current exchange models and specialized instruments (European Union, 2013). The UCC and the related assigned and executing acts (embraced by the European Commission under the guideline) mean to offer more

noteworthy lawful assurance and consistency to businesses; increase lucidity for customs authorities all through the EU; complete the shift by customs to a completely electronic environment; simplify customs rules and strategies and work with more-proficient traditions exchanges in accordance with present day needs; reinforce swifter traditions techniques for agreeable and dependable organizations (approved monetary operators); safeguard the monetary and financial interests of the EU and of the EU Member States, as well as the wellbeing and security of EU residents (European Union, 2013).

The current trade policy of the EU has been launched in February 18, 2021 as “an open, sustainable and assertive trade policy” where EU underlined its support for member countries’ prosperity and its position as the world’s largest agricultural and manufactured goods and services trader. Free trade agreements (FTAs) with foreign countries are crucial tools for promoting EU’s values and interests. The EU has placed significant emphasis on bolstering the revival and essential restructuring of its economy, aligning with its green and digital goals, while also contributing to the formulation of global regulations that promote sustainability and equitable globalization. This endeavour aims to enhance the EU's capability to safeguard its interests and assert its rights, including independent actions whenever necessary, to effectively address economic recovery, climate change, environmental degradation, escalating international tensions, increased reliance on unilateral actions, and their implications for multilateral institutions. To promote its objectives, the EU's focal points encompass the reform of the WTO, backing the green transformation, and endorsing responsible and sustainable value chains. It also involves fostering the digital transition and trade in services, enhancing the EU's regulatory influence, intensifying partnerships with neighbouring, enlargement countries, and Africa, fortifying the implementation and enforcement of trade agreements, and guaranteeing equitable opportunities for EU enterprises. The term “Open Strategic Autonomy” is an important notion that defines EU’s ambitions to forge its own path on the international scene, exerting influence on the global stage through leadership and active involvement while upholding its principles and safeguarding its interests (European Commission, 2021c).

2.3. EU EMISSIONS TRADE SYSTEM

In 1997, The EU committed to limit emissions for six main GHG such as Carbon dioxide, Methane, Nitrous oxide, Hydrofluorocarbons, Perfluorocarbons and Sulphur hexafluoride by 8% with Kyoto Protocol (UNFCCC, 2008). The EU's Green Paper launched in 2000 with aims to implement a broad initiative to trade GHG emissions among community members (Christiansen C. & Wettestad, 2003). The EC defines emissions trade as “...a scheme whereby companies are allocated allowances for their emissions of greenhouse gases according to the overall environmental ambitions of their government, which they can trade subsequently with each other” (European Commission, 2000).

The Directive on establishing a scheme for GHG emission allowance trading within the Community and amending Council Directive 96/61/EC was launched in October 2003 (Delvaux & Leuven, 2005). Its purpose was to effectively fulfill the EU's commitments on reducing GHG emissions through a well-organized European market in GHG emission allowances (Holder & Lee, 2007). To ensure a balance between economic development and employment, member states are responsible for ensuring that no installation undertakes any activity resulting in emissions specified in relation to that activity (e.g., coking ovens, metal ore roasting, or sintering) unless its operator possesses a permit issued by a competent authority in accordance with the Directive. (European Council, 2003).

The envisaged requirement for GHG permits includes providing a detailed account of the installation and its operations, including technology, raw materials, auxiliary substances, emission sources, and proposed monitoring and reporting measures following the prescribed guidelines (Yamin, 2012). Additionally, the permit application should also include a non-technical explanation outlining the essential details (Galizzi & Sands, 2006).

The competent authority will issue a GHG emissions permit, allowing the emission of GHG from an installation or part thereof, once it is satisfied that the operator

has the capacity to monitor and report emissions (Fisher, Lange, & Scotford, 2013). A single GHG emissions permit can encompass multiple installations under the same operator at the same site (Sigel, 2008).

During the three-year period commencing on 1 January 2005 (Phase 1) and the five-year period commencing on 1 January 2008(Phase 2), each Member State was required to formulate a national plan outlining the intended allocation of allowances for the respective period and the proposed allocation methodology (Spinelle, 2017). The plan was to be devised using objective and transparent criteria, while also considering input from the public through a participatory process also during the Phase 1 (Nakanishi, 2016). Member States were obligated to allocate a minimum of 95% of the allowances free of charge and similarly, for the Phase 2, member States were required to allocate at least 90% of the allowances free of charge (Colangelo, 2012).

Prior to the initiation of phases 1 and 2 of the EU ETS, member states individually determined the allocation of their emission allowances by utilizing national allocation plans (NAPs) and this decentralized approach not only established the overall cap for the EU as a collective sum of the NAPs, but also established specific guidelines for the allocation of allowances to individual installations (Grubb, Betz, & Neuhoff, 2014).

During Phase 1, each Member State decided on the total quantity of allowances it would allocate for that period and how those allowances would be distributed to each installation's operator, with this decision made at least three months prior to the period's commencement and based on its national allocation plan (Robinson, 2007). During phase 1, efforts were made to establish a carbon price (Murray, 2009), facilitate the unrestricted trade of emission allowances across the EU (Antes, Hansjürgens, & Letmathe, 2006), and develop the necessary infrastructure to monitor, report, and verify emissions from the relevant businesses (Hinrichs-Rahlwes, 2013). In this phase, only two sectors, namely “power generators and energy-intensive industries”, were subject to CO₂ emissions coverage, most allowances were allocated to businesses at no cost, while non-compliance incurred a penalty of €40 per tonne (European Commission,

2023e). Due to the lack of reliable emissions data, caps for phase 1 were determined based on estimates, thus the total number of issued allowances exceeded actual emissions, resulting in a surplus supply that significantly surpassed demand and this surplus led to the price of allowances plummeting to zero in 2007 (European Commission, 2023e).

In Phase 2 and for each subsequent five-year period, each member state determined the total quantity of allowances it would allocate for that period and commenced the process of allocating those allowances to each installation's operator. This decision was made at least 12 months before the beginning of the relevant period and was based on the Member State's national allocation plan (European Council, 2003). In phase 2 of the EU ETS, notable changes included a lower cap on allowances (approximately 6.5% lower than in 2005), the inclusion of three new countries (Iceland, Liechtenstein and Norway), the incorporation of nitrous oxide emissions from nitric acid production by certain countries, a slight decrease in the proportion of free allocation (to around 90%), an increased penalty for non-compliance (€100 per tonne), and the allowance for businesses to acquire international credits totalling approximately 1.4 billion tonnes of CO₂ have realised (European Commission, 2023e). During phase 2 of the EU emissions trading system, the cap on allowances was revised using verified annual emissions data from the pilot phase, taking into account actual emissions however, the unexpected emissions reductions resulting from the 2008 economic crisis led to a substantial surplus of allowances and credits, exerting a notable influence on the carbon price throughout the entirety of phase 2 (European Commission, 2023e).

During phase 3 between 2013 and 2020, the proposed amendments to the EU Directive 2003/87/EC aim to achieve the EU's objective of reducing GHG emissions by at least 40% below 1990 levels by 2030 (European Commission, 2015).

During phase 4 for period between 2021 to 2030, the amendments include translating the 43% GHG reduction target for the ETS into an annual cap decline of 2.2% starting from 2021 onwards, leading to an additional reduction of approximately 556 million tonnes of carbon dioxide during the period 2021-2030 compared to the

current annual decline rate of 1.74%. Moreover, the proposal strengthens harmonized rules for the free allocation of allowances to industry, aiming to mitigate carbon leakage, maintain competitiveness, and incentivize low-carbon technology investment despite limited allowances. Targeted rules are implemented through aligned production data, updated benchmarks, and addressing both direct and indirect carbon costs. Additionally, funding mechanisms are introduced to support the power sector and industry in their transition to a low-carbon economy. These mechanisms encompass support for innovative technologies, breakthrough innovation, modernization of the power sector in lower-income member states through the free allocation of allowances, and the establishment of a specialized fund designed to support investments in energy system modernization and energy efficiency enhancements. This additional funding leverages existing collaboration between the Commission and the European Investment Bank, drawing on elements from the European Fund for Strategic Investments as applicable (European Commission, 2015).

The Market Stability Reserve (MSR), which is designed to address the surplus of emission allowances and enhance the resilience of the EU ETS, has undergone significant reinforcement (Perino & Willner, 2016). From 2019 to 2023, the proportion of allowances allocated to the reserve will double, reaching 24% of the total circulating allowances (Bruninx, Ovaere, & Delarue, 2020). Commencing in 2024, the standard replenishment rate of 12% will be reintroduced. As a permanent strategy to enhance the efficiency of the EU ETS, unless otherwise determined during the initial review of the MSR in 2021, the quantity of allowances held in the reserve will be capped at the prior year's auction volume starting from 2023, and any surplus allowances will become invalid (European Commission, 2015).

To facilitate the transition of “energy-intensive industrial sectors and the power sector” to a low-carbon economy, a range of funding mechanisms will be introduced, including the establishment of the Innovation Fund that will offer financial support for demonstrating innovative technologies and breakthrough innovations in the industrial sector, with the funding allocation determined by the market value of no less than 450 million emission allowances. To support the modernization of the power sector, broader

energy systems, and promote energy efficiency while ensuring a just transition in carbon-dependent regions of 10 lower-income member states, the Modernisation Fund will be established; furthermore, lower-income member states will have the opportunity to access the optional transitional free allocation (European Commission, 2019).

3. TÜRKİYE AND THE EU'S TRADE

3.1. TÜRKİYE AND THE EU

Türkiye applied for membership in the European Economic Community (EEC), only 19 months after EEC was founded, on July 31, 1959. In order to bolster the trade between Türkiye and EEC and increase the degree of workforce participation as well as well-being of Turkish citizens (Ankara Agreement, 1964), Türkiye and EEC signed Ankara Agreement on September 12, 1963 which entered into force on December 1, 1964. In Ankara Agreement, these following steps were foreseen; firstly, a period where Türkiye was obliged to strengthen its economy, secondly a period where Türkiye must align its economic policies with EEC and finally both parties create the CU (Ankara Agreement, 1964).

Türkiye and EEC signed an additional protocol on November 23, 1970, where the EEC expressed its beliefs about Türkiye's preparation for strengthening its economy that Türkiye completed the first procedure and was qualified to pass the transitional stage in where a twenty-two years period was foreseen for the establishment of the CU (Additional Protocol, 1970). The Additional Protocol entered into force on January 1, 1973 but on December 28, 1978 due to economic turmoil in Türkiye, Council of Ministers decided to postpone reductions in the taxes on the customs which were decided in Ankara Agreement and suspended its commitments (Decision from Council of Ministers, 1978). After coup d'état in September,12 1980 in Türkiye, The European Parliament demanded that the agreement between Türkiye and the EEC be suspended from the European Council and the European Commission (EC), hence relations between Türkiye and the EU were de facto halted on January 22, 1982 (European Council, 2022c).

Türkiye and EEC convened on September 16, 1986 and relations were recommenced on April 14, 1987. Afterwards Türkiye applied for full membership to EEC pursuant to article 237 of the Treaty of Rome (European Council, 2022c). The EEC responded that Türkiye was not appropriate politically and economically for the membership and the EC has not considered new accession negotiations with Türkiye (European Commission, 1989). In July 1994, the EC reaffirmed the principles of CU set out in the Ankara Agreement and The EU mentioned the implementation of the final stages of the CU between Türkiye and the EU (European Council, 2022c). The EC-Türkiye Association Council implemented final principles on the foundation on CU on March 6, 1995 (EC-Türkiye Association Council, 1995). The foundation of CU between Türkiye and EC entered into force on January 1, 1996 (European Commission, 1996). Finally, in Helsinki, following a European Council meeting in December 1999, Türkiye was granted candidate status (European Council, 2022c).

On December 2004, European Council stated that Türkiye fulfilled the criteria in order to open accession negotiations in October 2005. Türkiye's EU accession negotiations have been opened in 16 branches until today, one of which has been temporarily closed, thirteen chapters were opened between 2006 and 2010, but only one chapter could be opened between 2010 and 2013 (European Commission, 2022c).

3.2. TÜRKİYE'S TRADE WITH THE EU

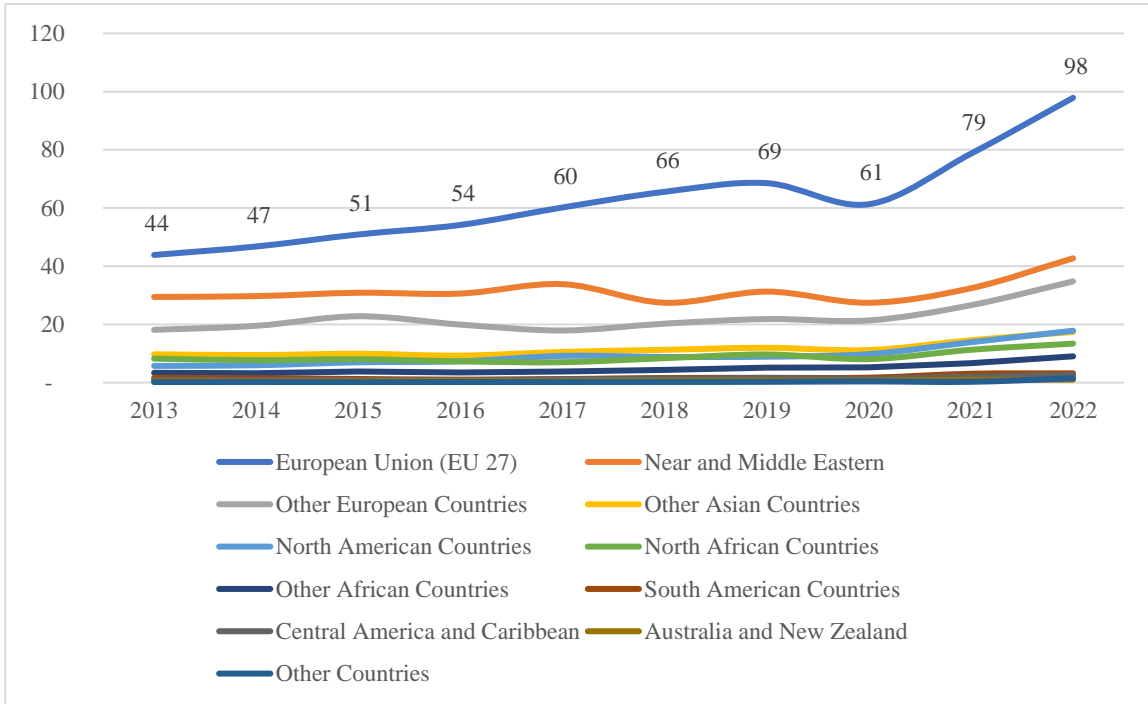


Figure 2. 3: Türkiye's Exports per region (Billion €)
Source: (TURKSTAT, 2023a)

In 2022, 40,5% of the Türkiye's exports were made to the EU which makes the EU as Türkiye's largest export partner with €98 billion (TURKSTAT, 2022a). Near and Middle East, Other European Countries, Other Asian Countries and North American countries' share in Türkiye's total exports were 17,7%, 14,4%, 7,2%, 7,3% respectively (TURKSTAT, 2022a). Comparing to 2016, even though Near and Middle Eastern countries and Other European Countries' places remained the same at second and third places respectively, their shares in total have decreased from 37,5% to 32,1% (TURKSTAT, 2022a).

During 10-year period, the EU has increased its share in Türkiye's exports from 36,1% to 40,5%, from €44 billion to €98 billion. Also, North American and Other African countries' share has increased by 2,7% and 1% with €6 billion to €18 billion (TURKSTAT, 2023a).

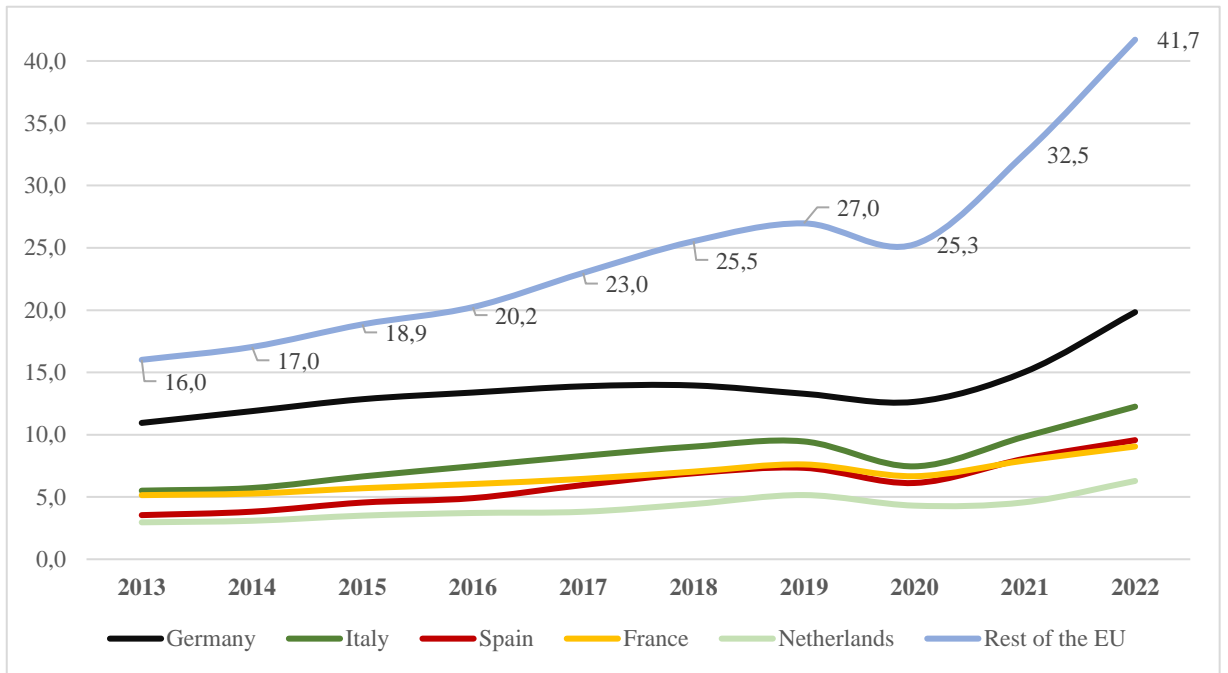


Figure 2. 4: Türkiye's Exports to EU (Billion €)
Source: (TURKSTAT, 2023b)

Germany, Italy, Spain, France and the Netherlands became the top 5 countries in the EU, where 58.8% of Türkiye's exports amounted to 57 billion Euros in 2022. (TURKSTAT, 2022b). Even though their combined share has peaked in 2015 with 63,8% and there is a decrease in trend since then, except for Spain during 10-year period (TURKSTAT, 2022b). Türkiye's exports to Ireland, Lithuania, Estonia, Poland and Finland have increased by 460%, 336%, 291%, 253% and 241%. Türkiye has also started to export goods to Cyprus (TURKSTAT, 2023a).

From 2013 to 2022, Germany has remained in the first place in terms of share in total exports within the EU but its share has decreased from 24,8% to 20,1%, Italy has remained in the same place as the second export destination, however its share is nearly the same with 12,5%, France has lost its position as the third partner to Spain and these countries shares were 11,7% and 8% respectively (TURKSTAT, 2022b). Additionally Romania, Spain, Poland, Bulgaria and Slovenia's shares in exports have increased by 1,9%, 1,7%, 1,7%, 1,3% and 0,9% respectively (TURKSTAT, 2023a).

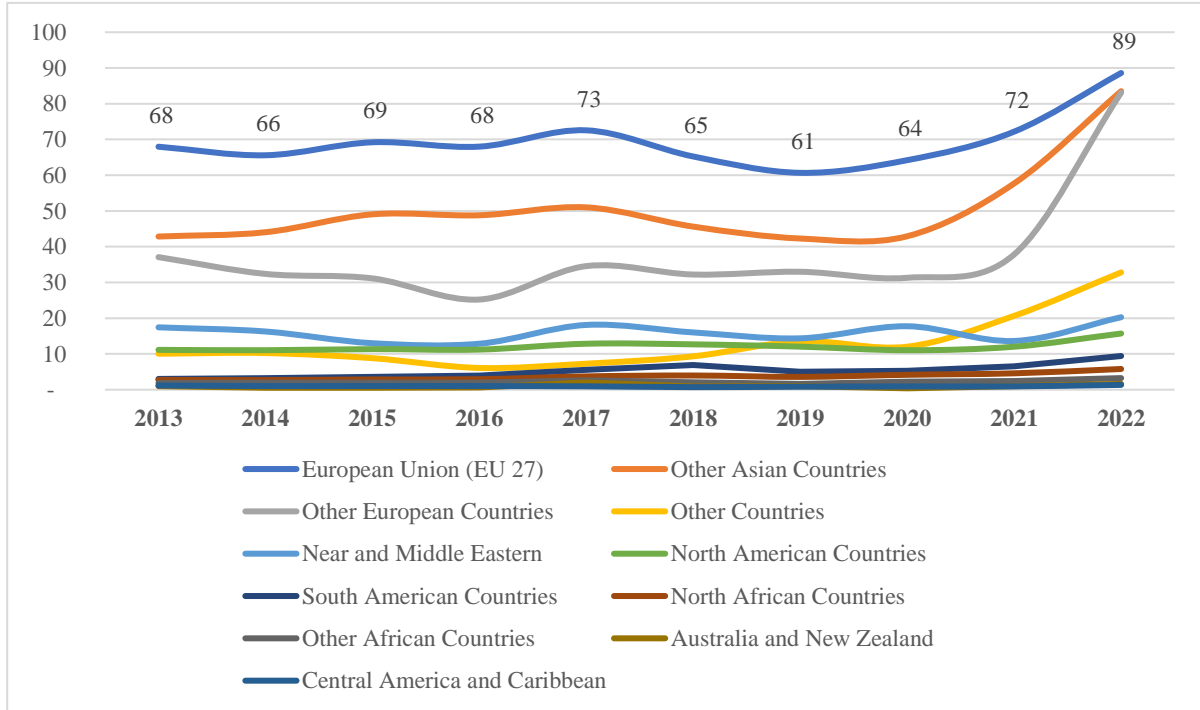


Figure 2. 5: Türkiye's imports in goods per region (Billion €
Source: (TURKSTAT, 2023a)

In 2022, 25,6% of the Türkiye's imports was coming from the EU which makes the EU as Türkiye's largest partner in regards to imports with €89 billion. Other Asian and European countries' shares in total imports were 24,2% and 24,1% respectively with €84 and €83 billion (TURKSTAT, 2023a). Comparing to 2013, Other Asian and European countries' shares in imports increased in total from 40,7% to 48,2% from €80 billion to €167 billion, Russia increased its share in Türkiye's imports from 10% to 16,2% and became the major importing country (TURKSTAT, 2023a).

During 10-year period, Türkiye's imports from the EU have declined from 34,6% to 25,6% (TURKSTAT, 2022b). Also Near and Middle Eastern countries and North American countries shares decreased from 8,9% to 5,9% and 5,7% to 4,5% respectively (TURKSTAT, 2023a).

Following Russia; China, Switzerland, the USA, India and South Korea are non-EU countries with top shares in Türkiye's imports with 11,4%, 4,2%, 4,2%, 2,9% and 2,5% and €39, €15, €14, €10 and €9 billion respectively (TURKSTAT, 2023a).

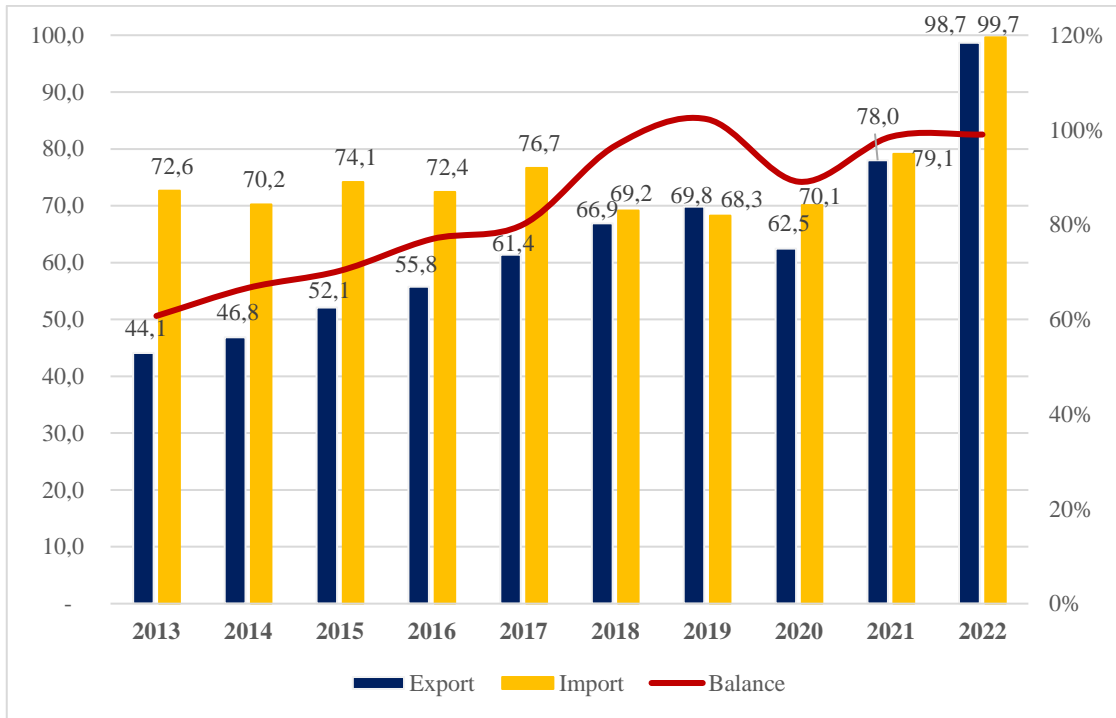


Figure 2. 6: Türkiye - EU Trade Balance by STIC
Source: (Eurostat, 2023a)

From Standard International Trade Classification (STIC) point of view, in 2022, Türkiye exported €98,7 billion to the EU and imported €99,7 billion from the EU (Eurostat, 2023a). Thus, Türkiye has increased its exports by 124% in 10-year period which realised €44.1 billion exports in 2013, and its imports increased by 37% that were €72.6 billion in 2013 (Eurostat, 2023a). Additionally, Türkiye's exports to the EU, which were 66.9 million Euros in 2018, experienced a 48% increase, reaching 98.7 million Euros as of 2022 (Eurostat, 2023a). In addition, Türkiye's imports from the EU rose from 69.2 million Euros to 99.2 million Euros during the same period (Eurostat, 2023a).

Between 2013 and 2018, Türkiye's imports from the EU were 75% higher than its exports to the EU (Eurostat, 2023a). In 2019, Türkiye's exports to the EU exceeded its imports by 2% (Eurostat, 2023a). However, from 2020 till 2022, Türkiye's imports from the EU were, on average, 5% higher than its exports to the EU (Eurostat, 2023a). The ratio of exports to imports in the EU's trade with Türkiye peaked at 165% in 2013, over a ten-year period. From this year until 2020, it followed a continuous downward trend, even falling to 98% in 2019 and the rate is 95.9% in 2022 (Eurostat, 2023a).

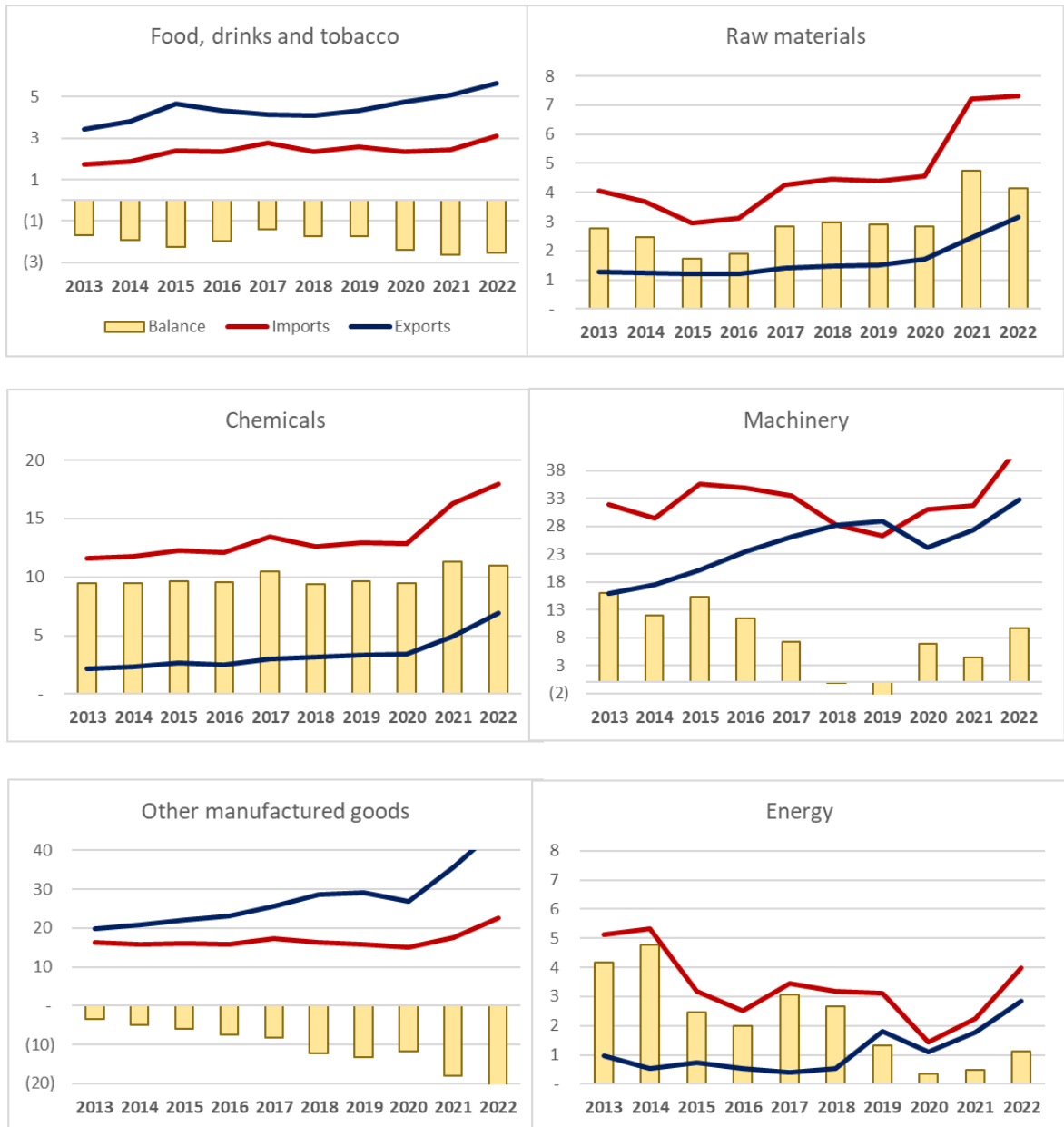


Figure 2. 7: Türkiye-EU Import-Exports by product group
Source: (Eurostat, 2023a)

Since 2013; food, drinks and tobacco, raw materials, chemicals, machinery, energy and other manufactured goods are main areas for EU and Türkiye’s trade (Eurostat, 2023b). The trade deficit for exports and imports in goods was highest due to chemicals with €9,94 billion on average between 2013 and 2022, machinery and transport equipment ranked as second among goods creating a trade deficit with €8,03 billion and the trade deficit has peaked in 2013 with €15,94 billion due to machinery

and transport equipment(Eurostat, 2023b). Despite Türkiye having a trade deficit with the EU, the food, drinks, and tobacco and other manufactured goods have been the sectors where Türkiye has had a trade surplus with the EU in the last 10 years (Eurostat, 2023a). In the "Other manufactured goods" sector, Türkiye has an average annual trade surplus of €10.98 billion (Eurostat, 2023a). In the "Food, drinks, and tobacco" sector, Türkiye has annual trade surplus of €2.03 billion on average (Eurostat, 2022).

Within the EU, Türkiye has generated a trade deficit between 16 EU countries; Germany, Netherlands, Italy, Czechia and Belgium are leading countries with €8, €2, €1,6, €0,8 and €0,7 billion on average between 2013 and 2022 (Eurostat, 2023a). In contrary, Slovenia, Romania, Spain, Portugal and Austria are leading countries where Türkiye has a trade surplus with €1,4, €1, €0,9, €0,3 and €0,2 billion on average (Eurostat, 2023a).

Following the presidential meeting with President Recep Tayyip Erdoğan of Türkiye on 6, April 2021, President of the EC Ursula von der Leyen announced that their objective is to strengthen economic relations in the first area. She underlined the EU's prominent position as Türkiye's main import and export partner. Ursula von der Leyen stated that the EU aims to stimulate trade further by addressing the current difficulties in the implementation of the Customs Union. She also emphasized the EU's commitment to modernize the framework of this unique arrangement with Türkiye. Furthermore, she highlighted that innovative approaches will be explored to foster joint efforts between public and private entities (European Commission, 2021d).

In the contemporary global context, nations are increasingly inclined to participate in bilateral and regional FTAs as the WTO's progress in achieving greater liberalization has been limited. As a consequence, there are currently over 500 FTAs, out of which 350 are actively in effect and have been duly notified to the WTO (Ministry of Trade, 2022).

3.3. TÜRKİYE'S FTAs and the EU

Türkiye's FTAs are primarily based on the Türkiye-EU CU, and these agreements are established without undermining the provisions of the WTO (Ministry of Trade, 2022). Within the framework of the CU, Türkiye harmonizes its policies with the EU's Common Commercial Policy, encompassing both autonomous regimes and preferential agreements with third parties, alongside the EU Common Customs Tariff (Ministry of Trade, 2022). The preferential trade regimes represent a significant component of Türkiye's trade policy towards third countries (Ministry of Trade, 2022).

As stipulated in Article 16 of Decision No. 1/95 of the Türkiye – EC Association Council, which pertains to the implementation of the final phase of the CU, Türkiye is required to undertake necessary measures and engage in negotiations to establish mutually beneficial agreements with the relevant countries (Ministry of Trade, 2022). In accordance with this provision, Türkiye conducts and finalizes FTAs with third countries simultaneously with the EU's negotiations (Ministry of Trade, 2022).

Given the evolving global situation, the impasse in multilateral negotiations, and recurring economic crises, the EU has chosen to prioritize bilateral trade agreements and as part of the new trade strategy known as "Global Europe" the EU initiated bilateral trade agreements with the objective of promoting growth in 2006. These agreements involved negotiations for FTAs with comprehensive provisions addressing services, investment, public procurement, and intellectual property rights (Ministry of Trade, 2022). In line with the EU's negotiations, Türkiye has undertaken its own efforts to align with the diverse topics addressed in these agreements and is actively engaging in negotiations for new-generation FTAs (Ministry of Trade, 2022).

Up until now, Türkiye has successfully finalized FTAs with 38 countries, with 11 agreements becoming nullified following these countries' accession to the EU. Currently, Türkiye has 22 active FTAs in effect, involving countries such as EFTA, Israel, Macedonia, Bosnia-Herzegovina, Palestine, Tunisia, Morocco, Egypt, Albania, Georgia, Montenegro, Serbia, Chile, Mauritius, South Korea, Malaysia, Moldova, Faroe Islands, Singapore, Kosovo, Venezuela, and the United Kingdom. Additionally, Türkiye

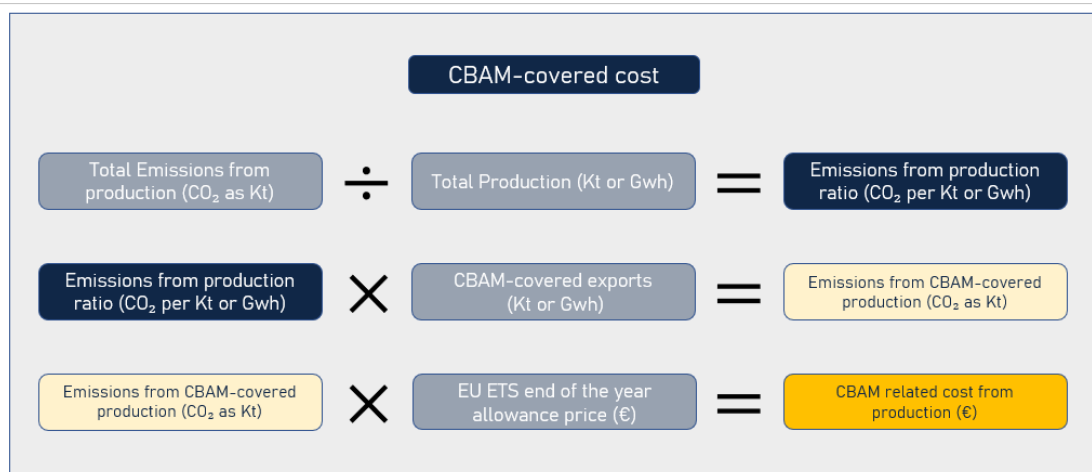
has FTAs signed with Lebanon, Qatar, and Sudan, which are currently undergoing the ratification process (Ministry of Trade, 2022). Furthermore, Türkiye is actively engaged in negotiations to expand the coverage of its current FTAs, seeking to modernize and enhance their scope. As a result, negotiations with EFTA, Serbia, Bosnia and Herzegovina, and Montenegro have reached a conclusion, while negotiations with Georgia and Malaysia are nearing their finalization (Ministry of Trade, 2022).

4. CBAM AND ITS EFFECTS ON TÜRKİYE

4.1. METHODOLOGY

In this thesis, qualitative and quantitative analyses have been used together to examine Türkiye's trade with the EU and analyse the effects of the CBAM on Türkiye's exports to the EU in 5 sectors; iron & steel, aluminium, fertiliser, electricity and cement. The analyses have been conducted on a sector-by-sector basis with the exclusion of export of hydrogen due to its volume which equals nearly zero. Using product codes from the CBAM Regulation, the total quantities of the products subject to the CBAM have been derived by consolidating TURKSTAT's product-country-based foreign trade data for the EU countries.

Figure 4.8: Steps of calculation for the CBAM-covered cost
Source: Author's own diagram



First and foremost, in order to calculate Scope 1 emissions arising solely from the production of products within the relevant sectors, the "Total Production" and "Total Emissions" quantities were proportionally analyzed by establishing the "Emissions from Production Ratio". The quantity of products subject to the CBAM was multiplied by this ratio to determine the emissions resulting from the production of products subject to the CBAM. Lastly, the year-end "Carbon Permits Price" for the respective years was multiplied.

The penalty amount per Kt for emissions resulting from the production in the relevant year was calculated by assuming the year-end Carbon price and considering the absence of any "free allowance," thereby determining the potential cost incurred from the CBAM. To achieve cost averaging despite the diversity of products and production processes within the sectors subject to the CBAM, emissions have been treated uniformly across all products within each respective sector, even though actual emissions may vary due to differing products and production processes.

For the iron and steel sector, the total production quantities and associated emissions from Türkiye's 2023 National Inventory Report (NIR) submitted to the UN were compared. The ratio was used to calculate the sector's total emissions related to the products subject to the CBAM and exported to the EU, which were then multiplied by the end-of-year ETS Carbon Price to calculate the CBAM cost.

Similarly, for the aluminium sector, the ratio of emissions to primary aluminium production data from Türkiye's 2023 NIR was applied to the total production to calculate emissions related to the products sold to the EU. These values were multiplied by the end-of-year ETS Carbon Price to calculate the CBAM cost.

For the fertiliser sector, the emission values associated with Türkiye's fertiliser exports to the EU were determined by using the emissions from the production of nitrogen fertilisers and the average emissions rate of the total production-to-total production emissions values of the United States and Canada because of their leading position on EU's imports. Based on this, the emissions generated from total production were calculated using product-specific quantities obtained from TURKSTAT's database. These emission values were then multiplied by the end-of-year ETS Carbon Price for the relevant year to calculate the CBAM cost.

For the electricity sector, the total production and export quantities were obtained from TEİAŞ, and the emissions from total production were obtained from TURKSTAT's NIR. Using these data, the GWh-CO₂ Kt ratio was calculated, and the total emissions related to electricity exported to the EU were determined based on the

total production-emission ratio. These values were multiplied by the end-of-year ETS Carbon Price to calculate the CBAM cost.

Finally, for the cement sector, the total production quantities and associated emissions from Türkiye's 2023 NIR submitted to the UN were compared. The ratio was used to calculate the sector's total emissions related to products subject to the CBAM and exported to the EU, which were then multiplied by the end-of-year ETS Carbon Price to calculate the CBAM cost.

4.2. CARBON BORDER ADJUSTMENT MECHANISM (CBAM)

A "carbon border adjustment mechanism" refers to a policy in which a region implementing carbon pricing imposes import tariffs according to the carbon content of imported goods (Kimberly & Wolfram, 2023). As a part of the EGD, CBAM has announced in the EGD with the aim to attain the goal of a climate-neutral EU by 2050 in accordance with the Paris Agreement, while also mitigating the risks of carbon leakage (Marcu, Mehling, & Cosbey, 2020). The EU's CBAM is a mechanism that incorporates carbon pricing for imported goods from third countries based on non-preferential rules of origin, as well as for domestic products (Reif & Hancher, 2022). The CBAM serves as an alternative to address carbon leakage in the EU's ETS that aims to prevent the EU's emission reduction efforts from being counteracted by increased emissions outside the EU due to production relocation or higher imports of products with higher carbon intensity (Jakob & Mehling, 2023). The effectiveness of the CBAM in preventing carbon leakage depends on policy stringency, with broader carbon coverage, wider product range and higher CBAM prices contributing to its effectiveness, but protection of domestic competitiveness and minimizing global welfare costs are not always guaranteed (Zhong & Pei, 2023). In order to counteract carbon leakage, it's important to enhance the CBAM with supplementary measures like providing refunds on exports (Ambec, Esposito, & Pacelli, 2023).

The Regulation of the European Parliament and of the Council establishing a CBAM was launched on 10 May 2023 (Atagher, 2023). The CBAM system possesses unique features when compared to the EU ETS, notably in regards to the computation of CBAM certificate prices (Simola, 2021), the tradability of these certificates, and their duration of validity (European Commission, 2023f). These features that are implemented to maintain the CBAM's effectiveness in preventing carbon leakage over time also aim to strike a balance that minimizes excessive burdens on operators and administrative resources, while providing a certain degree of adaptability similar to that of the EU ETS (European Commission, 2023f). The pricing of CBAM certificates should reasonably reflect auction prices, utilizing weekly average calculations (Marín Durán, 2021). These weekly averages closely mirror the price fluctuations of the EU ETS, allowing importers to leverage price changes while ensuring the system remains administratively feasible (European Commission, 2023f).

In order to facilitate the transition for related countries, the EU has set a two-year transitional period starting 1 October 2023 (Bellora & Fontagné, 2023). Every importer or the indirect customs representative, the representative shall act his or her own name (European Commission, 2013) but agrees to act on behalf of the importer, who has imported goods within a specific quarter of a calendar year must submit a report (referred to as the 'CBAM report') to the Commission (Hufbauer, Schott, Hogan, & Kim, 2022). The report should contain information on the total quantity of each type of goods, the actual total embedded emissions, the total indirect emissions, and the carbon price attributed to the embedded emissions in the imported goods for the country of origin. During the transitional period, the report must be submitted no later than one month after the conclusion of each quarter (European Commission, 2023f). The last CBAM report is scheduled for submission for the last quarter of 2025 and should be sent by 31 January 2026 (EY, 2023). The EC will assess the CBAM reports submitted, and in case a report is found to be inaccurate or lacking crucial information, the EC will notify the relevant authority of the Member State where the importer or the indirect customs representative is located (European Commission, 2023f). The competent authority will

then be required to provide any additional information considered necessary by the EC to correct or improve the completeness of the report (European Commission, 2023f).

The CBAM should be based on a declarative system, where an authorized CBAM declarant, capable of representing multiple importers, will annually submit a declaration detailing the embedded emissions in the goods imported into the customs territory of the EU (Sato, 2022). Subsequently, the declarant shall surrender the corresponding number of CBAM certificates based on the declared emissions (European Commission, 2023f). The primary CBAM declaration contains information about the aggregate amount of each category of goods imported during the previous calendar year measured in megawatt-hours for electricity and in metric tons for other goods, the cumulative embedded emissions in the goods, the overall number of CBAM certificates to be surrendered and copies of verification reports issued by accredited verifiers, pertaining to the calendar year 2026, are required to be submitted by 31 May 2027 (European Commission, 2023f).

The CBAM is designed to align with the sectors and emissions covered by the EU ETS, encompassing the same sector coverage, and it follows the climate logic of the EU ETS by prioritizing sectors with the highest absolute emissions, as they have the most significant impact such as cement, iron, steel, aluminium, fertiliser, hydrogen and electricity (Benson, Majkut, Reinsch, & Steinberg, 2023) which accounts for more than 50% percent of the emissions in ETS. The carbon intensity of goods is a crucial aspect of the CBAM as it represents the GHG emissions, measured in carbon dioxide equivalent (CO_{2e}), emitted during their production overseas which is done to ensure that imported products receive equitable treatment compared to domestically produced goods within the EU ETS framework. Since EU ETS installations are subject to a carbon price based on their actual emissions, imported products falling under the CBAM should also be assessed based on their actual GHG emissions but, to allow businesses time to adapt, it is suggested to implement a transitional period without financial adjustments (European Commission, 2021e).

The EC has established rules for the importation of goods, stipulating that only an authorized CBAM declarant is permitted to carry out such imports, and customs authorities are prohibited from permitting importation by others (Baker & McKenzie, 2023). The customs authorities are responsible for regularly and automatically transmitting specific information about the imported goods to the Commission using the established surveillance mechanism (European Commission, 2023f). Moreover, the customs authorities have the discretion to share confidential information acquired during their duties or received in confidence with both the Commission and the competent authority of the Member State that has authorized the CBAM declarant (European Commission, 2023f).

In order to guarantee importers' declarations, the EC has set penalties. If an authorized CBAM declarant does not submit the required number of CBAM certificates by 31 May of each year, corresponding to the emissions embedded in the goods imported during the previous calendar year, they will be held accountable for paying (European Commission, 2023f) emissions penalty as EUR 100 for each tonne of carbon dioxide equivalent emitted by that installation for which the operator has not surrendered allowances (European Council, 2003) in parallel with Article 16(3) of Directive 2003/87/EC. If a person who is not an authorized CBAM declarant imports goods into the customs territory of the EU without adhering to the obligations outlined in the Regulation of the European Parliament and of the Council establishing a CBAM, he/she will be held responsible for paying a penalty that should be effective, proportionate, and deterrent in nature as specific amount will depend on factors such as the duration, seriousness, extent, intentionality, and recurrence of the non-compliance, as well as the level of cooperation demonstrated by the individual with the competent authority (European Commission, 2023f). The penalty will be set between three and five times the penalty as €100 for each tonne of carbon dioxide equivalent emitted by that installation for which the operator has not surrendered allowances, applicable in the year when the goods were introduced, for each CBAM certificate that the person failed to surrender (European Commission, 2023f).

In addition to penalties, the practices of circumvention of CBAM referred as “...a change in the pattern of trade in goods, which stems from a practice, process or work, for which there is insufficient due cause or economic justification other than to avoid, wholly or partially, any of the obligations laid down...” such as making slight adjustments to the goods in question in order to classify them within the relevant CN codes and deliberately dividing shipments into separate consignments with each consignment having an intrinsic value that does not exceed the specified threshold, the EC has set rules based on relevant and objective data (European Commission, 2023f). The Commission shall conduct ongoing monitoring of the situation that may involve market surveillance activities or utilizing various sources of information, including submissions and reports from civil society organizations throughout the EU in order to identify any instances of circumvention (European Commission, 2023f). A Member State or any party that has experienced the effects or advantages resulting from circumvention practices has the right to inform the Commission when confronted with such practices and also interested parties, including environmental organizations and non-governmental organizations, who possess substantial evidence of circumvention practices, even if they are not directly affected or benefited, are also eligible to notify the Commission (European Commission, 2023f). If the Commission, after considering the pertinent data, reports, and statistics, including those furnished by customs authorities, has valid grounds to suspect the existence of established patterns of circumvention practices in one or more Member States, it is authorized to adopt delegated acts for the purpose of countering circumvention. These acts may involve amending the list of goods affected by adding the relevant slightly modified products, based on their anti-circumvention significance (European Commission, 2023f).

Exporting countries can potentially reduce adjustment costs for importers by factoring in their existing climate policies and comparable carbon prices. However, the adjustment calculation becomes complex when countries of origin lack a carbon price but claim other climate policies, and importers are not directly integrated into the intra-European ETS and are subjected to the exogenously imposed carbon price of the EU-ETS (Magacho, Espagne, & Godin, 2023). To ensure a swift and efficient response to

unforeseen, extraordinary, and unjustifiable situations that result in destructive impacts on the economic and industrial infrastructure of one or more third countries subject to the CBAM, the Commission is required to present a legislative proposal to the European Parliament and the Council (European Commission, 2023f). Also, the Commission is obligated to provide a report that should align with the schedules established for the functioning of the carbon market to the European Parliament and the Council regarding the implementation of the Regulation establishing a CBAM two years after the conclusion of the transitional period and subsequently every two years (European Commission, 2023f).

The introduction of the CBAM influences countries in proportion to their exports to the EU. Türkiye, Ukraine, China, and Russia are expected to be the most affected economies due to their exports of CBAM products to the EU countries (Magacho, Espagne, & Godin, 2023). The countries' responses have displayed a wide range of tones, but they share a common aspect, all of them have implemented or declared intentions to implement carbon emissions trading systems that, in principle, could be interconnected or aligned with the EU's ETS (Shum, 2023). Among these economies, Russia exports approximately USD 10 billion worth of CBAM products, covering Iron and Steel, Aluminium, Fertilisers, and Electricity. Meanwhile, China, Ukraine, and Türkiye each export over USD 2.5 billion of CBAM products, primarily focused on iron and steel and aluminium notably, Iron and Steel is the most affected product from Türkiye, as well as from the USA and other BRICS countries (Brazil, India, and South Africa), South Korea, and Ukraine (Magacho, Espagne, & Godin, 2023). The CBAM carries a significant political implication, as it has the potential to encourage other countries to implement similar measures (Magacho, Espagne, & Godin, 2023). Since the CBAM deducts the existing carbon price implemented in the country of origin, its introduction may prompt EU partners to adopt a carbon pricing mechanism (Magacho, Espagne, & Godin, 2023). Additionally, it is important for the countries affected by CBAM to commit to make necessary changes and to disclose their roadmaps for compliance (Atabay Kuşçu, 2021).

Additionally, focusing on CBAM for exports only can be more effective in safeguarding local competitiveness compared to full CBAM or CBAM only on imports. Implementing CBAM solely on imports may result in lower global welfare loss; incorporating domestic default carbon rates for imports and maintaining a lower CBAM price than the carbon price differential can enhance global welfare by reducing the burden on low-income and developing countries. The CBAM serves as a means for developed countries to ensure fair competition, but its fairness controversy stems from disagreements over equal emission costs between developed and developing countries, highlighting the ongoing global dispute over the distribution of mitigation responsibilities and creating a dilemma due to the lack of consensus on responsibility allocation. Also, numerous developing countries express concerns that the EU's CBAM is driven by protectionist objectives (Kapan, 2022). Resolving this issue requires addressing income inequality and supporting developing countries in emission mitigation through the utilization of CBAM revenues, while additional efforts and novel approaches are necessary for effectively resolving and utilizing the CBAM, despite some existing studies on fairness concerns (Zhong & Pei, 2023).

Three fundamental macro-structural factors, namely disparities in country size, government-induced internal and cross-border economic frictions, and the international competitive structure, have significantly influenced the participation of individual states in international trade, the configuration of that trade, and the exercise of national economic sovereignties in their external economic relations (John, 2014). Thus, as it stands in its present form and timeline for execution, the CBAM poses significant risks with potentially counterproductive consequences for both the competitiveness of European industries and the environment (Cham, 2023).

4.3. TÜRKİYE AND THE CBAM

After the European Commission's statements in 2020 regarding the possible extension of the ETS to include imports and the potential implementation of the CBAM by the EU, Türkiye published its country position on CBAM on April 6, 2020. Based on this country position, Türkiye emphasized the potential barrier that this mechanism

could create for Türkiye-EU trade, referring to the principle of reciprocity with the EU, the principles of the CU, and the WTO and UNFCCC principles. Furthermore, if such a mechanism were to be implemented, Türkiye expressed its desire for it to be done in accordance with the principles of the CU, taking into account different capacities of countries to address emissions and without compromising the principles of fair trade (Ministry of Trade, 2020).

Türkiye's Green Deal Action Plan in 2021 aimed to model the impacts of CBAM on Türkiye's energy-intensive and resource-intensive sectors through scenario-based analyses, identifying sector-specific actions to be taken. As part of the efforts towards an appropriate carbon pricing mechanism, studies coordinated by Türkiye would be conducted to determine Türkiye's position on carbon pricing, considering the EU's CBAM. Türkiye's evaluations would be made on the potential additional costs and economic impacts on sectors, assessing support mechanisms for rising costs, and emphasizing the importance of developing a monitoring system for industrial greenhouse gas emissions tailored to specific needs (Ministry of Trade, 2021). Furthermore, Türkiye has announced its "Net-Zero" and green development objectives for the year 2053 and continues its efforts to achieve these goals (Ministry of Environment, Urbanization and Climate Change, 2021).

As indicated in Türkiye's submitted Nationally Determined Contribution to the United Nations, preparations for a National Taxonomy and Climate Law are ongoing (Ministry of Environment, Urbanization and Climate Change, 2023a). Undertaking these preparations is of significant importance in order to mitigate the potential adverse impacts of the CBAM. Additionally, The Ministry of Trade is actively engaged in sector-specific studies on the impacts of the CBAM through its working groups. A presentation shared in June 2023 outlined the scope of the CBAM, how emissions within this scope will be calculated, and how countries could potentially be affected (Ministry of Trade, 2023b). In August, the focus shifted to product-specific carbon intensities in the aluminium (Ministry of Trade, 2023c) and cement sectors, providing insights on how to consider the scope of the CBAM (Ministry of Trade, 2023d).

With the introduction of the CBAM concept, extensive research has been conducted to determine its scope. Various sectors have also conducted studies to explore potential income losses and devise strategies in response to this issue. One notable study, conducted by TÜSİAD, analysed direct and indirect emissions on a sectoral basis, taking into account the current carbon price in 2020 (TUSIAD, 2020). In another study of the ERCST in 2021, it was estimated that an additional amount of €399 Mio could be incurred by 2026 due to direct emissions (ERCST, 2021). Furthermore, EGD's potential negative effect on the Turkish economy is projected to result in a GDP loss ranging from 2.7% to 3.6% by 2030 compared to the business-as- (un) usual baseline scenario (Acar, Aşıcı, & Yeldan, 2022). Assuming that the CBAM will have an impact on emissions across all three scopes, the projected carbon expenses for Turkish exporters are estimated to vary from €1.8 billion to €2.8 billion to €4 billion per year, excluding the incorporation of any free allocation provisions (Kılınç, 2022).

The regulation establishing the CBAM launched on May 2023 in which the EU's trade partners obtained responsibilities about their export and imports from the EU for iron and steel, aluminium, fertilisers, electricity, cement and hydrogen sectors. The scope of the regulation encompasses imports of goods from the third countries into the customs territory of the EU, unless the production of those goods has already undergone scrutiny under the EU-ETS in the third countries or territories, or is subject to a carbon pricing system that is completely integrated with the EU-ETS (European Commission, 2023f).

Table 4. 1: Türkiye's CBAM related exports to the EU
Source: (TURKSTAT, 2023b)

Product (Mio €)	2018	2019	2020	2021	2022
Iron and Steel	5.367	4.498	3.844	7.316	7.388
Aluminium	1.320	1.355	1.250	2.370	3.503
Fertilisers	85	76	71	118	340
Electricity	83	92	60	147	216
Cement	51	68	105	158	206
Total	6.910	6.080	5.327	10.105	11.691

Based on the CBAM regulation, it is possible to determine which products from the sectors covered by CBAM will be initially considered. Accordingly, Türkiye's exports resulting from the production of iron & steel, aluminium, fertilisers, electricity, and cement amounted to €6.9, 6, 5.3, 10.1 and 11.6 billion and accounted for 10.3%, 8.7%, 8.5%, 13% and 11.8% of Türkiye's total exports to the EU from 2018 to 2022 (TURKSTAT, 2023b).

During five-year period, iron and steel products constitute 71,9%, aluminium constitutes 23,7% of total CBAM products with €5,6 and €1,9 billion respectively (TURKSTAT, 2023b). In 2022, Türkiye exported iron and steel valued at €1.2 billion to Romania, €1.1 billion to Italy, €1.1 billion to Germany, €0.6 billion to Bulgaria, and €0.5 billion to Spain. In addition, Türkiye exported aluminium worth €998 Mio to Germany, €339 Mio to Poland, €309 Mio to Italy, €223 Mio to the Netherlands, and €217 Mio to Bulgaria (TURKSTAT, 2023b). Fertiliser exports from Türkiye amounted to €153 Mio to Romania, €38 Mio to Ireland, €26 Mio to Croatia, €26 Mio to Spain, and €19 Mio to Italy (TURKSTAT, 2023b). Türkiye also exported electricity worth €167 Mio to Bulgaria and €48 Mio to Greece (TURKSTAT, 2023b). Lastly, cement exports from Türkiye were valued at €36 Mio to Italy, €33 Mio to Belgium, €31 Mio to Spain, €30 Mio to Bulgaria, and €26 Mio to Romania (TURKSTAT, 2023b).

Considering the trade volume between Türkiye and the EU, as well as the overall contribution of CBAM-covered products to trade with the EU, it is necessary to calculate the emissions generated from the production separately for each sector. In this study, using the calculation methods detailed in the methodology section, the potential income loss resulting from the emissions generated by sector-specific production was calculated for the period between 2018 and 2021. These emissions specifically refer to the production-related emissions of the relevant products, categorized as Scope 1 emissions (TUSIAD, 2020). The impact of indirect emissions, referred to as Scope 2 emissions, which are inputs used in the sectors, has not been reflected (TUSIAD, 2020). Undoubtedly, if these values are included, the income loss experienced by Türkiye would be even higher.

Iron and Steel

The EU's efforts reflect its aim to control direct and indirect GHG emissions which mainly come from production processes. In Türkiye, there are currently three fully integrated iron and steel production plants comprising sinter production units, blast furnaces for pig iron production, and basic oxygen furnaces, along with operating electric arc furnace mills, but direct reduced iron (DRI) production is not undertaken in the country (TURKSTAT, 2023c). Türkiye's integrated steel production plants depend on both domestic and foreign markets to satisfy their iron ore demand, with the country operating a single pellet iron production plant to meet the iron ore requirements of these integrated steel facilities (TURKSTAT, 2023c).

The blast furnace units for pig iron production and the sinter plants within the integrated steel plants in Türkiye are the most emissions-intensive units in the iron and steel production processes, as the sintering process plays a significant role in agglomerating iron ore fines and metallurgical wastes into porous particles necessary for charging blast furnaces, involving the heating of iron ore fines and burning coke fines to create a semi-molten mass that solidifies into sinter pieces (TURKSTAT, 2023c). The integrated steel plants in Türkiye incorporate Basic Oxygen Furnaces (BOF) that utilize molten iron from the blast furnace, employing oxygen blowing and stirring to produce steel while generating CO₂ emissions as the oxygen interacts with impurities and dissolved carbon, facilitating the conversion of iron into steel (TURKSTAT, 2023c). The Electric Arc Furnaces are utilized in steel production, where scrap iron and steel are melted using high voltage electric arcs, and in the presence of iron oxides in the feed, these oxides are reduced to iron with the same reactions causing CO₂ emissions as mentioned earlier, while the carbon source can vary, and oxygen is introduced to the molten steel to remove excess carbon and impurities, resulting in additional CO₂ emissions (TURKSTAT, 2023c).

Iron and steel production in Türkiye, as a heavy industry, requires significant energy, and the integrated steel plants effectively utilize exhaust gases from Blast Furnaces and Basic Oxygen Furnaces for various purposes, such as heating, steam

generation, electricity production, and roll heating, with the resulting emissions addressed in the energy sector section of the NIR, while the CO₂ emissions from lime production within these plants are discussed in the lime production section of the Industrial Processes and Product Use (TURKSTAT, 2023c).

Table 4. 2: Iron & Steel Production and Emissions

Source: (TURKSTAT, 2023b) & (TURKSTAT, 2023c) & Author's own calculation

Iron & Steel	Total Production (Kt)	Total CO₂ Emissions (Kt CO₂)	CBAM Exports (Kt)	CBAM Exports CO₂ Emissions (Kt CO₂)
2018	37.533	11.933	7.855	2.497
2019	33.887	10.600	6.597	2.063
2020	35.338	10.133	5.757	1.651
2021	40.622	11.898	7.315	2.142

From these production processes, during the four-year period between 2018 and 2021, 37.533, 33.887, 35.338 (TURKSTAT, 2022c) and 40.6222 Kt steel have been produced in Türkiye (TURKSTAT, 2023c). During this production; 11.933, 10.600, 10.133 and 11.898 kt CO₂ and equivalent have been emitted (TURKSTAT, 2023c). Iron and steel products subject to the CBAM exported to the EU were 7.885, 6.597, 5.757 and 7.315 Kt (TURKSTAT, 2023b) accounted for 21%, 19%, 16% and 18% of total production.

In 2018, 2019, 2020 and 2021 the ratio of emissions generated from the production were 32%, 31%, 29% and 29% respectively. GHG emissions from production for iron and steel products subject to the CBAM exported to the EU were predictably 2.497, 2.063, 1.651 and 2.142 Kt. The objective of the CBAM is to ensure parity in the carbon pricing under the ETS where carbon prices were - taking the end of the year prices – €23,7; €25; €32,7, €80,7 and €88 in 2018, 2019, 2020, 2021 and 2022. Additionally in 30 June 2023 the carbon price was € 93,67 (Trading Economics, 2023).

Table 4. 3: CBAM-related Iron & Steel Exports and loss
Source: (TURKSTAT, 2023b) and Author's Own Calculation

Iron & Steel	CBAM Exports (Mio €)	CBAM-related loss (Mio €)
2018	5.367	59,3
2019	4.498	51,5
2020	3.844	54,0
2021	7.316	172,8

Taking into account the expenses incurred due to emissions from production during the respective years, Türkiye's export losses could amount to €59.3 million, €51.5 million, €54 million, and €172 million in 2018, 2019, 2020, and 2021, respectively. These calculated losses might represent 1.1%, 1.1%, 1.4%, and 2.4% of Türkiye's total exports to the European Union for the corresponding years.

Aluminium

Türkiye calculates CO₂ and perfluorocarbons (PFCs) emissions specifically from the production of primary aluminium, which refers to aluminium obtained from electrolytic cells or pots during the electrolytic reduction of metallurgical alumina, excluding alloying additives and recycled aluminium, where the primary aluminium is in a molten or liquid state, weighed prior to moving from one furnace to another furnace or undergoing further processing (TURKSTAT, 2023c).

The integrated production process encompasses five main phases, including bauxite mining, alumina production, liquid aluminium production, alloying and casting of the liquid aluminium, and the production of semi and/or end products using casting, rolling, and extrusion processes (TURKSTAT, 2023c). The main sources of carbon dioxide emissions in primary aluminium production are the reaction between the carbon anode and alumina during electrolysis, particularly from the consumption of prebaked carbon anodes and Søderberg paste, while PFCs are formed during the "anode effect" in the electrolytic production of liquid aluminium (TURKSTAT, 2023c).

Table 4. 4: Primary Aluminium Production and Emissions
Source: (TURKSTAT, 2023c) and Author’s Own Calculation

Aluminium	Primary Aluminium Production (Kt)	Primary Aluminium Emissions (Kt CO₂)	CBAM Exports (Kt)	CBAM Exports CO₂ Emissions (Kt CO₂)
2018	73,3	107,3	420,2	615,2
2019	78,1	112,1	456,9	655,7
2020	80,2	117,7	428,0	628,3
2021	79,6	117,8	701,9	1.038,3

Türkiye’s primary so called unwrought aluminium production, during four-year period between 2018 to 2021 were 73,3, 78,1, 80,2 and 79,6 Kt (TURKSTAT, 2022c) and from these productions 107,3, 112,1, 117,7 and 117,8 Kt CO₂ have been emitted (TURKSTAT, 2023c). In order to predict emissions from the production exported to the EU covered by the CBAM, unwrought aluminium productions’ carbon intensity ratio, on average 146,2% per Kt/CO₂, has been used since emissions from the production are generally sourced from unwrought aluminium. The CBAM-covered exported aluminium products were 420,2; 456,9; 428 and 701,9 Kt (TURKSTAT, 2023b) and from these products 615,2; 655,7; 628,3 and 1.038,3 Kt CO₂ have been emitted from 2018 to 2021 respectively, considering primary aluminium’s carbon intensity.

Table 4. 5: CBAM-related Aluminium Exports and loss
Source: (TURKSTAT, 2023b) and Author’s Own Calculation

Aluminium	CBAM Exports (Mio €)	CBAM-related loss (Mio €)
2018	1.320	14,6
2019	1.355	16,4
2020	1.250	20,6
2021	2.370	83,7

CBAM-covered aluminium products accounted for €1.320; €1.355; €1.250 and €2.370 from 2018 to 2021 (TURKSTAT, 2023b). If the CBAM was applied in this period, considering carbon price at that time and emissions from the production process, €14,6; €16,4; €20,6 and €83,7 Mio loss could be realised which is responsible for 1,1%, 1,2%, 1,6% and 3,5% revenue loss from exports.

Fertilisers

Fertiliser exports of Türkiye, which constitute less than 10% of production, are relatively lower compared to the other countries due to the factors such as a domestic market-oriented production approach, reliance on imported raw materials, high production costs, and limited competitiveness in nitrogen fertilisers against exporting nations, with variations influenced by raw material prices, domestic market conditions, and international fertiliser prices (TAGEM, 2023). CBAM-covered fertilisers are Nitric acid, sulphonitric acids; ammonia, anhydrous or in aqueous solution; nitrates of potassium; mineral or chemical fertilisers and mineral or chemical fertilisers containing two or three of the fertilising elements nitrogen, phosphorus and potassium (European Commission, 2023f). These products are third most sold products to the EU with €339 Mio in 2022 (TURKSTAT, 2023b).

To calculate the emissions of fertilisers subject to the CBAM that Türkiye exports to the EU, the emission amounts generated during the production of nitrogen fertilisers, such as ammonium nitrate which is a widely used fertiliser for crops, and calcium ammonium nitrate, a granular mixture of ammonium nitrate and calcium nitrate, need to be considered. Additionally, the emissions from urea, which is the most concentrated solid nitrogen fertiliser, should also be included in the calculation (Samuel & Dines, 2023). In order to determine the emissions generated from Türkiye's fertiliser exports to the EU the production figures by product according to Food and Agriculture Organization of the United Nations (FAO) can be used. The emission values arising from the production of nitrogen fertilisers were calculated using the emission factor (Menegat, Ledo, & Tirado, 2022), and the average CO₂ ratio of 94.5% Kt/CO₂ was used, based on the total production and production-related emissions of the USA and Canada which were ranked 2nd and 4th in nitrogen fertiliser production according to the FAO data set (FAO, 2023). Also, the USA and Canada are among the EU's main fertiliser trade partners with €650 Mio and € 645 Mio ranked 5th and 6th respectively in fertiliser imports by the EU (Fertilizers Europe, 2023). Although the energy usage and production processes vary in country-specific production, the carbon intensity figure for nitrogen-

based fertiliser production from the USA and Canada is used to calculate Türkiye's emissions from production.

Table 4. 6: Fertilisers Production and Emissions
Source: (TURKSTAT, 2023b) and Author's Own Calculation

Fertilisers	Total Production (Kt)	Total Emissions (Kt CO₂)	CBAM Exports (Kt)	CBAM Exports CO₂ Emissions (Kt CO₂)
2018	4.027	5.680	415	393
2019	4.661	6.575	490	465
2020	6.547	9.234	525	497
2021	6.335	8.935	419	397

In 2018, Türkiye produced 4.027 Kt fertilisers (Republic of Türkiye Ministry of Agriculture and Forestry, 2023) and exported 415 Kt to the EU (TURKSTAT, 2023b) as CBAM related products such as nitric acid, sulphonitric acids, ammonia, anhydrous or in aqueous solution, nitrates of potassium, mineral or chemical fertilisers, nitrogenous etc (European Commission, 2023f). In 2019, 2020 and 2021 4.661, 6.547 and 6.335 Kt fertilisers were produced (Republic of Türkiye Ministry of Agriculture and Forestry, 2023). Türkiye's exports to the EU as the CBAM-covered fertilisers were 10,5%, 8% and 6,6% of its production in 2019, 2020 and 2021 respectively (TURKSTAT, 2023b). The emissions resulting from the production of the fertiliser products exported by Türkiye to the EU and subject to the CBAM, amounted to 393 Kt, 465 Kt, 497 Kt, and 397 Kt between the years 2018 and 2021.

Table 4. 7: CBAM-related Fertiliser exports and loss
Source: (TURKSTAT, 2023b) and Author's Own Calculation

Fertilisers	CBAM Exports (Mio €)	CBAM-related loss (Mio €)
2018	85,0	9,3
2019	75,5	11,6
2020	70,7	16,3
2021	117,5	32,0

The revenue generated from the exports during the period between 2018 and 2021 amounted to €85 Mio, €75.5 Mio, €70.7 Mio and €117.5 Mio respectively (TURKSTAT, 2023b). If the CBAM obligations had been in place during these years,

Türkiye could have potentially faced an export loss of €9.3 Mio, €11.6 Mio, € 16.3 Mio and €32 Mio representing 11%, 15.4%, 23%, and 27.2% of fertiliser exports to the EU.

Electricity

Total electricity generation were 304.802, 303.898, 306.703 and 334.723 Gwh between 2018 and 2021 respectively. Thermal production's share was 69%, 58%, %60 and 67%; hydro energies' share was 20%, 29%, 25% and %17; geothermal, solar, and wind energies' share were 12%, 13%, 15% and %17 between 2018 and 2021 respectively (Turkish Electricity Transmission Corporation, 2023). In 2021, electricity consumption by industry, transportation and other sectors were 134.969, 1.571 and 147.731 Gwh respectively (Ministry of Energy and Natural Resources, 2023).

Electricity exports of Türkiye are conducted with the approval of the Energy Market Regulatory Authority (EMRA) in accordance with the views of the Ministry of Energy and Natural Resources, either to or from countries where international interconnection conditions have been established (Official Gazette, 2011). Türkiye exported 3.111, 2.788, 2.483 and 4.186 Gwh electricity to abroad between 2018 and 2021 and these exports constitute an average of 1% of the total production over the 4-year period (Turkish Electricity Transmission Corporation, 2023). Also, exports to the EU were 3.002, 2.788, 2.167 and 3.172 Gwh respectively (Turkish Electricity Transmission Corporation, 2023).

The emission intensity is directly related to the relative contribution of primary energy resources in total GHG emissions, with fossil fuels being the main culprits responsible for the majority of emissions at 99.3% in 2008 and 97.5% in 2020 (Sahin & Esen, 2022). Also coal, lignite, and natural gas consistently rank the highest in terms of contribution to emission intensity (Sahin & Esen, 2022). Due to the lack of data about the share of sources in Türkiye's electricity energy exports, in order to predict Türkiye's cost about its electricity exports to EU, GHG emissions from public electricity and heat production in total fuel combustion has been taken into consideration.

Table 4. 8: Electricity Production and emissions

Source: (Turkish Electricity Transmission Corporation, 2023) and Author's Own Calculation

Electricity	Total Production (Gwh)	Total Emissions (Kt CO ₂)	CBAM Exports (Gwh)	CBAM Exports CO ₂ Emissions (Kt CO ₂)
2018	304.802	150.032	3.002	1.477
2019	303.898	139.116	2.788	1.276
2020	306.703	131.662	2.167	930
2021	334.723	149.395	3.172	1.416

Total Emissions arising from the production of public electricity and heat are computed by considering the fuel consumption and net calorific values specific to each power plant, along with the carbon content of fuels that is specific to the Türkiye (TURKSTAT, 2023c). From this point of view emissions were 150.032, 139.116, 131.662 and 149.395 Kt from 2018 to 2021 (TURKSTAT, 2023c). Carbon intensity ratio was 51,3% on average, from production to emissions ratio CO₂ emissions for exports to the EU were 1.477, 1.276, 930 and 1.416 Kt.

Table 4. 9: CBAM-related Electricity Exports and loss

Source: (Turkish Electricity Transmission Corporation, 2023)

Electricity	CBAM Exports (Mio €)	CBAM Exports loss (Mio €)
2018	83,5	35,1
2019	92,0	31,9
2020	60,1	30,4
2021	146,8	114,2

Electricity exports to the EU were €83,5; €92; €60,1 and €146,8 Mio from 2018 to 2021 (TURKSTAT, 2023b). If the CBAM was to be applied €35,1; €31,9; €30,4 and €114,2 Mio could be lost as 42%, 34,7%, 50,7% and 77,8% of exports. Based on these figures, it can be said that the electricity generation sector will be the most affected sector by the CBAM. In this case, it is important for Türkiye to increase the intensity of alternative energy sources rather than carbon-intensive energy sources in its production, in order to continue its energy exports.

Cement

Türkiye initially imported cement until the 1970s but shifted to become an exporter in 1978. As of 2021, it has become Europe's largest cement producer, with a clinker production capacity of 84 million tons (TURKSTAT, 2023c). Its production facilities are spread across the country due to high transportation costs, primarily manufacturing portland cement while also producing slag cement, puzzolan added cement, and their variations (TURKSTAT, 2023c).

The production of cement results in CO₂ emissions as a result of the calcination reaction of limestone, and it is also an energy-intensive process, with a significant amount of energy required to heat the kiln and its load to high temperatures; in Türkiye, the majority of kilns rely on coal, petroleum coke, and lignite as the main energy sources, leading to emissions from the combustion of these fuels for kiln heating (TURKSTAT, 2023c).

Cement sector is a reference for manufacturing of other non-metallic mineral products such as manufacture of glass and glass products, refractory products, clay building materials, other porcelain and ceramic products, cement, lime and plaster, articles of concrete, cement and plaster, cutting, shaping and finishing of stone, abrasive products and non-metallic mineral product (European Commission, 2010) in various reports utilizing NACE C-23 codes. However, for cement sector other kaolinic clays; cement clinkers; white Portland cement, whether or not artificially coloured; other Portland cement; aluminous cement and other hydraulic cements are subject to the CBAM (European Commission, 2023f).

In 2022, Türkiye ranked as the world's second-largest exporter in terms of total cement and clinker exports by tonnage, and when considering only cement exports, it held the position of the world's leading exporter in terms of value. The most significant markets for exports, spanning over 100 countries, included the the United States, Israel, and the EU (TURKCIMENTO, 2023).

Table 4. 10: Total Cement Production and emissions
Source: (TURKSTAT, 2023c) and Author’s Own Calculation

Cement	Total Production (Kt)	Total CO₂ Emissions (Kt)	CBAM Exports (Kt)	CBAM Exports CO₂ Emissions (Kt)
2018	150.626	39.413	946	248
2019	120.969	32.349	1.642	439
2020	152.711	40.813	2.923	781
2021	165.906	44.227	4.361	1.162

From total cement production of 150.626, 120.969, 152.711 and 165.906 Kt; 39.413, 32.349, 40.813 and 44.227 CO₂ was emitted meaning that there were 26,6% carbon intensity (TURKSTAT, 2023c). Cement exports subject to the CBAM were 946, 1.642, 2.9123 and 3.361 Kt (TURKSTAT, 2023b); 248, 439, 781 and 1.162 Kt CO₂ was emitted as a result of these exports.

Table 4. 11: CBAM-related Cement exports and loss
Source: (TURKSTAT, 2023b) and Author’s Own Calculation

Cement	CBAM Exports (Mio €)	CBAM Exports loss (Mio €)
2018	51,4	5,9
2019	67,8	11,0
2020	104,9	25,6
2021	157,8	93,8

Türkiye’s exports of cement subject to the CBAM created €51,4; €67,8; €104,9 and €157,8 Mio (TURKSTAT, 2023b). If CBAM was applied during 2018 and 2021; €5,9; €11; €25,6 and €93,8 Mio loss could be realized and 11,4%, 16,2%, 24,4% and 59,4% of cement export values would be lost. According to our calculations, the cement sector is expected to experience the highest rate of export loss in terms of proportion.

Overall Impact of the CBAM on Sectors

Table 4. 12: Total CBAM-covered Exports and Cost

Source: (TURKSTAT, 2023b) and Author's Own Calculation

EoY CO ₂ Price	CBAM-related cost (Mio €)			
	2018	2019	2020	2021
Iron and Steel	59	52	54	173
Aluminium	15	16	21	84
Fertilisers	9	12	16	32
Electricity	35	32	30	114
Cement	6	11	26	94
Total	124	122	147	496

Looking at the overall impact of the CBAM, we observe that between 2018 and 2021, the total effects amount to €124, €122, €147 and €496 Mio respectively. These potential losses represent 1.8%, 2%, 2.8%, and 4.9% of Türkiye's total exports in CBAM-covered products for the corresponding years. Based on 2021 data, the most affected sectors are the electricity and cement sectors, followed by the fertiliser, aluminium, and iron and steel sectors.

Table 4. 123: CBAM-covered exports and cost by actual CO₂ price

Source: (TURKSTAT, 2023c) & Author's own calculation

Current CO ₂ Price	CBAM-related cost (Mio €)			
	2018	2019	2020	2021
Iron and Steel	234	193	155	201
Aluminium	58	61	59	97
Fertilisers	37	44	47	37
Electricity	138	120	87	133
Cement	23	41	73	109
Total	490	459	420	577

If we had used the most recent carbon price of €93.67 (Trading Economics, 2023) as of June 30, 2023 for all years, the total costs between 2018 and 2021 would have been €490, €459, 420 and €577 Mio € respectively. These costs could have represented 7.1%, 7.5%, 7.9%, and 5.7% of Türkiye's total exports in CBAM-covered

products for the corresponding years. There would not have been any change in the ranking of the most affected sectors.

Table 4. 133: CBAM-covered exports and cost as Turkish Lira
Source: (*TURKSTAT, 2023c*) & Author’s own calculation

EoY CO2 Price	CBAM-related cost (Mio ₺)			
	2018	2019	2020	2021
Iron and Steel	358	343	492	2.607
Aluminium	88	109	187	1.263
Fertilizers	56	77	148	483
Electricity	212	212	277	1.723
Cement	36	73	233	1.414
Total	750	815	1.339	7.490

In addition, the cost that Türkiye may face under the CBAM for its exports to the EU is calculated in Euros based on the Carbon certificates of the relevant years. Therefore, in addition to the cost of emissions from the production, the continued depreciation of the Turkish Lira will also be reflected as an additional cost to the Turkish economy in its exports to the EU. From this point of view, the cost to be incurred within the scope of the CBAM would show an increasing trend with the exchange rate effect according to the years. For example, although the cost of the CBAM in Euro in 2019 would be lower than in 2018, the cost in Turkish Lira would be higher in 2019 due to the depreciation of the Turkish Lira.

Limitations on the study

Initially, this study aims to assess the potential impacts of the CBAM, which is expected to be one of the pivotal instruments for the EU in achieving its Green Deal objectives, on Türkiye. The calculations are based on the relevant sectors and product codes specified in the EU's CBAM regulations. The effects of CBAM on Türkiye will be influenced by changes in the sectors covered and the products included, which could amplify or mitigate its impact.

Specifically, considering the direct emissions known as "Scope 1", the year-end "Carbon allowance" price of the respective year was applied. This calculation was conducted to determine the hypothetical cost if CBAM had been implemented between 2018 and 2021. Emissions arising from "Scope 2" and "Scope 3" were not considered in this analysis, although their costs could contribute to the total cost and should be taken into account.

Given CBAM's recent regulatory inception and pending disclosures of the relevant products, research in this field is expected to accelerate. With this study, it becomes evident that even the impact of emissions stemming solely from "Scope 1" can have a negative effect on Türkiye's exports to the EU, especially considering CBAM's nascent regulatory status and the forthcoming elucidation of the concerned products.

5. CONCLUSION

Since the beginning of her presidency, Ursula von der Leyen has emphasized the implementation of the EGD and the European Climate Law, highlighting the need for a specific price on carbon emissions and the importance of multilateralism and fair trade in a "European way". In March 2020, the "European Climate Law" came into effect, and efforts were announced to achieve a 55% reduction in emissions by 2030 compared to 1990 levels through the Green Deal.

The innovations introduced by the EU in its trade policies and processes deeply impact countries like Türkiye, which have high trade volumes with the EU. Particularly, the obligations imposed by the EU on imports of member countries to achieve the goal of becoming a "Carbon Neutral" union by 2050 significantly influence the future of Türkiye's trade. In this context, the most significant mechanism that needs to be highlighted is the CBAM, for which the EU published regulations in May 2023. According to this mechanism, member countries of the EU will pay a certain amount per ton based on the price of Carbon Certificates in the Emission Trading System to compensate for the emissions resulting from the products they import. In the regulations published in May 2023, trade codes were provided in detail, and the iron and steel, aluminium, cement, fertiliser, hydrogen and electricity sectors were initially included in the CBAM.

The products subject to the CBAM account for approximately 10.5% of Türkiye's total exports to the EU. The implementation of the CBAM will significantly increase costs for Türkiye, especially in the electricity, fertiliser, and cement sectors. In addition to the expenses incurred from Scope 1, which covers direct emissions from the production; the emissions resulting from materials used in the production process of the products, such as electricity and steel, referred to as Scope 2 emissions and are not calculated in this thesis, will increase the CBAM costs further.

With this thesis, we have tried to reveal the costs that may arise when Scope 1 is considered by analysing the sectors subject to the CBAM in Türkiye's exports through

their emissions arising from production. We only highlighted the emissions and costs arising from Scope 1 by considering sectoral variables in order to provide a basis for future studies. From this point of view, it is of vital importance to analyse the CBAM on Scope 2 and Scope 3, and to establish Türkiye's own carbon pricing mechanism in parallel with the EU's emission trading system in order not to disrupt the trade between Türkiye and the EU. We have shown how the CBAM might incur additional costs to Türkiye and its international trade. We suggest that Türkiye must implement a carbon pricing system in order not pay high carbon taxes to the EU but keep this amount within her boundaries. Hence, the contribution of this thesis to the literature is to provide a calculation of CBAM related costs in the sectors that are subject to this mechanism, to provide a basis for further research and to raise awareness for this issue in the academia and among policy makers. If Türkiye wants to export to the EU under the conditions of the CBAM without additional costs and without losing her competitiveness, it is urgent to work on and implement the carbon pricing mechanism and tax carbon emissions in Türkiye.

Lastly, Türkiye and the EU have made significant progress in their integration through the CU established many years ago. In this regard, although the CBAM introduces additional costs, if a special pricing or integration concept is proposed for Türkiye, the CBAM could be considered as an opportunity for revising Türkiye's CU with the EU.

BIBLIOGRAPHY

- Acar, S., Aşıcı, A. A., & Yeldan, E. (2022). Potential effects of the EU's carbon border adjustment mechanism on the Turkish economy. *Environment, Development and Sustainability*, 8162-8194.
doi:<https://doi.org/10.1007/s10668-021-01779-1>
- Additional Protocol. (1970, November 23). *Additional Protocol*. Retrieved from EUR-Lex: [https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:21970A1123\(01\)&from=EN](https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:21970A1123(01)&from=EN)
- Alcidi, C., Baiocco, S., & Corti, F. (2021). A Social Dimension for a New Industrial Strategy for Europe. *Intereconomics*, 138-144.
- Almeida, D. V., Kolinjivadi, V., Ferrando, T., Roy, B., Herrera, H., Gonçalves, M. V., & Hecke, G. V. (2023). The “Greening” of Empire: The European Green Deal as the EU first agenda. *Political Geography*.
- Ambec, S., Esposito, F., & Pacelli, A. (2023, January). *The Economics of Carbon Leakage Mitigation Policies*. Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4345349
- Ankara Agreement. (1964, 12 29). *Agreement establishing an Association between the European Economic Community and Türkiye*. Retrieved from EUR-Lex: [https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:21964A1229\(01\)](https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:21964A1229(01))
- Antes, R., Hansjürgens, B., & Letmathe, P. (2006). *Emissions Trading and Business*. Physica-Verlag HD.
- Atabay Kuşçu, R. (2021). Trade Policies in Transition to Green Economy. In F. H. Sezgin, E. Yüksel Acı, & R. Atabay Kuşçu, *Green Economics in the Scope of European Green Deal* (pp. 69-97). İstanbul: Nobel Yayınevi.
- Atagher, L. (2023, June). *Application of Border Carbon Adjustments (BCAs) to International Fertilizer Trade: Legal Challenges and Options*. Retrieved from The Canadia Agri-Food Policy Institute: <https://capi-icpa.ca/wp-content/uploads/2023/06/2023-06-19-Luter-Atagher-Individual-Report-CAPI-EN-1.pdf>
- Baker & McKenzie. (2023, May). *European Union: “FIT FOR 55”- Carbon Border Adjustment Mechanism regulation signed*. Retrieved from InsightPlus : <https://insightplus.bakermckenzie.com/bm/tax/european-union-fit-for-55-european-union-carbon-border-adjustment-mechanism-regulation-signed>
- Bellora, C., & Fontagné, L. (2023). EU in search of a Carbon Border Adjustment Mechanism. *Energy Economics*.

- Benson, E., Majkut, J., Reinsch, W. A., & Steinberg, F. (2023, February). *Analyzing the European Union's Carbon Border Adjustment Mechanism*. Retrieved from Center for Strategic & International Studies: <https://www.csis.org/analysis/analyzing-european-unions-carbon-border-adjustment-mechanism>
- Biedenkopf, K., Dupont, C., & Torney, D. (2022). The European Union: A Green Great Power? In R. Falkner, & B. Buzan, *Great Powers, Climate Change, and Global Environmental Responsibilities*. Oxford Academic.
- Bruninx, K., Ovaere, M., & Delarue, E. (2020). The long-term impact of the market stability reserve on the EU emission trading system. *Energy Economics*.
- CBRT. (2023). *Indicative Exchange Rates*. Retrieved from CBRT: <https://www.tcmb.gov.tr/wps/wcm/connect/en/tcmb+en/main+menu/statistics/exchange+rates/indicative+exchange+rates>
- Cham, C. (2023). Le mécanisme d'ajustement carbone aux frontières : un moyen de rétablir le level playing field ? *Annales des Mines - Réalités industrielles*, 57-61. doi:<https://doi.org/10.3917/rindu1.232.0057>
- Christiansen C., A., & Wettestad, J. (2003). The EU as a frontrunner on greenhouse gas emissions trading: how did it happen and will the EU succeed? *Climate Policy*, 3-18.
- Claeys, G., Tagliapietra, S., & Zachmann, G. (2019, November). *How to make the European Green Deal work*. Retrieved from Bruegel: https://www.bruegel.org/sites/default/files/wp-content/uploads/2019/11/PC-13_2019-151119.pdf
- Colangelo, M. (2012). *Creating Property Rights*. Martinus Nijhoff Publishers.
- Council of the European Union. (2021, May 5). *European climate law: Council and Parliament reach provisional agreement*. Retrieved from Council of the European Union: <https://data.consilium.europa.eu/doc/document/ST-8440-2021-INIT/en/pdf>
- Dechezleprêtre, A., Nachtigall, D., & Venmans, F. (2023). The joint impact of the European Union emissions trading system on carbon emissions and economic performance. *Journal of Environmental Economics*.
- Decision from Council of Ministers. (1978, Decembre 28). *Resmi Gazete (16503)*. Retrieved from www.resmigazete.gov.tr: <https://www.resmigazete.gov.tr/arsiv/16503.pdf>
- Delvaux, B., & Leuven, K. U. (2005). The Eu Greenhouse Gas Emission Allowance Trading Directive. *Environmental Law Review*, 63-68.
- Dennison, S., & Engström, M. (2023, March 04). *Decarbonisation nations: How EU climate diplomacy can save the world*. Retrieved from European Council on Foreign Relations: <https://ecfr.eu/publication/decarbonisation-nations-how-eu-climate-diplomacy-can-save-the-world/>
- Domorenok, E., & Graziano, P. (2023). Understanding the European Green Deal: A narrative policy framework approach. *European Policy Analysis*, 9-29.

- Dür, A., Eckhardt, J., & Poletti, A. (2020). Global value chains, the anti-globalization backlash, and EU trade policy: a research agenda. *Journal of European Public Policy*, 944-956.
- EC-Türkiye Association Council. (1995, 03 6). *Decision No 1/95 of the EC-Türkiye Association Council of 22 December 1995 on implementing the final phase of the Customs Union*. Retrieved from EUR-Lex: [https://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX:21996D0213\(01\)](https://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX:21996D0213(01))
- ERCST. (2021, July 28). *Implications of EU Carbon Border Adjustment Mechanism for Türkiye*. Retrieved from ERCST: <https://ercst.org/event/eu-carbon-border-adjustment-mechanism-türkiye-stakeholder-meeting/>
- European Commission. (1989, 12 20). *Commission Opinion on Türkiye's request for accession to the Community*. Retrieved from CVCE: https://www.cvce.eu/content/publication/2005/2/4/4cc1acf8-06b2-40c5-bb1e-bb3d4860e7c1/publishable_en.pdf
- European Commission. (1996, June 04). *EU-Türkiye Relations*. Retrieved from European Commission: https://ec.europa.eu/commission/presscorner/detail/en/MEMO_96_52
- European Commission. (2000, March 08). *Green Paper on greenhouse gas emissions trading within the European Union*. Retrieved from EUR-Lex: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52000DC0087>
- European Commission. (2010, March 25). *List of NACE Codes*. Retrieved from European Commission: https://ec.europa.eu/competition/mergers/cases/index/nace_all.html
- European Commission. (2013, 10 09). *REGULATION (EU) No 952/2013 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL*. Retrieved from EUR-Lex: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32013R0952&rid=1>
- European Commission. (2015, October 06). *DECISION (EU) 2015/1814 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL*. Retrieved from EUR-Lex: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2015.264.01.0001.01.ENG
- European Commission. (2015, July 17). *Proposal for a Directive of the European Parliament and of the Council amending Directive 2003/87/EC to enhance cost-effective emission*. Retrieved from European Commission: <https://data.consilium.europa.eu/doc/document/ST-11065-2015-INIT/en/pdf>
- European Commission. (2018, November 28). *A Clean Planet for all*. Retrieved from EUR-Lex: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52018DC0773>
- European Commission. (2019, February 26). *COMMISSION DELEGATED REGULATION (EU) 2019/856*. Retrieved from EUR-Lex: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:02019R0856-20210811>

- European Commission. (2019, December 11). *The European Green Deal*. Retrieved from EUR-Lex: <https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1588580774040&uri=CELEX:52019DC0640>
- European Commission. (2020, March 4). *European Climate Law*. Retrieved from EUR-Lex: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52020PC0080>
- European Commission. (2020a, March 10). *A New Industrial Strategy for Europe*. Retrieved from EUR-Lex: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52020DC0102>
- European Commission. (2020b, February 04). *Shaping Europe's Digital Future*. Retrieved from EU for Digital: https://commission.europa.eu/system/files/2020-02/communication-shaping-europes-digital-future-feb2020_en_4.pdf
- European Commission. (2020c, March 15). *Commission moves to ensure supply of personal protective equipment in the European Union*. Retrieved from European Commission: https://ec.europa.eu/commission/presscorner/detail/en/IP_20_469
- European Commission. (2021a, July 14). *'Fit for 55': delivering the EU's 2030 Climate Target on the way to climate neutrality*. Retrieved from EUR-Lex: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52021DC0550&qid=1673447194995>
- European Commission. (2021b, July 6). *Strategy for Financing the Transition to a Sustainable Economy*. Retrieved from EUR-Lex: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52021DC0390>
- European Commission. (2021c, March 09). *2030 Digital Compass: the European way for the Digital Decade*. Retrieved from European Commission: https://commission.europa.eu/system/files/2023-01/cellar_12e835e2-81af-11eb-9ac9-01aa75ed71a1.0001.02_DOC_1.pdf
- European Commission. (2021c, February 18). *Trade Policy Review - An Open, Sustainable and Assertive Trade Policy*. Retrieved from European Commission Trade: https://trade.ec.europa.eu/doclib/docs/2021/february/tradoc_159438.pdf
- European Commission. (2021d, April 06). *Statement by President von der Leyen following the meeting with Turkish President Erdoğan*. Retrieved from European Commission: https://ec.europa.eu/commission/presscorner/detail/en/statement_21_1603
- European Commission. (2021e, 07 14). *EUR-Lex*. Retrieved from Regulation of the European Parliament and of the Council establishing a carbon border adjustment mechanism: <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52021PC0564&rid=9>
- European Commission. (2022a, October 10). *A European Green Deal*. Retrieved from European Commission: https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en

- European Commission. (2022b, December 14). *The 2021-2027 EU budget – What’s new?* Retrieved from European Commission: https://commission.europa.eu/strategy-and-policy/eu-budget/long-term-eu-budget/2021-2027/whats-new_en
- European Commission. (2022c). *European Neighbourhood Policy and Enlargement Negotiations*. Retrieved from European Commission: https://neighbourhood-enlargement.ec.europa.eu/enlargement-policy/turkiye_en
- European Commission. (2023, 07 05). *Standard international trade classification (SITC)*. Retrieved from Eurostat: [https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:Standard_international_trade_classification_\(SITC\)](https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:Standard_international_trade_classification_(SITC))
- European Commission. (2023a, February 01). *A Green Deal Industrial Plan for the Net-Zero Age*. Retrieved from European Commission: https://commission.europa.eu/system/files/2023-02/COM_2023_62_2_EN_ACT_A%20Green%20Deal%20Industrial%20Plan%20for%20the%20Net-Zero%20Age.pdf
- European Commission. (2023b, March 16). *Proposal for a Regulation on establishing a Net Zero Industry Act*. Retrieved from EUR-Lex: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52023PC0161>
- European Commission. (2023c, March 16). *Critical Raw Materials: ensuring secure and sustainable supply chains for EU's green and digital future*. Retrieved from European Commission: https://ec.europa.eu/commission/presscorner/detail/en/ip_23_1661
- European Commission. (2023d, July 05). *National allocation plans*. Retrieved from European Commission: https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets/development-eu-ets-2005-2020/national-allocation-plans_en
- European Commission. (2023e, July 05). *Development of EU ETS (2005-2020)*. Retrieved from European Commission: https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets/development-eu-ets-2005-2020_en
- European Commission. (2023f, 05 16). *REGULATION (EU) 2023/956 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL establishing a carbon border adjustment mechanism*. Retrieved from EUR-Lex: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32023R0956>
- European Council. (2003, 10 13). *DIRECTIVE 2003/87/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL*. Retrieved from EUR-Lex: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32003L0087>
- European Council. (2003, October 13). *Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003*. Retrieved from EUR-Lex: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32003L0087#ntr8-L_2003275EN.01003201-E0008

- European Council. (2019, June 20). *A new strategic agenda for the EU 2019-2024*. Retrieved from European Council: <https://www.consilium.europa.eu/en/eu-strategic-agenda-2019-2024/>
- European Council. (2022a, April 13). *Sustainable finance: Council agrees its position on European Green Bonds*. Retrieved from European Council: <https://www.consilium.europa.eu/en/press/press-releases/2022/04/13/sustainable-finance-council-agrees-its-position-on-european-green-bonds/>
- European Council. (2022b, October 28). *Council approves 2021 climate finance figure*. Retrieved from European Council: <https://www.consilium.europa.eu/en/press/press-releases/2022/10/28/council-approves-2021-climate-finance-figure/>
- European Council. (2022c, 10). *Türkiye Current Situation*. Retrieved from European Council: <https://www.consilium.europa.eu/en/policies/enlargement/Türkiye/>
- European Environment Agency. (2022, May 27). *European Union. 2022 National Inventory Report (NIR)*. Retrieved from UNFCCC: <https://unfccc.int/documents/461931>
- European Parliament. (2020, January 01). *DIRECTIVE 2003/87/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL*. Retrieved from EUR-Lex: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A02003L0087-20200101>
- European Parliament. (2021a, June 25). *European climate law: Council and Parliament reach provisional agreement*. Retrieved from European Council: <https://data.consilium.europa.eu/doc/document/PE-27-2021-INIT/en/pdf>
- European Parliament. (2021b, June 06). *REGULATION (EU) 2021/1056 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL establishing the Just Transition Fund*. Retrieved from EUR-Lex: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32021R1056>
- European Parliament and of the Council. (2015, 3 27). *Regulation (EU) 2015/479 of the European Parliament and of the Council of 11 March 2015 on common rules for exports*. Retrieved from EUR-Lex: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32015R0479>
- European Union. (2008, July 26). *Council Regulation*. Retrieved from EUR-Lex: <https://eur-lex.europa.eu/EN/legal-content/summary/allocation-of-eu-import-and-export-quotas-and-licences.html>
- European Union. (2013, October 10). *REGULATION (EU) No 952/2013 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL*. Retrieved from EUR-Lex: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:32013R0952>
- European Union. (2014, June 27). *REGULATION (EU) No 654/2014 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL*. Retrieved from EUR-Lex: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32014R0654>
- European Union. (2022a, 10). *External Trade*. Retrieved from EUR-Lex: https://eur-lex.europa.eu/summary/chapter/external_trade.html?root_default=SUM_1_CODED%3D07&locale=en

- European Union. (2022b, 10). *Common EU Rules for exports*. Retrieved from EUR-Lex: <https://eur-lex.europa.eu/EN/legal-content/summary/common-eu-rules-for-exports.html>
- Eurostat. (2022, November). *EU trade since 1999 by SITC*. Retrieved from Eurostat: https://ec.europa.eu/eurostat/databrowser/view/DS-018995__custom_3849894/default/table?lang=en
- Eurostat. (2022, November). *Türkiye-EU - international trade in goods statistics*. Retrieved from Eurostat: https://ec.europa.eu/eurostat/databrowser/view/EXT_ST_EU27_2020SITC__custom_3810877/default/table?lang=en
- Eurostat. (2022a). *Extra-EU Trade by partner*. European Union.
- Eurostat. (2023a, 07 05). *EU trade since 1999 by SITC with Türkiye*. Retrieved from Eurostat: https://ec.europa.eu/eurostat/databrowser/view/DS-018995__custom_6837097/default/table?lang=en
- Eurostat. (2023b, July 05). *EU27 (from 2020) trade by SITC product group [EXT_ST_EU27_2020SITC__custom_3845650]*. Retrieved from Eurostat: https://ec.europa.eu/eurostat/databrowser/view/EXT_ST_EU27_2020SITC__custom_6844553/default/table
- EY. (2023, May). *Final regulations published for new EU Carbon Border Adjustment Mechanism (CBAM) and EU Emission Trading System revisions; CBAM transition period begins 1 October 2023*. Retrieved from Tax News Update: Global Edition: <https://globaltaxnews.ey.com/news/2023-0925-final-regulations-published-for-new-eu-carbon-border-adjustment-mechanism-cbam-and-eu-emission-trading-system-revisions-cbam-transition-period-begins-1-october-2023>
- FAO. (2023, June 04). *Fertilizers by Product*. Retrieved from FAOSTAT: <https://www.fao.org/faostat/en/#data/RFB>
- Fertilizers Europe. (2023, June). *Fertilizer Industry Facts & Figures 2023*. Retrieved from Fertilizers Europe: <https://www.fertilizerseurope.com/wp-content/uploads/2023/07/Industry-Facts-and-figures-2023.pdf>
- Fisher, E., Lange, B., & Scotford, E. (2013). *Environmental Law: Text, Cases & Materials*. OUP Oxford.
- Galizzi, P., & Sands, P. (2006). *Documents in European Community Environmental Law*. Cambridge University Press.
- Geden, O., Knopf, B., & Schenuit, F. (2023, June). *Benefits and Pitfalls of an EU Emissions Budget Approach*. Retrieved from Stiftung Wissenschaft Und Politik (SWP): https://www.swp-berlin.org/publications/products/comments/2023C34_EUEmissionsBudgetApproach.pdf
- Grubb, M., Betz, R., & Neuhoff, K. (2014). *National Allocation Plans in the EU Emissions Trading Scheme*. Taylor & Francis Group.

- Herrmann, C., & Trapp, P. (2023). *EU Trade Defence Law and Practice An Introduction*. Springer Nature Switzerland.
- Hinrichs-Rahlwes, R. (2013). *Sustainable Energy Policies for Europe: Towards 100% Renewable Energy*. Taylor & Francis.
- Holder, J., & Lee, M. (2007). *Environmental Protection, Law and Policy*. Cambridge University Press.
- Hufbauer, G. C., Schott, J. J., Hogan, M., & Kim, J. (2022, October). *EU carbon border adjustment mechanism faces many challenges*. Retrieved from Peterson Institute for International Economics: <https://www.piie.com/publications/policy-briefs/eu-carbon-border-adjustment-mechanism-faces-many-challenges>
- International Energy Agency. (2023, June 04). *Ammonia Technology Roadmap*. Retrieved from International Energy Agency: <https://iea.blob.core.windows.net/assets/6ee41bb9-8e81-4b64-8701-2acc064ff6e4/AmmoniaTechnologyRoadmap.pdf>
- Jakob, M., & Mehling, M. (2023). *Comparing Policy Options to Address Export-related Carbon Leakage*. Retrieved from Ecologic Institute: <https://www.ecologic.eu/19263>
- John, R. (2014). *International trade theories and the evolving international economy*. Bloomsbury Academic.
- Joint Research Centre. (2022, June 29). *The twin green & digital transition: How sustainable digital technologies could enable a carbon-neutral EU by 2050*. Retrieved from Joint Research Centre: https://joint-research-centre.ec.europa.eu/jrc-news/twin-green-digital-transition-how-sustainable-digital-technologies-could-enable-carbon-neutral-eu-2022-06-29_en
- Kapan, Y. (2022). *The Effects of the European Green Deal on Türkiye's Trade Integration with the EU. Master's Thesis*. University of Sussex.
- Kılınç, A. (2022). *Master's Thesis*.
- Kimberly, A., & Wolfram, C. (2023). Carbon Border Adjustments, Climate Clubs, and Subsidy Races When Climate Policies Vary. *The Journal of Economic Perspectives*, 137-162.
- Kleimann, D., Poitiers, N., Sapir, A., Tagliapietra, S., Véron, N., Veugelers, R., & Zettelmeyer, J. (2023). Green tech race? The US Inflation Reduction Act and the EU Net Zero Industry Act. *The World Economy*, 1-15.
- Kölling, M., & Hernández-Moreno, J. (2023). The Multiannual financial framework 2021–2027 and Next Generation EU - A turning point of EU multi-level governance? *Journal of Contemporary European Studies*.
- Leyen, U. v. (2020, March 07). *"Move fast, build to last: Europe's new generation" - op-ed by Ursula von der Leyen, President of the European Commission*. Retrieved from European Commission: https://ec.europa.eu/commission/presscorner/detail/en/ac_20_417

- Magacho, G., Espagne, E., & Godin, A. (2023). Impacts of the CBAM on EU trade partners: consequences for developing countries. *Climate Policy*, 1–17.
doi:<https://doi.org/10.1080/14693062.2023.2200758>
- Månberger, A. (2023). Critical Raw Material Supply Matters and the Potential of the Circular Economy to Contribute to Security. *Intereconomics*, 74-78.
- Marcu, A., Mehling, M., & Cosbey, A. (2020). *Border Carbon Adjustments in the EU: Issues and Options*. Retrieved from European Roundtable on Climate Change and Sustainable Transition: <https://ercst.org/border-carbon-adjustments-in-the-eu-issues-and-options/>
- Marín Durán, G. (2021). EU Carbon Border Adjustment Mechanism: Key Issues Going Forward. *European Foreign Affairs Review*, 499-506.
- McDonald, J. (2023, February 08). *CBAM, ETS reform to impact fertilizer trade*. Retrieved from S&P Global: <https://www.spglobal.com/commodityinsights/en/market-insights/blogs/agriculture/020823-cbam-ets-impact-fertilizer-trade>
- Menegat, S., Ledo, A., & Tirado, R. (2022). Greenhouse gas emissions from global production and use of nitrogen synthetic fertilisers in agriculture. *Sci Rep*.
doi:<https://doi.org/10.1038/s41598-022-18773-w>
- Ministry of Energy and Natural Resources. (2023, June 04). *National Energy Balance Sheet 2021*. Retrieved from Ministry of Energy and Natural Resources:
<https://enerji.gov.tr/eigm-raporlari>
- Ministry of Environment, Urbanization and Climate Change. (2021). *Directorate of Climate Change*. Retrieved from <https://iklim.gov.tr/turkiye-nin-2053-yili-net-sifir-emisyon-rotasi-hazirlaniyor-haber-22>
- Ministry of Environment, Urbanization and Climate Change. (2023a, April). *Republic of Türkiye Updated First Nationally Determined Contribution*. Retrieved from United Nations Framework Convention on Climate Change:
https://unfccc.int/sites/default/files/NDC/2023-04/T%C3%9CRK%C4%B0YE_UPDATED%201st%20NDC_EN.pdf
- Ministry of Trade. (2020, April 06). *VIEWS OF THE GOVERNMENT OF TÜRKİYE ON THE CARBON BORDER ADJUSTMENT MECHANISM WITHIN THE FRAMEWORK OF THE INCEPTION IMPACT ASSESSMENT*. Retrieved from Ministry of Trade:
https://ticaret.gov.tr/data/5f901d8813b8760d9ce54aeb/AB%20S%C4%B1n%C4%B1rda%20Karbon%20D%C3%BCzenleme%20Mekanizmas%C4%B1%20Etki%20Analizi-%C3%9CIke%20G%C3%B6r%C3%BC%5%9F%C3%BC_Ek_Türkiye%20Views%20on%20CBA.pdf.pdf
- Ministry of Trade. (2021, July 2021). *Green Deal Action Plan*. Retrieved from Ministry of Trade:
<https://ticaret.gov.tr/data/60f1200013b876eb28421b23/MUTABAKAT%20YE%C5%9E%C4%B0L.pdf>

- Ministry of Trade. (2022, October 15). *Free Trade Agreements*. Retrieved from Ministry of Trade: <https://www.trade.gov.tr/free-trade-agreements>
- Ministry of Trade. (2023b, June). *3rd Meeting of the EU CBAM Specialized Working Group*. Retrieved from Ministry of Trade: <https://ticaret.gov.tr/dis-iliskiler/yesil-mutabakat/duyurular/ab-skdm-ih-tissas-calisma-grubu-3-toplantisi>
- Ministry of Trade. (2023c, August). *EU CBAM Aluminium Sector*. Retrieved from Ministry of Trade: <https://ticaret.gov.tr/dis-iliskiler/yesil-mutabakat/duyurular/ab-skdm-uygulamasina-yonelik-aluminyum-sektoru-bilgilendirme-toplantisi>
- Ministry of Trade. (2023d). *EU CBAM Cement Sector*. Retrieved from Ministry of Trade: <https://ticaret.gov.tr/dis-iliskiler/yesil-mutabakat/duyurular/ab-skdm-uygulamasina-yonelik-cimento-sektoru-bilgilendirme-toplantisi>
- Murray, B. (2009). *Power Markets and Economics: Energy Costs, Trading, Emissions*. Wiley.
- Nakanishi, Y. (2016). *Contemporary Issues in Environmental Law; The EU and Japan*. Springer Japan.
- Nurođlu, E., & Nurođlu, H. H. (2022). Avrupa Yeşil Mutabakatı ve İkiz Dönüşüm Çerçevesinde Akıllı Şehirler. *Çevre, İklim ve Afet; Dirençli Şehirler İçin Yol Haritası* (pp. 57-67). Kocaeli: Kocaeli Büyükşehir Belediyesi Kültür ve Sosyal İşler Daire Başkanlığı Yayınları.
- Official Gazette. (2011, June 01). *Regulation on Electricity Market Import and Export*. Retrieved from Official Gazette: <https://www.resmigazete.gov.tr/eskiler/2011/06/20110601-11.htm>
- Pelkmans, J. (2020). Linking“values”to EU trade policy—a good idea? *European Law Journal*, 391-400.
- Perino, G., & Willner, M. (2016). Procrastinating reform: The impact of the market stability reserve on the EU ETS. *Journal of Environmental Economics and Management*, 37-52.
- Rayner, T., Szulecki, K., Jordan, A. J., & Oberthür, S. (2023). *Handbook on European Union Climate Change Policy and Politics*. (T. Rayner, K. Szulecki, A. J. Jordan, & S. Oberthür, Eds.) Edward Elgar.
- Reif, V., & Hancher, L. (2022, December). Carbon border adjustment mechanisms and the World Trade Organization. *The EU Green Deal(2022)*. (V. Reif, L. Hancher, A. Nouicer, & L. Meeus, Eds.) European University Institute. Retrieved from <https://fsr.eui.eu/publications/?handle=1814/75156>
- Renda, A. (2021). The EU Industrial Strategy: Towards a Post-Growth Agenda? *Intereconomics*, 133-138.
- Republic of Türkiye Ministry of Agriculture and Forestry. (2023, June 04). *Plant Nutrition Statistics*. Retrieved from Republic of Türkiye Ministry of Agriculture and Forestry: <https://www.tarimorman.gov.tr/Konular/Bitkisel-Uretim/Bitki-Besleme-ve-Tarimsal-Teknolojiler/Bitki-Besleme-Istatistikleri>

- Robinson, J. (2007). *Climate Change Law: Emissions Trading in the EU and the UK*. Cameron May.
- Rosa, P., Sassanelli, C., Urbinati, A., Chiaroni, D., & Terzi, S. (2020). Assessing relations between Circular Economy and Industry 4.0: a systematic literature review. *International Journal of Production Research*, 1662-1687.
- Sahin, H., & Esen, H. (2022). The usage of renewable energy sources and its effects on GHG emission intensity of electricity generation in Türkiye. *Renewable Energy*, 859–869. doi:<https://doi.org/10.1016/j.renene.2022.03.141>
- Samuel, A., & Dines, L. (2023). Fertilisers and manures. In A. Samuel, & L. Dines, *In Woodhead Publishing Series in Food Science, Technology and Nutrition*, (pp. 81-114). Woodhead Publishing. doi:<https://doi.org/10.1016/B978-0-323-85702-4.00014-5>
- Sato, S. (. (2022). EU’s Carbon Border Adjustment Mechanism: Will It Achieve Its Objective(s)? *Journal of World Trade* , 383-404.
- Schlacke, S., Wentzien, H., Thierjung, E., & Köster, M. (2022). Implementing the EU Climate Law via the ‘Fit for 55’ package. *Oxford Open Energy*.
- Shum, R. Y. (2023). Decarbonizing contending industries: policy design and the EU’s CBAM. *Climate Policy*, 1-6.
- Sigel, G. (2008). *Emerging Issues in Environmental Law & Climate Change*. LexisNexis/Matthew Bender.
- Simola, H. (2021). *CBAM! – Assessing potential costs of the EU carbon border adjustment mechanism for emerging economies*. Retrieved from Bank of Finland Institute for Emerging Economies: <http://urn.fi/URN:NBN:fi:bof-202110252070>
- Spinelle, C. (2017). *European Energy Studies Volume X: The EU ETS and the European Industry Competitiveness*. Claeys and Casteels.
- TAGEM. (2023, June 04). *Gübre Sektör Politika Belgesi 2018 - 2022*. Retrieved from Republic of Türkiye Ministry of Agriculture and Forestry: <https://www.tarimorman.gov.tr/TAGEM/Belgeler/yayin/G%C3%BCbre%20Sekt%C3%B6r%20Politika%20Belgesi%202018-2022.pdf>
- Thieme, A., & Galariotis, I. (2020, March). *The European Council's strategic agenda : 2019-2024*. Retrieved from CADMUS EUI Research Repository: https://cadmus.eui.eu/bitstream/handle/1814/67068/STG_PB_2020_03-EN.pdf
- Trading Economics. (2023, July 03). *EU Carbon Permits*. Retrieved from Trading Economics: <https://tradingeconomics.com/commodity/carbon>
- TURKCIMENTO. (2023). *Turkish Cement Sector in 2022*. Retrieved from TURKCIMENTO: https://www.turkcimento.org.tr/uploads/pdf/2022_sekt%C3%B6r_kitab%C4%B1.pdf
- Turkish Electricity Transmission Corporation. (2023, June 04). *Development of Türkiye's Gross Electricity Generation-Import-Export and Demand Over the Years (1996-*

- 2021). Retrieved from Turkish Electricity Transmission Company:
<https://www.teias.gov.tr/tr-TR/turkiye-elektrik-uretim-iletim-istatistikleri>
- Turkish Electricity Transmission Corporation. (2023, June 04). *Monthly Distribution of Exported Electricity Energy Over the Years*. Retrieved June 04, 2023, from Turkish Electricity Transmission Corporation: <https://www.teias.gov.tr/tr-TR/turkiye-elektrik-uretim-iletim-istatistikleri>
- TURKSTAT. (2022a, June 06). *Dış Ticaret Endeksleri*. Retrieved from TURKSTAT: <https://data.tuik.gov.tr/Kategori/GetKategori?p=dis-ticaret-104>
- TURKSTAT. (2022b, January 31). *Dış Ticaret Endeksleri*. Retrieved from TURKSTAT: <https://data.tuik.gov.tr/Kategori/GetKategori?p=dis-ticaret-104>
- TURKSTAT. (2022c, April 14). *Türkiye. 2022 National Inventory Report (NIR)*. Retrieved from UNFCCC: <https://unfccc.int/documents/461926>
- TURKSTAT. (2023a, 07 5). *Ülke Gruplarına Göre Yıllık İhracat (Genel Ticaret Sistemi)*. Retrieved from TURKSTAT: <https://data.tuik.gov.tr/Kategori/GetKategori?p=Dis-Ticaret-104>
- TURKSTAT. (2023b, July 05). *Ürün/Ülke Grubuna Göre Dış Ticaret*. Retrieved from TÜİK: <https://iz.tuik.gov.tr/#/showcase/SC-2851FY777F34D2R?token=8d79727fff862a891ce574d27220bfebbf66fedc>
- TURKSTAT. (2023c, April 14). *Türkiye. 2023 National Inventory Report (NIR)*. Retrieved from UNFCCC: <https://unfccc.int/documents/627786>
- TUSIAD. (2020, September 24). *Ekonomik Göstergeler Merceğinden Yeni İklim Rejimi*. Retrieved from TUSIAD: <https://tusiad.org/tr/yayinlar/raporlar/item/10633-ekonomik-gostergeler-merceginden-yeni-i-klim-rejimi-raporu>
- UNFCCC. (2008, November). *Kyoto Protocol - Targets for the first commitment period*. Retrieved from UN Climate Change: https://unfccc.int/resource/docs/publications/08_unfccc_kp_ref_manual.pdf
- Von Homeyer, I., Oberthür, S., & Dupont, C. (2022). Implementing the European Green Deal during the Evolving Energy Crisis. *Journal of Common Market Studies*, 125-136.
- Wettestad, J. (2023). Proactive prevention of carbon leakage? The EU Carbon Border Adjustment Mechanism. In T. Rayner, K. Szulecki, A. J. Jordan, & S. Oberthür, *Handbook on European Union Climate Change Policy and Politics* (pp. 231-245). Edward Elgar.
- Woerdman, E., Roggenkamp, M., & Holwerda, M. (2022). *Essential EU Climate Law*. Edward Elgar.
- Yamin, F. (2012). *Climate Change and Carbon Markets; A Handbook of Emissions Reduction Mechanisms*. Taylor & Francis.
- Zhong, J., & Pei, J. (2023). Carbon border adjustment mechanism: a systematic literature review of the latest developments. *Climate Policy*.

APPENDICES

ANNEX A: Türkiye's trade balance with EU countries

Türkiye and EU Trade Balance (Billion €)	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Germany	- 10,4	- 7,6	- 9,8	- 8,8	- 7,9	- 5,7	- 6,8	- 9,5	- 6,8	- 7,1
Italy	- 4,6	- 4,0	- 3,3	- 2,1	- 1,8	- 0,3	- 1,1	- 0,3	- 0,3	- 1,2
Spain	- 1,3	- 1,2	- 0,5	- 0,3	- 0,3	- 2,1	- 2,9	- 1,9	- 2,6	- 2,8
France	- 1,1	- 0,8	- 1,5	- 1,0	- 0,3	- 1,0	- 1,6	- 0,3	- 0,5	- 0,2
Netherlands	- 2,3	- 2,3	- 2,2	- 1,9	- 2,7	- 1,5	- 1,1	- 1,8	- 2,2	- 2,3
Belgium	- 1,4	- 1,4	- 1,0	- 0,5	- 0,8	- 0,1	- 0,0	- 0,5	- 0,6	- 1,1
Romania	- 0,7	- 0,4	- 0,1	- 0,7	- 0,9	- 1,6	- 1,6	- 1,4	- 1,8	- 3,2
Bulgaria	- 0,5	- 0,6	- 0,5	- 0,2	- 0,6	- 0,2	- 0,0	- 0,4	- 0,9	- 1,8
Poland	- 1,0	- 0,9	- 0,8	- 0,8	- 0,8	- 0,1	- 0,6	- 0,3	- 0,8	- 0,7
Greece	- 2,0	- 2,1	- 0,4	- 0,0	- 0,5	- 0,2	- 0,0	- 0,2	- 0,4	- 0,4
Slovenia	- 0,6	- 0,6	- 0,7	- 0,9	- 1,5	- 1,8	- 2,2	- 1,8	- 1,9	- 2,2
Austria	- 0,1	- 0,1	- 0,0	- 0,2	- 0,2	- 0,1	- 0,4	- 0,3	- 0,3	- 0,6
Czechia	- 1,0	- 0,8	- 0,9	- 1,0	- 1,0	- 0,7	- 0,6	- 0,9	- 0,5	- 0,7
Sweden	- 0,6	- 0,3	- 0,3	- 0,1	- 0,3	- 0,3	- 0,1	- 0,3	- 0,1	- 0,4
Hungary	- 0,7	- 0,7	- 0,8	- 0,8	- 0,7	- 0,4	- 0,2	- 0,3	- 0,6	- 0,6
Portugal	- 0,1	- 0,0	- 0,1	- 0,1	- 0,3	- 0,4	- 0,4	- 0,2	- 0,6	- 0,6
Denmark	- 0,1	- 0,0	- 0,1	- 0,0	- 0,1	- 0,1	- 0,1	- 0,0	- 0,1	- 0,1
Ireland (Eire)	- 0,3	- 0,3	- 0,3	- 0,2	- 0,1	- 0,1	- 0,2	- 0,2	- 0,1	- 0,4
Finland	- 0,5	- 0,4	- 0,5	- 0,4	- 0,4	- 0,4	- 0,3	- 0,4	- 0,4	- 0,4
Croatia	- 0,1	- 0,1	- 0,1	- 0,1	- 0,1	- 0,1	- 0,2	- 0,2	- 0,2	- 0,3
Slovakia	- 0,6	- 0,3	- 0,3	- 0,5	- 0,4	- 0,1	- 0,1	- 0,3	- 0,1	- 0,2
Lithuania	- 0,0	- 0,0	- 0,0	- 0,1	- 0,2	- 0,1	- 0,1	- 0,2	- 0,2	- 0,1
Cyprus	- 0,0	- 0,0	- 0,0	- 0,0	- 0,1	- 0,1	- 0,0	- 0,1	- 0,2	- 0,3
Malta	- 0,1	- 0,1	- 0,1	- 0,1	- 0,1	- 0,1	- 0,2	- 0,1	- 0,2	- 0,2
Estonia	- 0,1	- 0,1	- 0,1	- 0,0	- 0,1	- 0,1	- 0,1	- 0,0	- 0,1	- 0,0
Latvia	- 0,1	- 0,0	- 0,1	- 0,1	- 0,1	- 0,0	- 0,1	- 0,1	- 0,1	- 0,1
Luxembourg	- 0,3	- 0,1	- 0,1	- 0,1	- 0,1	- 0,1	- 0,1	- 0,1	- 0,1	- 0,1