

THE EU CARBON BORDER ADJUSTMENT MECHANISM (CBAM) AND ALGERIA'S HYDROCARBON EXPORTS: LEGAL FRAMEWORK AND ECONOMIC ADAPTATION STRATEGIES

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Abstract: *The European Union's carbon border adjustment system was implemented in October 2023. This mechanism influenced international commerce by linking climate objectives to trade restrictions and levying taxes primarily on carbon-intensive and high-emission imports. The objective of this approach was to avert carbon leakage and to guarantee equitable competition. This mechanism poses significant challenges for developing nations dependent on fossil fuel exports, like Algeria, where exports to the EU primarily consist of fossil fuels and carbon-intensive goods, potentially reducing its revenue and market access opportunities. This study employs a descriptive and analytical methodology to delineate the legal framework of the carbon border adjustment mechanism, assess its compliance with World Trade Organization regulations, and evaluate its economic implications for Algeria. The data indicate that the mechanism has a negligible impact on Algeria's economy, accounting for approximately 0.2% of the nation's GDP. The mechanism's impact is concentrated in the fertilizer, steel, and iron sectors, jeopardizing the nation's competitiveness and employment opportunities. Furthermore, the carbon tax exacerbates the existing structural vulnerabilities within the Algerian economy. The vulnerabilities include overdependence on hydrocarbons, high carbon intensity, insufficient use of renewable energy, and the absence of a regional carbon pricing mechanism.*

Keywords: *Carbon border adjustment mechanism, Carbon pricing, Climate policy, EU-Algeria trade, Hydrocarbon exports.*

1. Introduction

In alignment with its ambitious European Green Deal and its pledge to achieve carbon neutrality by 2050, the EU initiated the Carbon Border Adjustment Mechanism (CBAM) in October 2023. This novel policy instrument signifies a major advancement in climate and trade policy in recent decades. The CBAM seeks to avert carbon leakage, which transpires when EU firms transfer production to nations with more lenient climate legislation or when EU goods are supplanted by imports with elevated carbon emissions (European Commission, 2023). CBAM presents a significant issue for developing nations such as Algeria, whose economy is largely dependent on the export of carbon-intensive products to the EU. The World Bank (2024) reports that hydrocarbons constitute over 91% of Algeria's exports, rendering the nation significantly susceptible to climate-related trade regulations. The EU imports significant quantities of natural gas, oil products, steel, fertilizers, and aluminum from Algeria, all of which fall within the initial scope of CBAM. The execution of CBAM poses a multifaceted challenge to Algeria's economic framework. As the European Union's third-largest supplier of natural gas and a significant exporter of fertilizers and steel, Algeria faces the threat of reduced competitiveness in its key export markets (IMF, 2025). This study uses a qualitative methodology that incorporates many research approaches to examine these topics. The document encompasses a legal analysis of EU Regulation 2023/956 and its

conformity with WTO regulations, an assessment of policy and institutional reports from the European Commission, the World Bank, the IMF, and the International Energy Agency, as well as an evaluation of trade data between Algeria and the EU from 2020 to 2025. The study also derives insights from the responses of other developing nations to CBAM in order to pinpoint effective tactics for Algeria.

2. The EU Carbon Border Adjustment Mechanism: Legal Framework and Implementation

2.1 Origins and Policy Context

The revised EU Emissions Trading System (ETS) sets stricter emission reduction targets, which makes it harder for European industries to compete with producers in places where carbon pricing is not as strict (European Commission, 2023). CBAM's goal is to "level the playing field" by making sure that imported goods have the same carbon cost as goods made in the EU under the ETS. CBAM has three political goals. First, it tries to stop carbon leakage by making it less appealing to move carbon-intensive production outside the EU. Second, it wants to get other countries to use carbon pricing systems and cut down on the amount of pollution their industries make. Third, it is a way to make money, with CBAM expected to bring in €7.2 billion a year for the EU budget by 2030 (Brookings Institution, 2024).

2.2 Legal Framework and Regulatory Architecture

The European Parliament and Council passed Regulation (EU) 2023/956 on May 10, 2023, and it was published in the Official Journal on May 16, 2023. The regulation went into effect on October 1, 2023, and there is a transitional reporting period that lasts until December 31, 2025. (EUR-Lex, 2023). The following areas are covered: The first part of the CBAM covers six industries that use a lot of carbon:

- ✓ **Cement (HS code 2507, 2523):** Emissions from making clinker directly.
- ✓ **Iron and steel (HS code 72, 73):** This includes both finished and semi-finished goods.
- ✓ **Aluminum (HS code 76):** This includes both primary and secondary aluminum.
- ✓ **Fertilizers (HS code 31):** Nitrogen-based fertilizers, especially ammonia and urea.
- ✓ **Electricity:** Things that come from outside the EU.
- ✓ **Hydrogen (HS code 2804):** All types, such as grey, blue, and green hydrogen.
- ✓

2.3 Operational Mechanics

Under CBAM, EU importers of covered commodities are required to acquire a "CBAM certificate" that reflects the greenhouse gas emissions associated with their importation. The cost of these certificates is determined weekly according to the average auction price of EU ETS allowances, expressed in euros per tonne of CO₂ equivalent. (European Commission, 2023). Implementation phase:

- ✓ **Phase 1: Transition period (October 2023 – December 2025):** The initial report, covering the period October to December 2023, was scheduled for submission by 31 January 2024. This transitory period aims to achieve multiple objectives: acquainting firms with the reporting requirements, allowing the Commission to enhance the methodology using actual data, and providing third countries with the opportunity to adjust their standards. (European Commission Implementing Regulation/1117323).
- ✓ **Phase 2: Determined governance (from January 2026):** As of 2026, importers must obtain the status of "Authorized CBAM Declarant" from their national authorities. They will purchase CBAM certificates for imports from the previous calendar year and deliver them by 31 May annually. Notably, the introduction of full CBAM obligations coincides with the gradual phasing out of free ETS allowances for EU industries. Free allocations

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will be reduced linearly from 2026 to 2034, when they will be phased out completely, and the CBAM will provide complete border protection (European Parliament, 2023).

Table 1. CBAM Implementation Timeline and Key Phases

Phase	Period	Obligations	Key Features
Transitional	Oct 2023 - Dec 2025	Quarterly reporting only	No financial payments; Data collection; Methodology refinement
Definitive	Jan 2026 - 2034	Certificate purchase & surrender	Full CBAM charges; Gradual ETS free allocation phase-out
Full Implementation	From 2034	Complete border carbon adjustment	100% CBAM coverage; Zero free ETS allocations

Source: (European Commission, 2023).

Table 1 provides a broad overview of CBAM's implementation timeline, while Table 2 describes the specific sectors and products covered by the mechanism's initial scope.

Table 2. CBAM Covered Sectors and Products (Initial Scope)

Sector	HS Codes	Key Products	Emissions Coverage
Cement	2507, 2523	Clinker, cement	Direct emissions
Iron & Steel	72, 73	Semi-finished & finished steel products	Direct emissions
Aluminum	76	Primary & secondary aluminum	Direct + Indirect (from 2026)
Fertilizers	31	Ammonia, urea, NPK fertilizers	Direct + Indirect (from 2026)
Electricity	2716	Imported electricity	Direct emissions
Hydrogen	2804	All hydrogen types	Direct emissions

Source: (European Commission Implementing Regulation, 2023)

2.4 Legal Controversies and WTO Compatibility

There has been a lot of debate about whether the CBAM follows World Trade Organization (WTO) rules. Several WTO rules may be useful:

- ✓ **The Most Favored Nation (MFN) principle (GATT Article I):** says that CBAM charges the same carbon price for imports from all non-EU countries, no matter how developed they are or how much they have historically been responsible for emissions. Developing nations assert that this contravenes the principle of "common but differentiated responsibility" (CBDR) established in the Paris Agreement and the UN Framework Convention on Climate Change (Mehling et al., 2023).
- ✓ **National treatment (GATT Article III):** Critics say that CBAM is unfair to foreign producers because it doesn't recognize their different but equally effective decarbonization strategies (Gore et al., 2021).

The EU says that CBAM is a legal environmental measure that allows trade restrictions that are needed to protect human, animal, or plant life or health and are related to the protection of natural resources that can't be used up. The European Union says that CBAM is fair, reasonable, and needed to reach its climate goals (European Commission Legal Service, 2023).

3. Global Implications and Impacts on Developing Countries

3.1 Macroeconomic Effects on Global Trade

CBAM has a big effect on the flow of goods around the world and the global trading system. This system first applies to about 3% of all EU imports by value, which is about €50 billion a year. But this percentage doesn't show how much of an effect it has on certain regions and countries. For instance, iron and steel products are expected to bear 75% of the economic impact of CBAM because they have a lot of carbon and trade volume (S&P Global, 2024). Preliminary economic modeling indicates that CBAM may decrease imports from impacted nations by 5–15%, contingent upon variations in carbon intensity and the capacity to transfer costs to consumers. The IMF says that the Middle East and Central Asia region has an annual cost of \$1.7 billion, which is the same as a 14% tariff on CBAM-related exports to Europe (IMF, 2025).

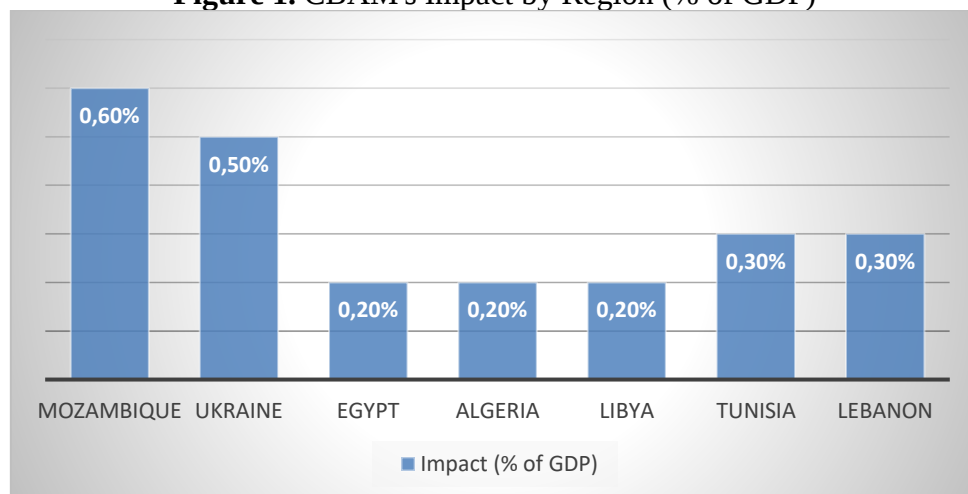
3.2 Differential Impacts on Developing Countries

There are a number of reasons why developing countries are especially vulnerable to CBAM:

- ✓ **High carbon intensity:** Many developing countries get their electricity from coal-fired plants and have old industrial infrastructure, which means they release a lot more carbon than the EU's benchmark. Electricity in Algeria has a carbon intensity of 488 grams CO₂e per kWh, while electricity in France has a carbon intensity of 85 grams and electricity in Sweden has a carbon intensity of 45 grams (Our World in Data, 2023). Because of this difference, Algerian producers will have to pay much higher CBAM fees for the same amount of production.
- ✓ **Limited ability to cut carbon emissions:** Many developing countries don't have access to low-carbon technologies, green finance, or the technical know-how needed to quickly cut emissions. The World Bank says that meeting CBAM standards could cost middle-income countries like Algeria between \$2 and \$5 billion, which is hard to get because they have other development priorities (World Bank, 2025).
- ✓ **No carbon pricing in the home country:** Most developing countries don't have carbon taxes or systems for trading emissions. Kazakhstan and Mauritania are the only CBAM-vulnerable countries that have put in place or plan to put in place a way to charge for carbon. Exporters can't get reductions under CBAM without domestic carbon pricing. This means they have to pay the full European carbon price, which is currently around €80–100 per tonne of CO₂ (ICAP, 2024).

Figure 1 and Table 3 show that the effects of CBAM are very different in developing countries.

Figure 1. CBAM's Impact by Region (% of GDP)



Source: prepared by authors based on (IMF, 2025), (World Bank, 2025)

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Table 3. Most Affected Developing Countries by CBAM (2026–2030)

Country	Main Affected Exports	Annual Impact (USD million)	% of Total Exports to EU
Mozambique	Aluminum	150-200	54.1%
Algeria	Fertilizers, Steel	100-170	3-4%
Egypt	Fertilizers, Steel, Cement	180-250	5-6%
Tunisia	Steel, Cement	80-120	4-5%
Turkey	Steel, Cement	800-1,200	6-8%
South Africa	Steel, Aluminum	400-600	7-9%

Source: (World Bank, 2025).

4. Algeria's Case: Exposure, Vulnerabilities, and Economic Impacts

4.1 Algeria-EU Trade Relations: Structural Overview

Algeria's closeness to the larger European market offers a competitive edge, the nation's excessive reliance on this singular market renders it vulnerable to policy changes like the CBAM.

Table 4. Algeria–EU Trade Statistics (2020–2024)

Year	Exports to EU (€ billion)	Imports from EU (€ billion)	Trade Balance (€ billion)	% of Total Algerian Exports
2020	18.5	14.2	4.3	52%
2021	22.8	15.8	7.0	53%
2022	32.1	17.2	14.9	56%
2023	28.7	16.9	11.8	54%
2024	26.4	16.1	10.3	51%

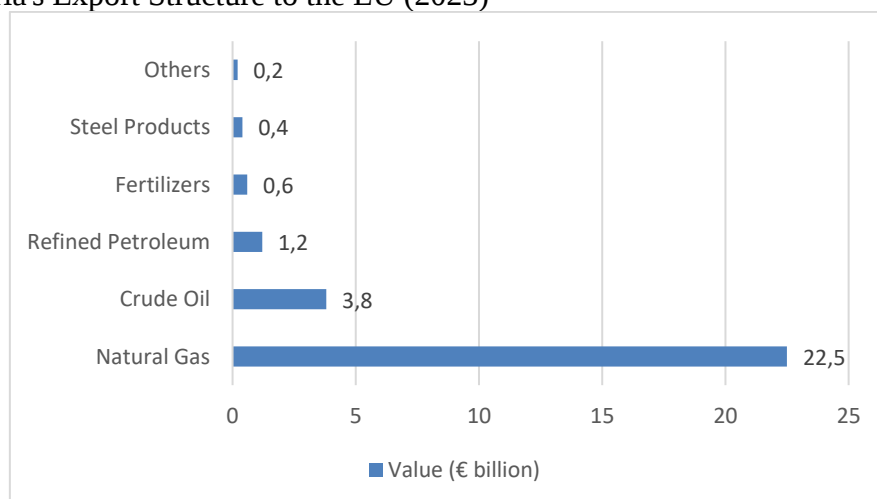
Source: (Eurostat, 2024), (ONS Algeria, 2024).

An overview of the development of Algeria's commercial ties with the European Union over the course of the last five years is presented in Table 4. The European Union (EU) typically receives more than fifty percent of Algeria's total exports, notwithstanding changes in trade that are occurred as a result of the volatility of hydrocarbon prices.

4.2 Sectorial Analysis of CBAM Exposure

The composition of Algeria's exports to the European Union is depicted in Figure 2.

Figure 2. Algeria's Export Structure to the EU (2023)



Source: (Eurostat, 2024)

- ✓ **Fertilizers Sector:** One of the industries that is most immediately impacted by CBAM is the fertilizer sector in Algeria. The value of Algeria's fertilizer exports to the European Union in 2023 was approximately 500–700 million euros. This accounted for approximately twenty percent of the region's entire production and two percent of the overall exports of the country (World Top Exports, 2024). One of the most significant products is ammonia, which is the primary component responsible for the production of nitrogen fertilizer from natural gas. The use of urea as a fertilizer is quite frequent in European agricultural. The nitrogen, phosphorus, and potassium (NPK) fertilizer is a form of compound fertilizer that contains all three elements at the same time.

Algeria's fertilizer industry uses a lot of carbon because it relies on natural gas for both raw materials and energy. Natural gas is cleaner than coal-fired generation, which is common in China. However, Algerian plants often use older technology that is less energy-efficient than modern EU plants. Initial estimates indicate that CBAM costs may elevate Algerian fertilizer exports by €50–100 million annually following the implementation of the fixed regime in 2026, representing 10–15% of the current export value (IMF, 2025).

- ✓ **Iron and Steel Products:** The steel industry in Algeria is mostly owned by the government and is mostly based in the El Hadjar and Annaba complexes. It sends €300–500 million worth of steel products to the EU every year. The industry itself employs about 20,000 people and supports about 50,000 jobs in related fields (Ministry of Industry Algeria, 2024). But Algerian steel production has a lot of problems to deal with:
 - **Infrastructure that is getting old:** Most of the buildings, which were built in the 1970s and 1980s, have not been updated much.
 - **Energy intensity:** Using blast furnace technology releases about 1.8–2.2 tonnes of CO₂ for every tonne of steel, which is higher than the EU average of 1.3–1.6 tonnes.
 - **Limited scrap utilization:** A low recovery rate for steel means that iron ore is more important for making new steel.
- ✓ **Cement Sector:** Algeria's cement exports to the EU are not very high, only about €50–100 million a year. The main focus of the sector is on building homes in Africa and in the region. However, CBAM's inclusion of cement could mean that there will be more barriers in the future and could make foreign investors less likely to invest in Algeria's cement industry, which was meant to grow (African Development Bank, 2023).
- ✓ **Natural Gas: Indirect CBAM Exposure.** As the EU moves forward with its energy transition, the long-term demand for Algerian gas may go down. However, it is still enough for now because Europe needs to find new sources of gas to replace Russian ones (IEA, 2024).

Table 5. Exposure of Algeria's CBAM-Covered Sectors (Detailed Analysis)

Sector	Exports to EU 2023 (€ mn)	Carbon Intensity (tCO ₂ /t)	EU Benchmark (tCO ₂ /t)	Gap vs. Benchmark	Est. CBAM Cost (€ mn)	% of Export Value
Fertilizers – Ammonia	350	2.8	2.0	+40%	55–75	16–21%
Fertilizers – Urea	250	2.2	1.6	+37%	25–35	10–14%
Fertilizers (Subtotal)	600	2.5*	1.8*	+39%	80–110	13–18%
Steel Products	400	2.0	1.4	+43%	40–70	10–17%
Cement	75	0.70	0.65	+8%	5–10	7–13%
TOTAL	1,075	—	—	—	125–190	12–18%

Source: Author calculations based on (European Commission, 2023), (S&P Global, 2024), (World Bank, 2025).

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4.3 Quantitative Impact Assessment

Based on trade data and carbon intensity estimates, we can project CBAM's financial impact on Algeria:

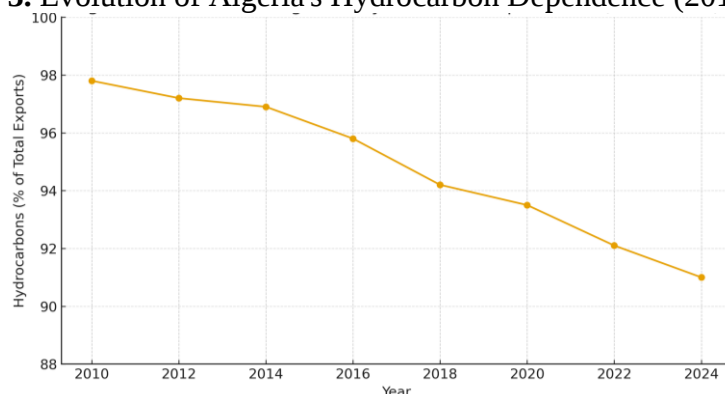
Table 6. Estimated Annual CBAM Costs for Algeria (2026 onwards)

Sector	Export Value (€ million)	Average Emissions Intensity	Estimated CBAM Cost (€ million)	% of Export Value
Fertilizers	600	2.5 tons CO ₂ /ton product	60-90	10-15%
Steel	400	2.0 tons CO ₂ /ton product	40-70	10-17%
Cement	75	0.7 tons CO ₂ /ton product	5-10	7-13%
Total	1,075	-	105-170	10-16%

Source: Authors calculations based on (European Commission, 2023), (IMF, 2025), (World Bank, 2025)

These estimates show that Algeria's annual CBAM costs are between €100 million and €170 million, which is about 0.2% of GDP and 0.3% to 0.5% of all exports. Even though this seems small when looked at as a whole, the fact that it has a big effect on certain areas and sectors could have big effects on the economy and society.

Figure 3. Evolution of Algeria's Hydrocarbon Dependence (2010-2024)



Source: (ONS Algeria, 2024), (World Bank, 2024)

4.4 Indirect and Systemic Impacts

Algeria will have to contend with a range of indirect effects in addition to the direct costs imposed by CBAM. The mechanism's impact—raising the prices of carbon-intensive goods in the EU market by an estimated 10% to 16%—is likely to undermine Algeria's competitiveness. This could result in a loss of market share to countries with lower carbon footprints, such as Egypt, which is currently modernizing its steel industry. Furthermore, the uncertainty surrounding the future evolution of CBAM and its potential expansion represents a significant risk to investment.

4.5 Algeria's Current Decarbonization Efforts: Achievements and Gaps

The Algerian government has set lofty goals for the use of renewable energy sources. One of the goals of the National Program for Renewable Energy Development is to increase the capacity of renewable energy sources to 22,000 megawatts by the year 2030. This includes 13,500 megawatts (MW) of solar photovoltaic power, 5,000 megawatts (MW) of wind energy, 2,000 megawatts (MW) of concentrated solar power, and 1,000 megawatts (MW) of concentrated solar power and minor hydropower power. As a result, the use of renewable energy technology might increase from less than one percent at the present time to twenty-seven percent by the year 2030 (Ministry of Energy and Renewable Energy, 2021).

Despite the fact that targets have been defined, the reality of execution demonstrates that progress has been slow.

Algeria has integrated only about 450–500 MW of renewable energy capacity as of 2024, which falls significantly short of what is required to meet its 2030 targets. Of this total, only around 60 MW comes from operational wind and solar installations, while the remainder is generated by the hybrid gas-solar complex at Hassi R'Mel (IEA, 2024). This deployment gap can be attributed to several factors. From a financing perspective, constraints include limited access to concessional capital and increasing pressure on public finances. In addition, regulatory barriers—such as complex approval procedures and an unclear investment framework—continue to hinder progress.

Furthermore, Algeria remains one of the top ten gas-flaring countries globally, with approximately 10–12 billion cubic meters of gas flared annually. According to the World Bank's Global Gas Flaring Tracker (2024), although the government aims to capture and utilize associated gas, progress has been slowed by persistent infrastructure and technological challenges.

In contrast to several peer countries, such as Kazakhstan and South Africa, Algeria has yet to implement carbon pricing mechanisms, including carbon taxes or emissions trading systems. The absence of a domestic carbon price prevents Algerian exporters from benefiting from potential CBAM reductions, effectively requiring them to bear the full cost of the European carbon price. As highlighted by the International Monetary Fund (2024), this lack of carbon pricing removes a critical policy lever for incentivizing industrial decarbonization.

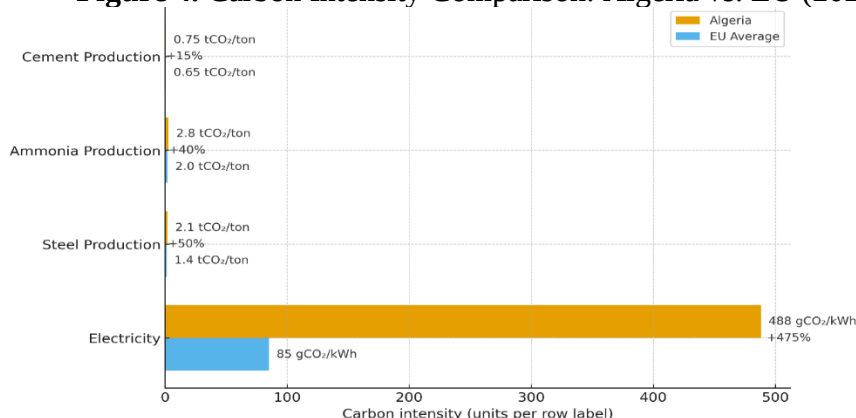
Table 7. Algeria's Renewable Energy Targets vs. Actual Progress

Technology	2030 Target (MW)	2024 Actual (MW)	Achievement Rate (%)	Required Annual Addition (MW)
Solar PV	13500	380	2.8	2187
Wind	5000	60	1.2	823
Concentrated Solar Power	2000	25	1.25	329
Biomass & Hydro	1000	35	3.5	161
TOTAL	22000	500	2.3	3500

Source: (Ministry of Energy Algeria, 2024), (IEA, 2024), (Middle East Institute, 2024)

Figure 4 provides more evidence of the significant carbon intensity difference that exists between the production processes in Algeria and those in the EU, which explains the widespread exposure to CBAM.

Figure 4. Carbon Intensity Comparison: Algeria vs. EU (2023)



Source: Our World in Data (2023), European Commission (2023)

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5. Adaptation Strategies and Policy Recommendations

5.1 Short-Term Measures (2025-2027)

- ✓ **Establish CBAM Compliance Infrastructure:** It is imperative that Algeria quickly enhance its institutional capability in order to properly manage compliance with CBAM regulations. This should include the establishment of a National CBAM Coordination Unit, which is an autonomous agency that is either part of the Ministry of Commerce or the Ministry of Environment. This body should be staffed with individuals who are knowledgeable in the fields of law, technology, and trade. The development of measuring, reporting, and verification (MRV) systems in industries that are covered by CBAM is required for emissions monitoring systems. It is possible that the European Union or the World Bank might provide funding for this endeavor.
- ✓ **Diplomatic Engagement with the EU:** Algeria should engage in constructive dialogue with European institutions through:
 - **Bilateral negotiations:** Leveraging Algeria's strategic importance as a gas supplier to obtain transitional arrangements, which could include longer compliance periods or technical assistance.
 - **Building a coalition:** Cooperating with North African and Middle Eastern countries (such as Tunisia, and Egypt) to ensure a unified position in EU-MENA trade and energy discussions.
 - **Highlighting its role in energy security:** Emphasizing Algeria's contribution to European energy security, especially in light of the EU's efforts to reduce reliance on Russian gas, as a rationale for requesting accommodations or special arrangements.
- ✓ **Immediate Sectoral Interventions:**
 - **Fertilizer Industry:**
 - ❖ **Technology Audits:** Conduct full energy and emissions audits of the largest fertilizer plants (e.g., Solfert, ASMIDAL) to identify simple ways to improve efficiency.
 - ❖ **Best Available Technology (BAT):** Begin planning to transition to more energy-efficient production methods, possibly with support from international partners.
 - ❖ **Green Ammonia Roadmap:** Explore the possibility of producing green ammonia using renewable electricity and water electrolysis.
 - **Steel Sector:**
 - ❖ **Use More Scrap:** Build additional steel recycling facilities to enable secondary steel production, which has 70–80% lower emissions compared to primary production.
 - ❖ **Electric Arc Furnaces:** Plan for a gradual transition from blast furnaces to electric arc furnaces powered by renewable energy.
 - ❖ **Energy Efficiency Retrofits:** Take immediate measures to improve energy efficiency in facilities (such as recovering waste heat and optimizing furnace operations) to reduce emissions by 10–15%.

5.2 Medium-Term Strategies (2027-2030)

- ✓ **Accelerated Renewable Energy Deployment:** Algeria needs to speed up the use of renewable energy right away to lower the amount of emissions in the economy:
 - By the year 2030, the primary objective is to concentrate on the construction of utility-scale solar photovoltaic (PV) projects, with the potential to be conducted through worldwide competitive bidding.
 - Our objective is to utilize Algeria's wind resources, particularly in the High Plateaus region, with the objective of achieving a power output of between 1,000 and 1,500 megawatts by the year 2030.

- It is recommended that modifications be made to the rules in order to facilitate the acquisition of permits for renewable projects, enhance the clarity of power purchase agreements (PPAs), and reduce the local content restrictions that hinder investment opportunities.
- Green finance mobilization involves the utilization of international climate financing instruments such as the Green Climate Fund, the African Development Bank, and the European Investment Bank in order to fulfill the financial obligations of green infrastructure.
- ✓ **Introduction of Domestic Carbon Pricing:** In the home country, establishing a price for carbon would alleviate several problems, including the following:
 - Algerian exporters should be allowed to deduct the cost of carbon emissions in their own nation from their CBAM charges. This will result in a reduction of their overall expenses when compared to other countries.
 - Acquire funds to finance initiatives that aid in the preservation of the environment and safeguard the rights of individuals.
 - Companies should be provided with incentives to reduce their emissions and invest in energy efficiency in order to bring about a change in behavior.

It is possible that Algeria might consider imposing a modest carbon tax of fifteen to twenty dollars per ton of carbon dioxide, with the proceeds going toward subsidies for renewable energy and the modernization of industry. This price, which is lower than EU ETS prices, would show a commitment to reducing carbon emissions and give some relief from the CBAM (World Bank Carbon Pricing Dashboard, 2024).

- ✓ **Industrial Modernization and Green Investment:**
 - **Green Steel Initiative:** Start a pilot project to build a green steel facility that uses hydrogen direct reduction or electric arc furnace technology as a demonstration.
 - **Partnerships with other countries:** To get to new markets and technology, look for joint ventures with steel companies in Europe or Asia.
 - **Retraining the workforce:** Make programs to teach steelworkers how to use new technologies.
 - **Development of the Circular Economy:** Waste-to-Energy: Put money into biomass and waste-to-energy plants to replace the use of fossil fuels.
 - **Industrial Symbiosis:** Set up industrial parks where waste heat and byproducts from one facility can be used as inputs for another, making better use of resources overall.
- ✓ **Export Diversification:** The EU will remain an important market, but Algeria should reduce its overreliance on this single market:
 - **African Continental Free Trade Area (AfCFTA):** Algeria's ratification in 2019 should be leveraged to increase exports to African markets, which currently account for only 5% of Algerian exports.
 - **Asia-Pacific Markets:** Seek opportunities to sell steel and fertilizers in Asian markets, while keeping in mind that other major economies may implement CBAM-like measures in the future.
 - **Value-Added Processing:** Develop downstream industries (such as petrochemicals and manufactured goods) to generate higher revenues, create more jobs, and move up the value chain.

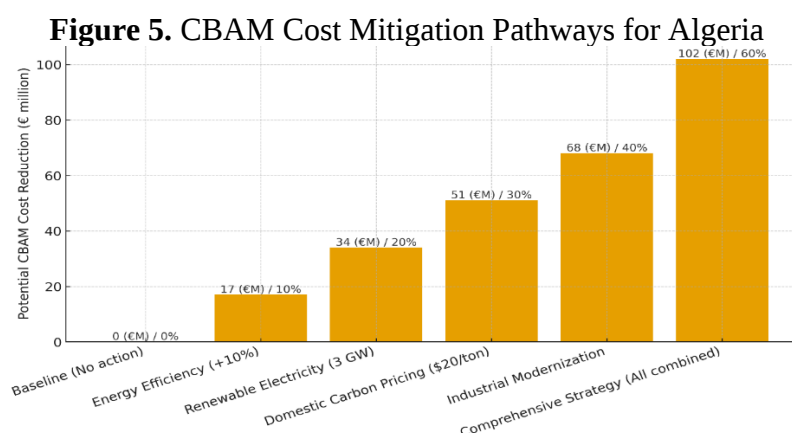
Table 8 presents a full adaptation plan for 2025–2035 with estimated costs between €13 and €20 billion.

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Table 8. Proposed Adaptation Roadmap for Algeria (2025–2035)

Time Period	Priority Actions	Expected Investment (€ billion)	Expected Impact
Short-term (2025-2027)	CBAM compliance infrastructure; Industrial energy audits; EU negotiations	0.1-0.2	Reduced CBAM costs by 10-15%
Medium-term (2027-2030)	5 GW renewable energy; Carbon pricing introduction; Steel/fertilizer modernization	3-5	Emissions reduction 15-20%; CBAM costs cut by 30%
Long-term (2030-2035)	15 GW renewables; Green hydrogen production; Economic diversification	10-15	Hydrocarbons <70% exports; 27% renewable electricity

Source: Author's analysis based on (World Bank, 2024), (IMF, 2024)



Source: prepared by the Authors.

Table 9. Regional Comparison: Climate Policy Preparedness (2024)

Country	Renewable Energy (% of electricity)	Carbon Pricing	CBAM Readiness Score (1-10)	Estimated CBAM Impact
Egypt	11	None	5	Medium
Tunisia	6	None	4	Medium-High
Algeria	1	None	3	Medium-High
South Africa	7	Yes (\$8/ton)	6	Medium
Turkey	17	Planned (2025)	6	High

Source: prepared by the Authors.

6. CONCLUSIONS

The EU's carbon limit adjustment mechanism is a pivotal intersection of climate policy and international trade. For Algeria, the CBAM presents a multifaceted challenge, with projected direct expenses significantly beyond 100-170 million euros annually. This method indicates that the Algerian economy faces significant challenges, including an excessive reliance on hydrocarbon exports, elevated carbon intensity in industrial output, slow progress in renewable energy adoption, and the absence of a domestic carbon pricing system. The quantitative analysis in this paper reveals that the immediate budgetary impact of the CBAM on Algeria is very minor (about 0.2% of GDP), although the effects are markedly concentrated in particular sectors. The fertilizer and steel sectors, employing over 35,000 individuals and exporting items valued at €1 billion annually, are required to remit CBAM taxes ranging from 10% to 16% of the export value. This may impair their competitiveness in the crucial European market, leading to reduced employment, lower output, and lower revenue from international sales.

This study advocates for the creation of a national CBAM coordination unit and the prompt initiation of emissions monitoring in the relevant industries, alongside the expansion of at least 5,000 MW of renewable energy by 2030 through regulatory simplification and the acquisition of supplementary international green financing. It underscores the necessity of establishing a carbon price of \$15–20 per ton of CO₂ and allocating the revenues to facilitate the green transition, thereby improving CBAM compliance and advancing decarbonization, while also launching targeted modernization initiatives in the fertilizer and steel sectors, concentrating on green ammonia production and electric arc furnaces.

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