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Content

Executive Summary

The ambitious climate targets of the European Green Deal have raised the concern that production of energy-intensive goods might be shifted to countries with less stringent climate policies. To address such "carbon leakage", the European Union (EU) has introduced a Carbon Border Adjustment Mechanism (CBAM). The CBAM imposes a price on emissions released during the production of imported iron and steel products, aluminium, fertilisers, hydrogen, electricity and cement similar to the one prevailing in the EU. The EU CBAM entered into force in October 2023 in a transitional form and will be gradually ramped up until the year 2035.

The CBAM is a promising approach to "level the carbon playing field", thus preventing that ambitious climate policies in the EU are undermined by carbon leakage while at the same time providing incentives for third countries to impose more stringent climate measures to reduce their exposure to the CBAM. Nevertheless, as the CBAM makes it harder for trade partners to export goods covered by the CBAM to the EU market, this instrument entails the risk of negatively affecting these countries' economic prospects. This concern is particularly relevant for the EU's direct neighbours in the Mediterranean region. These countries' economies are exposed to the CBAM in different dimensions. Libya, Tunisia and Morocco are especially export-dependent, as these countries' exports account for more than 40% of gross domestic product (GDP). For Tunisia, Algeria and Libya, the EU is the most important trade partner, accounting for more than half of total exports from these countries. Finally, for Morocco, Türkiye and Egypt, exports from sectors covered by the CBAM (regardless of whether they are targeted at the EU or elsewhere) account for sizable shares of total exports, reaching almost 15% for Morocco. Yet, as a share of total GDP, exports of CBAM sectors to the EU are below 1% for all countries included in this study.

Hence, in its current form the CBAM seems unlikely to exert substantial negative impacts on the macroeconomic level – which is in line with available modelling studies. Concentrated impacts on specific economic sectors might, however, impose social hardships on certain social groups, such as workers in emission-intensive industries. Furthermore, if the EU expands the CBAM to additional economic sectors or other countries introduce similar border carbon adjustments, the costs for Mediterranean countries could increase substantially. Implementing climate policies, especially a carbon price, is thus an appropriate way to lower exposure to border carbon adjustments.

The degree to which EU trade partners can adapt to the CBAM depends on the existing climate policy environment and political support to implement additional measures to accelerate the move towards decarbonisation. For instance, in recent years Algeria, Egypt and Lebanon have adopted several pieces of legislation relevant for the increased deployment of renewable energy sources.

For most countries, the main motivation to adopt climate measures neither lies in reduced climate impacts nor in lower exposure to the CBAM. Rather, a transformation to a low-carbon economy has the potential to yield a number of beneficial effects. These include cost-savings from renewable energy sources, improved air quality resulting from decreased combustion of fossil fuels, and novel opportunities to achieve structural economic change and create employment.

Closer examination of the political and economic situation in Egypt suggests that, in spite of the challenges associated with the CBAM, firms also see opportunities related to a transition to a low-carbon economy, such as further enhancing their energy efficiency and to improve their productivity. As many firms already have at least some of the infrastructures required for monitoring, reporting and verifying emissions in place, they are probably better placed to sell in the EU market than their competitors from other countries that are less well prepared. Yet, some – especially small – firms are not well prepared and concerned about the additional costs imposed by the EU CBAM. Policy-makers in Egypt have already implemented measures to harness the countries' potential for renewable energy. They are also currently devising plans for large-scale production of green hydrogen, which could be either directly exported to other countries, such as EU member states, or be used in the production of climate-neutral basic materials, such as iron, steel and aluminium.

The in-depth assessment of the fertiliser production and exports in Morocco also indicates that important emission-intensive industries are currently undergoing a transformation. State-owned OCP group, a major producer of fertilisers, is currently pursuing a programme which aims to derive its entire power consumption from renewable sources by 2027 and become carbon neutral by 2040. Achieving these goals would safeguard the competitiveness of Morocco's fertiliser exports in the EU market and also make sure that the industry is prepared for the possible introduction of carbon border adjustment schemes in other jurisdictions, for example in Asia or North America. Although this analysis shows that the fertiliser sector will not be affected in the short term by the CBAM, and that Morocco's fertiliser export diversification strategy should not be limited to the EU, Morocco is called upon to consider the carbon tax as an opportunity to make progress in the decarbonisation of its economy, as certain sectors will be more exposed and vulnerable to the carbon tax, including the fertiliser sector, if

certain American and Asian countries also apply some kind of carbon border adjustment on imports from Morocco.

Countries in the Mediterranean could adopt a range of policies that would foster the clean energy transition and reduce exposure to the CBAM. A price on emissions would not only reduce emission intensity in an economically efficient way but would at the same time also be deducted from the price that needs to be paid per unit of emissions when exporting to the EU. Support for renewable energy sources provides affordable alternatives to fossil fuels for firms aiming to reduce their emissions. Furthermore, governments can facilitate compliance with the EU CBAM and reduce the costs for firms by supporting their reporting and processing of data.

National institutions can provide technical assistance to firms and engage in capacity-building. These efforts can be supported by the international community. In the context of its neighbourhood policy, the EU is in a special position to offer measures that reduce adverse impacts of the CBAM for the Mediterranean countries. International cooperation and partnerships are thus crucial as a complement to the CBAM to ensure effective and equitable decarbonisation. Partnerships for decarbonisation could be mutually beneficial for countries in the Mediterranean and for the EU. They would alleviate the adverse effects of the CBAM and help reap the additional benefits from a transition to a low-carbon economy for the former while at the same time reducing leakage concerns for the latter.

Several partnerships in the areas of energy, climate and industrial development already exist between Mediterranean countries and EU member states. In addition, Morocco and the EU have a green partnership, which aims to advance the external dimension of the European Green Deal through action on the ground, and Egypt and the EU have recently signed a strategic and comprehensive partnership, which also includes sustainable investment. These partnerships could be welcome opportunities for the EU to support the low-carbon transition in their Mediterranean trade partners and reduce their exposure to the CBAM. These partnerships could also act as blueprints for similar approaches to align climate policy with trade considerations with other countries.

Introduction

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The European Green Deal aims to reduce greenhouse gas (GHG) emissions by 55% by 2030 compared to the levels of 1990 and to achieve climate neutrality by 2050 (European Commission, 2019). This will require adoption of novel, climate-neutral production technologies that are – at least in most cases – more expensive than conventional ones. As a consequence, there is the concern of shifting production of energy-intensive goods to countries in which producers face lower costs due to less ambitious climate policies (Jakob, 2021). Until now, there is only scant evidence of such "carbon leakage"; yet, increasing climate ambition could result in substantially higher leakage rates (Caron, 2022). Moreover, European Union (EU) firms in sectors that are deemed to be at risk of carbon leakage receive free allocation of emission permits to compensate for their higher production costs. This form of leakage protection will be replaced by the so-called Carbon Border Adjustment Mechanism (CBAM). The CBAM will require importers of iron and steel products, aluminium, fertilisers, hydrogen, electricity and cement to pay a price that reflects the carbon price in the EU Emission Trading System (ETS) for the emissions generated in the production of the respective goods. Even though the CBAM makes it harder for foreign firms to enter the EU market, a policy design that ensures that the latter are not disadvantaged compared to European firms increases the likelihood that the CBAM will be deemed compatible with international trade rules (Mehling et al., 2019).

The EU CBAM entered – in a transitional form – into force in October 2023. In its ramp-up phase of three years, it only requires reporting the emissions released to produce imported iron and steel, aluminium, cement, fertilisers, electricity and hydrogen (possible extensions to other sectors, such as organic chemicals and plastics, will be considered at a later stage). From 2026 on, importers will need to surrender dedicated CBAM certificates, which closely mirror the price in the EU ETS. Until 2035, the requirements to surrender CBAM certificates will increase in parallel to the phasing out of free allocation of EU ETS permits for EU producers, which currently constitutes the main instrument to address carbon leakage. In its current form, the CBAM mainly covers emissions that directly occur in the production process (Scope 1). Emissions from electricity inputs (Scope 2) and intermediate products (Scope 3) are only included in a few very specific cases, such as emissions released to generate electricity for hydrogen production or for clinker that serves as an intermediary input for cement. Revenues collected by the sale of CBAM certificates will be used as an "own resource" for the EU budget and can be used to, for instance, fund the net-zero transformation or to pay back common debt incurred during the COVID-19 pandemic to promote economic recovery. The CBAM applies to all trade partners, regardless of their economic situation or level of development. The only exception occurs for countries that have a carbon price in place (other policies, such as performance standards or support schemes for clean energy, are not taken into account). In this case, the domestic carbon price is deducted from the obligation to surrender CBAM certificates to prevent emissions from being priced twice.

The CBAM constitutes a promising approach to "level the carbon playing field" and to allow EU producers to employ clean production methods while remaining competitive in the EU market against firms from countries with less ambitious climate policies (Jakob et al., 2022). Nevertheless, this instrument makes it harder for trade partners to export goods covered by the CBAM to the EU market. The concern about potential negative implications for competitiveness of export industries is most pronounced for developing and least developing countries that are

highly dependent on carbon-intensive industries as a source of foreign currency, fiscal revenue, and employment and wage, and thereby might be highly exposed to the CBAM (Espagne et al., 2021).

An important lever to increase the political acceptance of the CBAM by the EU's trade partners can be partnerships that foster decarbonisation in partner countries (Jakob et al., 2022). With less emission-intensive production, exports to the EU would need to pay a lower price for entering the EU market. Hence, existing green partnership between the EU and its southern neighbours might be an important foundation for the success of the European Green Deal (Della Ragione et al., 2022). Even though the CBAM might adversely affect the competitive position of exporters of emission-intensive products, it might also help accelerate the transition to a low-carbon economy. This is due to the fact that such a transition would likely bring about several domestic benefits, such as cost saving from renewable energy sources, reduced air pollution, and novel opportunities for economic development.

With the countries in the Mediterranean being direct neighbours to the EU, with whom good diplomatic relations are a central aim of the EU's foreign policy, the impact of the CBAM on these countries is of particular importance for policy-makers. For this reason, this study sheds some light on the following questions:

- How might different countries in the Mediterranean be affected by the CBAM?
- How well are they able to adapt to it?
- Which economic opportunities would a transformation to clean energy create in these countries?
- How can international cooperation and partnerships support policies for decarbonisation in these countries?

Chapter 1 provides a broad overview of the trade portfolios of the EU's trade partners in the Mediterranean. It also presents a range of indicators that measure these countries' exposure to the CBAM as well as their ability to successfully adapt to it, for instance by switching to cleaner production technologies.

Chapter 2 takes a closer look at what the EU CBAM could mean for Algeria, Egypt and Lebanon. It also takes stock of potential benefits of a transition to low-carbon energy sources, reviews climate and energy policies that are already in place, and discusses how international cooperation and partnerships could help to accelerate decarbonisation.

Chapter 3 assesses how policy-makers and the private sector in Egypt are prepared for the EU's CBAM. The authors highlight which measures to reduce emissions are already being undertaken, identify barriers slowing down the transition, and discuss how these barriers could be successfully addressed.

In contrast to the first three chapters that take a cross-sectoral perspective, Chapter 4 puts a particular focus on Morocco's fertiliser sector. This chapter analyses the importance of fertiliser production for Morocco's economy, the significance of the EU as a trade partner as well as the composition of the EU's fertiliser imports. It also describes which adverse effect the EU CBAM might have on Morocco's economy, and presents options to mitigate these effects. Under the framework of the Morocco-EU Green Partnership and to overcome the challenges and impacts on the implementation of the CBAM, the author proposes concrete recommendations on how CBAM could be a valuable tool for achieving the objectives of this green partnership.

The CBAM constitutes a promising approach to "level the carbon playing field" and to allow EU producers to employ clean production methods while remaining competitive in the EU market against firms from countries with less ambitious climate policies

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Implications of the CBAM for EU Trade Partners in the Mediterranean[1]

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[1] I thank Guilherme Magacho, Indra Overland and Rahat Sabyrbekov for providing data for Table 1 and Figure 3.

Introduction

The Carbon Border Adjustment Mechanism (CBAM) has the potential to prevent that ambitious measures to reduce greenhouse gas (GHG) in the European Union (EU) are undermined by shifting the production of emission-intensive goods to countries with less stringent climate policies (Jakob, 2021). However, as the CBAM also makes it more difficult for exporters from third countries to enter the EU market, it will impose some costs for trade partners.

Against this background, this chapter provides a broad overview of the potential impacts of the CBAM on the EU's trade partners that are directly abutters to the Mediterranean Sea, i.e., Algeria, Egypt, Israel, Lebanon, Libya, Morocco, Syria, Tunisia and Türkiye. This analysis paints a highly aggregated picture of data on trade and emissions on the sectoral level in which the social and political situation in the countries under study is addressed only in a cursory way. The subsequent chapters carry out more detailed analyses of particular climate and energy policies in three selected countries, the perspective of the private sector in Egypt, and the situation of opportunities and challenges facing the fertiliser industry in Morocco.

In this chapter, we first analyse exports from these countries in CBAM-sectors to the EU. We put these trade flows into perspective by comparing them to total exports and overall economic activity. We also assess EU trade partners' vulnerability to the CBAM and potentials to reduce the cost burden by either adopting cleaner production technologies or by embarking on a transformation of the energy system. We also highlight potential effects for labour markets and livelihoods, and discuss their policy implications. Finally, we discuss the policy implications of these findings.

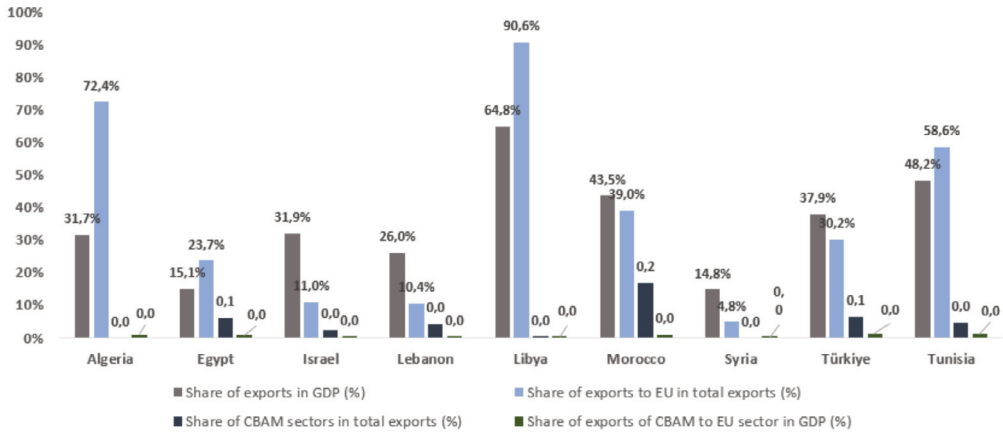
Trade patterns and exposure to the CBAM

To assess Mediterranean countries' trade portfolios in relation to the CBAM, we examine four dimensions. First, we use exports as a share of gross domestic product (GDP) as a measure of an economy's overall dependence on trade. Second, the share of a country's exports that go to the EU indicates the dependence on the EU as an export market. Third, the share of CBAM sectors in total exports provides information on the importance of the relevant industries (i.e., iron and steel products, aluminium, fertilisers, electricity and cement; hydrogen is not traded across borders). Figure 1 gives an overview of these four dimensions that help us understand different countries' exposure to the CBAM.

The nine countries under study display quite different export intensities, ranging from 15% (Egypt) to 65% (Libya). This means that a similar reduction of overall exports will have a more pronounced economic effect on export-intensive countries such as Libya, Tunisia and Türkiye than for countries such as Egypt, Syria and Lebanon, for which exports account for a smaller share of overall economic activity.

With regard to the importance of the EU as an export market, there is even more variation than for export intensity. Whereas more than 90% of Libya's exports are targeted at the EU, the respective figure for both Israel and Lebanon is only 10%. For this reason, any reduction in trade with the EU can be expected to result in comparable declines in overall trade for Libya, Algeria and Tunisia, whose exports are highly fo-

Figure 1. Indicators of Export Exposure to CBAM for Mediterranean EU Trade Partners for the year 2022



*No data available for Algeria and Syria on total exports in CBAM sectors.
Elaborated by author, sourced from Eurostat (2023) and World Bank (2023).

cused on the EU. By contrast, for countries with more diversified export portfolios, such as Israel, Lebanon and Syria, reductions in exports to the EU will have a substantially lower effect on overall trade.

Morocco is the only country for which the share of CBAM sectors in total exports exceeds 10% for Libya, the share is even below 1%. Hence, none of the countries can be regarded as being highly specialised on exporting these goods. Nevertheless, for countries with relatively large shares of CBAM sectors in total exports, such as Morocco, Türkiye and Egypt, deteriorating prospects to enter the EU market might translate into adverse economic effects. This might be of particular relevance for countries aiming to expand sectors that are covered by the CBAM as part of their development strategy.

Finally, when put into perspective relative to GDP, exports from CBAM sectors to the EU are relatively small. Türkiye, Tunisia and Morocco exhibit the highest values with 1.3%, 1.1% and 1%, respectively. For Israel and Syria, by contrast, the value is only about 0.1%. Hence, even under the rather conservative assumption that the carbon price with a full CBAM increases the final sales price by about 20% (Jakob & Mehling, under review) and that these extra costs are fully passed through to consumers, the former countries would experience GDP losses of less than 0.3%, and, for those countries with significantly lower ratios, the overall effects are likely negligible. Nevertheless, economic losses that are highly concentrated on specific industries can create social hardships, for instance, for workers who lose their jobs or whose salaries decline and for regions that are heavily dependent on these industries.

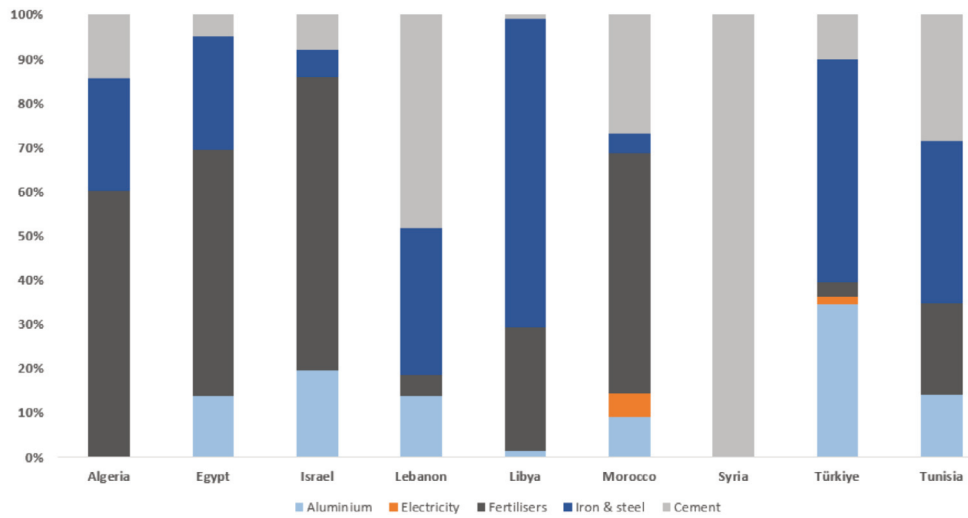
Morocco is the only country for which the share of CBAM sectors in total exports exceeds 10%

To get a closer understanding of the sectors that might be most affected by the CBAM, Figure 2 breaks down the exports of the countries considered to the EU into the individual CBAM sectors. Fertilisers are the most important export in this category for

Fertilisers are the most important export affected by the CBAM for Algeria, Egypt, Israel and Morocco; iron and steel exports for Libya, Türkiye and Tunisia; and cement exports for Lebanon and Syria

Algeria, Egypt, Israel and Morocco (accounting for as much as 60% of exports from CBAM sectors to the EU for Algeria; see chapter "Morocco's CBAM Implementation: Challenges and Opportunities" for a deep-dive into Morocco's fertiliser sector). For Libya, Türkiye and Tunisia, iron and steel exports dominate, and cement for Lebanon and Syria (albeit the overall volume for the latter is relatively low). Aluminium exports play an important role for Türkiye, where they account for about one third of exports from CBAM sectors to the EU, and to a lesser extent for Egypt, Israel, Lebanon, Morocco and Tunisia (for these countries, aluminium accounts for between 9% and 20% of exports from CBAM sectors to the EU). Finally, Morocco and Türkiye are the only two countries that export electricity to the EU in rather small volumes, accounting for about 5% and 1.7% of exports from CBAM sectors to the EU, respectively.

Figure 2. Composition of exports to the EU from CBAM sectors.



Elaborated by author, sourced from Eurostat (2023).

A country's trade patterns are one crucial determinant of how they will be affected by the CBAM. Other dimensions that matter include the emission intensity of production and the ease to adjust to the CBAM, for instance, by switching to cleaner energy sources and production technologies. These aspects will be addressed in the following section.

Vulnerability to the CBAM

The extent to which a country's exports are affected by the CBAM depends to a large part on the carbon intensity of production. Ideally, one would rely on data on carbon intensities in the relevant sectors. Unfortunately, this data is not readily available, and carrying out the complex input-output modelling required to estimate it would clearly go beyond the scope of this chapter. For this reason, we draw on Eike et al. (2021) to establish a proxy measure for carbon intensity. That is, we report the carbon intensity of total energy supply in the respective country, assuming that a country with more carbon-intensive energy supply can also be expected to have a higher

carbon intensity for production of iron and steel products, aluminium, fertilisers, electricity and cement. Following Overland and Sabyrbekov (2022), we also report patent applications as a measure for countries' overall capacity to adopt new technologies that would ease the cost burden arising from the CBAM. This measure builds on the assumption that countries with more patent activity possess higher technological capabilities and can thus more easily switch to cleaner production. Finally, to provide a sense of potential trade conflicts resulting from the CBAM, we present the number of cases in which countries have either brought cases to the World Trade Organization (WTO) or had cases brought against them.[1] The underlying logic here is that countries with more cases adhere less strictly to the international trade regime and thus are more likely to be involved in disputes related to the CBAM, either because they challenge the measure, or they impose retaliatory countermeasures that might in turn be challenged by the EU.

Table 1. Indicators for Mediterranean countries' vulnerability to the CBAM and possibilities to adapt to it for the year 2022.

	Carbon intensity of energy prod. (tCO_2 / terajoule)	**Innovative capacity (patent applications per mn inhabitants)**	**Commitment to trade regime (# of WTO cases)**	
			Complainant	Respondent
Algeria	53.3	6	#NA	#NA
Egypt	50.8	8.5	0	5
Israel	59.5	170	0	0
Lebanon	68.1	0	#NA	#NA
Libya	58.5	0	#NA	#NA
Morocco	71.0	6.8	0	3
Syria	61.0	0	#NA	#NA
Tunisia	54.9	0	2	0
Türkiye	58.2	106	6	12

Elaborated by author, sourced from IEA (2023), WIPO (2023) and WTO (2023).

For the countries under study, carbon intensities of energy supply range between about 50 and 70 tCO2 per terajoule, as shown in the first column of Table 1. This range is roughly comparable to (but for most countries a bit above) carbon intensities of energy production prevailing in Germany and in Italy, which are 54 and 56 tCO2 per terajoule, respectively. Hence, the CBAM would impose costs on firms that are comparable to the carbon price paid for EU Emission Trading System (ETS) allowances by firms in Germany and in Italy. By contrast, in France, for which power supply is dominated by nuclear energy, the carbon intensity is only 30 tCO2 per terajoule so that French firms would face only

[1] Algeria, Lebanon, Libya and Syria are not WTO members but currently subject to the accession process.

half the cost burden that their competitors from third countries are subject to.[2]

For many countries in the Mediterranean the lack of innovative capacity will constitute a serious barrier to successfully adapt to the CBAM, which highlights the importance of well-targeted capacity-building

With regard to innovative potential, the large majority of countries in the region does not seem to be well prepared to carry out the innovation required to quickly decarbonise production in order to adapt to changing market conditions. Only Israel and Türkiye display significant patenting activity of 170 and 106 domestic patent applications per million inhabitants. By contrast, Lebanon, Libya and Syria did not have a single domestic patent application in 2021. It hence seems likely that for many countries in the Mediterranean the lack of innovative capacity will constitute a serious barrier to successfully adapt to the CBAM, which highlights the importance of well-targeted capacity-building.

Most countries in the sample that are WTO members are largely in compliance with international trade rules. The most salient exception is Türkiye, which in 2022 filed six complaints against other WTO members and was subject to 12 complaints itself. This suggests that Türkiye might be the most likely candidate to either resort to the WTO dispute settlement mechanism to challenge the CBAM or adopt countervailing measures (such as retaliatory tariff against imports form the EU). Also Egypt has faced five complaints, indicating a certain propensity to adopt policies that are not fully aligned with international trade rules. Hence, the political priorities of Türkiye and Egypt might deserve special attention if EU policy-makers aim to prevent trade disputes related to the CBAM.

Potentials to reduce risks from the CBAM through climate policy

Adverse effects of the CBAM will be lower for trade partners that adopt ambitious policies to decarbonise their economies. The transition to a low-carbon economy entails several benefits unrelated to climate change mitigation, including cost savings from cheap renewable energy sources, improved ambient air quality, and establishing new industries that could act as engines of accelerated socio-economic development. It seems unlikely that the CBAM will constitute the main motivation to introduce climate policies or ramp up existing ones. Nevertheless, the CBAM could strengthen policy-makers' resolve to reduce emissions. Furthermore, it might also increase political support of emission-intensive industries for climate measures.

Whether climate policies are politically feasible depends to a large part on awareness of climate change among the population (Bergquist et al., 2022). For this reason, Table 2 reports the share of the population who perceive climate change as a "very serious threat". We also report the number of climate laws and policies (i.e., legislative and executive acts) related to energy.[3] Obviously, the number of policies does not entail information on the stringency of regulation. As countries adopt very different types of policies, the level of ambition is not straightforward to compare. However, the number of policies can give a rough understanding of the importance of climate policy in the political discourse. Finally, we also provide information on total fossil fuel

[2] This rough estimate is of course only informative when we assume that the overall carbon intensity is a good proxy for carbon intensity of production in CBAM sectors. This might not necessarily be the case for industries such as iron and steel or fertilisers that do not use electricity as an input but rely on direct use of fossil fuels.

[3] That is, we exclude climate policies on adaptation and mitigation policies that exclusively target land use, forestry, agriculture or waste management.

subsidies to better understand the extent to which fossil fuel production and consumption is politically entrenched in the economy. This measure includes subsidies for consumption (e.g., by means of prices that are set below the world market level) and production (e.g., by means of tax breaks). Phasing out fossil fuel subsidies will create losses for some interest groups. Hence, in countries with higher fossil fuel subsidies, more resistance against climate policy can be expected.

Table 2. Indicators measuring how CBAM risks can be mitigated.

	Fossil fuel subsidies		**Number of climate laws and policies**		**Share of population who perceive climate change as a "very serious threat" (%)**
	USD per capita	% of GDP	Legislative	Executive	
Algeria	1007	27.7	3	10	25
Egypt	248	6.5	5	6	18
Israel	29	0.1	1	9	27
Lebanon	419	9.9	0	3	35
Libya	338	5.8	1	1	24
Morocco	38	1.0	3	8	46
Syria	NA	NA	2	1	#NA
Tunisia	285	7.5	2	3	32
Türkiye	692	7.2	5	10	52

*Data for fossil fuel subsidies and climate laws are for the year 2022, data for climate change concern for the year 2019.
Elaborated by author, sourced from Climate Policy Radar (2023), Gallup (2019) and IMF (2023).

Regarding awareness of climate change, the share of the population who perceive climate change as a "very serious threat" in the 2019 Gallup Poll ranged from 18% in Egypt to 52% in Türkiye. It hence seems likely that in countries with a relatively high climate change awareness, such as Türkiye and Morocco, policy-makers will have more leeway to adopt climate policies than in countries such as Egypt, Libya or Algeria (see the chapter "The CBAM and Renewable Energy Interlinkages in Algeria, Egypt and Lebanon" for more information on existing and planned policies), where only a quarter or less of the population are aware of the dangers of climate change.

For the countries under consideration, this hypothesis is confirmed by the observation that countries with higher climate change awareness tend to have a higher number of climate policies in place. Whereas Türkiye and Morocco, which show the most pronounced concern about climate change, have adopted 15 and 11 such policies, respectively, Libya only has two and Lebanon and Syria have three each. An interesting outlier in this regard is Egypt, which has three legislative and 10 executive climate measures related to energy in place, even though it displays the lowest share of respondents perceiving climate change as a very serious threat.

Another interesting deviation is Israel, which despite low awareness of climate change has adopted a relatively large

number of climate policies and exhibits the lowest fossil fuel subsidies (per capita and as share of GDP). Lebanon, Libya and Tunisia all show a combination of low climate change awareness, high fossil fuel subsidies and a low number of climate policies, which might make it hard to embark on a low-carbon transformation of the economy. Likewise, Algeria, which has adopted three legislative and 10 executive climate measures related to energy. Yet, the fact that Algeria shows the highest fossil fuel subsidies per capita (more than USD 1,000 in 2022) and as a share of GDP (almost 28%) suggests that fossil fuels play an important role in the economy and will be hard to phase out.

In fact, fossil fuel subsidies account for a sizable share of GDP in all countries considered except Israel and Morocco. Removing fossil fuel subsidies is not only an essential part of a move toward a low-carbon economy but would also free up substantial resources that could be used to pursue other societal objectives, such as healthcare, education or access to infrastructure (Franks et al., 2018). Nevertheless, fossil fuel subsidy reform frequently faces severe opposition from those actors who would lose their existing benefits. As a consequence, EU policy makers could foster the clean energy transition in Mediterranean countries by supporting the design of measures to reform fossil fuel subsidies, for instance effective compensation payments to social groups that would bear oversize financial burdens. This might be particularly relevant in Algeria and Lebanon, in which fossil fuel subsidies amount to more than USD 1,000 and USD 400 per capita per year, respectively.

Removing fossil fuel subsidies is not only an essential part of a move toward a low-carbon economy but would also free up substantial resources that could be used to pursue other societal objectives

Potential implications for employment and wages

This section reviews the scant existing evidence of how the CBAM could affect employment and wages. As the CBAM has only entered into force very recently in a preliminary form, there cannot be any empirical insight on this question. Instead, researchers rely on ex-ante modelling based on a range of assumptions of how the economy – and in particular labour markets – might respond to the CBAM, which can be calibrated with parameters obtained.

We focus on the most comprehensive study in this regard, undertaken by Magacho et al. (2023).[4] These authors develop a modelling framework based on input-output data and empirical estimates of labour market reactions to changes in world market conditions. Their results on potential job losses and reductions in total wages paid out resulting from the full implementation of the CBAM for the countries addressed in this study are shown in Figure 3. In all countries, wage losses exceed job losses. This indicates that wages in CBAM sectors are above the national average, so that the CBAM would result in the loss of relatively well-paid jobs. Overall, although impacts on labour markets are relatively moderate, Egypt, Tunisia and Türkiye are projected to suffer the most pronounced job losses of between 0.2% and 0.4% of total employment (the chapter "The Carbon Border Adjustment Mechanism and Egyptian Competitiveness: A Trade Facilitator or a Trade Barrier?" explores potential challenges and opportunities for Egyptian firms in detail). For all other countries, the respective figure is below 0.1%. This confirms our preliminary assessment – which we based on the ob-

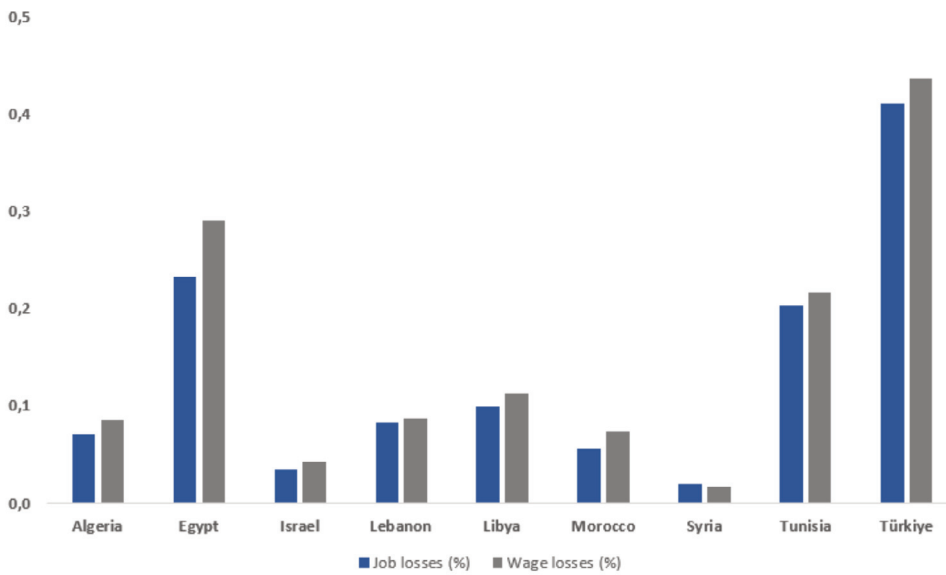
[4] A study by the African Climate Foundation and the London School of Economics and Political Science (2023) finds similar results in their country-level estimates.

servation that for all countries under study, exports from CBAM sectors to the EU only account for a small share of GDP – that on the macroeconomic level, the CBAM can be expected to have relatively limited impacts, and that assessing adverse effects requires a more detailed look into specific industries in particular countries.

The social impacts of job losses will also depend on the social security system. According to the International Labour Organization (ILO)'s (2023) Index of Social Protection Coverage, which measures the share of the population covered by social protection systems (grouped into quartiles of 0%-25%, 25%-50%, 50%-75% and 75%-100%, respectively; no data is available for Algeria, Libya, Morocco and Syria). Türkiye, which is most strongly affected by the CBAM also ranks in the highest group, suggesting that relatively well-developed social systems might be able to cushion some of the economic impacts of the CBAM. The most problematic situation might arise in Egypt, which is projected to experience the second-largest job losses, with only 25-50% of the population covered by social protection. Tunisia, with the third-largest job losses, occupies an intermediate position in the group of countries where 50%-75% of the population have access to social protection.

The social impacts of job losses will also depend on the social security system

Figure 3. Job losses and wage losses resulting from the CBAM.



Elaborated by author, sourced from Magacho et al. (2023).

Policy implications

This chapter has analysed the way in which different Mediterranean countries are exposed to the CBAM and how well they might be able to adapt to it. We find that exports from CBAM sectors to the EU only account for a small percentage of GDP. Moreover, the CBAM will only be phased in gradually in parallel to the phase-out of free allocation of emission permits in the EU ETS. This gives firms time to adjust their production structures and allows governments to implement policies that reduce the cost burden arising from the EU CBAM.

Adverse effects that are highly concentrated on a small set of industries might result in social hardships and spark political resistance against this instrument

This suggests that the CBAM can be expected to have limited impacts on overall economic activity in these countries. Nevertheless, adverse effects that are highly concentrated on a small set of industries might result in social hardships and spark political resistance against this instrument. Furthermore, there is the potential that the EU might expand the CBAM to other economic sectors in the future or that other countries, such as the United States (US) and the United Kingdom (UK), might implement border carbon adjustment systems of their own. In both cases, Mediterranean countries might experience substantially larger effects than under the current design of the EU CBAM. Implementing measures to reduce emissions, and in particular introducing a price on carbon emissions, would hedge against risks from expanded pricing of emissions embedded in Mediterranean countries' exports. As has been demonstrated in earlier studies, the benefits of better local air quality and reduction in automobile externalities might already justify carbon prices of around USD 50 per tCO2 on the national level even without taking into account climate damages (Parry et al., 2015). Any carbon price introduced on the national level would be deducted from the amount payable under the CBAM. The additional revenues generated for the domestic budget (instead of accruing to the EU budget) would further add to the benefits of a carbon price.

Our results point to the fact that policies to complement the CBAM to alleviate undesired side effects will likely need to be tailored to the specific country context. To decrease the impacts of the CBAM, targeted measures to reduce the carbon intensity of emission-intensive industries will be essential. These policies to decarbonise hard-to-abate sectors need to be put into the broader context of national strategies and policies for a clean energy transition. For example, in Algeria and Egypt, fossil fuel subsidies will likely constitute a major obstacle for decarbonisation, and, by supporting efforts to reform these subsidies, the EU could at the same time accelerate emission reductions in these countries and decrease their exposure to the CBAM. Likewise, supporting innovative capacity would in most Mediterranean countries remove an important bottleneck for the uptake of clean energy technologies. Moreover, some countries, such as Egypt and Türkiye, might be more likely than others to either challenge the CBAM or impose countervailing measures that are not aligned with WTO provisions. Hence, engaging in a dialogue to clarify the most important points of contention between these countries and the EU might help to avoid such trade disputes.

Building on existing or establishing new partnerships for decarbonisation could thus be mutually beneficial for countries in the Mediterranean and for the EU. If these partnerships successfully address barriers to a transition to a low-carbon economy, they would help the former to reap numerous socioeconomic benefits, such low-cost renewable energy, reduced air pollution and creation of new opportunities for economic development and, at the same time, reduce leakage concerns for the latter. Mediterranean countries and EU member states already entertain several partnerships related to energy, climate and industrial development. Recently, Morocco and the EU have established a green partnership to advance the external dimension of the European Green Deal, and Egypt and the EU have signed a strategic and comprehensive partnership, which also includes sustainable investment. These partnerships could be welcome opportunities for the EU to support the low-carbon transition in their Mediterranean trade partners and reduce their exposure to the CBAM. They could also act as blueprints for similar approaches to align climate policy with trade considerations with other countries.

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The CBAM and Renewable Energy Interlinkages in Algeria, Egypt and Lebanon

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Introduction

This chapter identifies and assesses the implementation and impact of the Carbon Border Adjustment Mechanism (CBAM) in the Southern Mediterranean Countries (SMCs) with the development of energy policies, strategies and frameworks in these countries in the coming years. It will commence by identifying and analysing best practices and trends. It also dives into the nascent energy targets and goals in SMCs through the dissection of the current legal and institutional frameworks, before proposing concrete recommendations at the policy, technical and financial levels.

To assess the SMCs preparedness for the implementation of the CBAM, several factors had to be taken into consideration such as the structure of their economies and livelihoods, their policies and objectives, their trade relations with the European Union (EU), as well as their adaptation measures. The aim of this chapter is to delve into a thorough analysis and evaluation of various sectors using a series of distinct case studies. The chapter's approach involves examining each selected SMC in detail, scrutinising its unique characteristics, challenges and opportunities. These case studies will provide concrete examples and empirical evidence to support the analysis, allowing us to draw meaningful conclusions and recommendations. Through this comprehensive approach, the chapter seeks to offer a nuanced understanding of the sectors being studied and contribute valuable insights to the existing body of knowledge in this field.

Overview of selected Southern Mediterranean Countries

Based on existing studies and data on energy use and economic structures of SMCs, a general overview is provided hereafter to understand the current status of the selected countries in the region that are dependent on carbon-intensive industries and which include Egypt, Lebanon and Algeria.

Lebanon, Algeria and Egypt are SMCs located along the coast of the Southern Mediterranean region, granting them access to major shipping routes and potential for energy trade within the Mediterranean Basin (World Bank, 2024c). Their closeness to Europe makes them potentially attractive exporters of energy to Europe (EU, 2024b). The geographical proximity of these countries has influenced their climates, economies, cultures and historical interactions. Additionally, all three countries have experienced challenges related to political stability, economic development and environmental sustainability, which have shaped their trajectories in different ways (World Bank, 2022).

Lebanon, situated on the eastern Mediterranean coast, is a densely populated, highly urbanised lower-middle-income country, with an estimated 88.9% of its inhabitants residing in cities (UN-Habitat & ESCWA, 2021). It has been dealing with a series of economic and humanitarian crises, resulting in significant budget deficits and increased living costs for its residents (UNDP, 2023).

In addition to these challenges, Lebanon is also confronting worsening impacts of climate change. The country is susceptible to heatwaves, droughts, wildfires and storms. Unpredictable extreme weather disrupts human activities, agricultural productivity and the fragile natural ecosystems and biodiversity that sustain them. Furthermore, Lebanon's 225 km coastline, lined with critical infrastructure and delicate ecosystems, faces risks from rising sea levels, coastal erosion, and saltwater intrusion (UNDP, 2023). Similar to other coun-

tries in the Arab States region, Lebanon heavily relies on food and energy imports, rendering its population and businesses increasingly vulnerable to external shocks and crises. Given that climate change exacerbates the country's existing socio-economic issues, estimates suggest that the cost of inaction on climate change could soar as high as USD 80.7 billion by 2040 (UNDP, 2023).

Algeria has an important dependence on hydrocarbon industries, specifically natural gas and oil. The energy sector has a primordial role in the country's economy, and the export and extraction of hydrocarbons have a substantial impact on governmental revenue.

The extraction of fossil fuels in oil-rich nations constitutes a significant source of greenhouse gas (GHG) emissions. Despite being the third-highest emitter of GHGs in Africa, after South Africa and Egypt, Algeria accounted for only 3.8% of CO2 emissions in 2020, the smallest share among all world regions. Much of the fuel produced in Algeria is exported and consumed elsewhere, resulting in additional CO2 emissions.

Stretching from the Mediterranean coast, where the majority resides, to the Sahara Desert, covering more than four fifths of the nation's land, Algeria experiences the world's highest surface temperatures in the Sahara. Before gaining independence in 1962, the economy was predominantly rural and centred around agriculture, with the produce sent to France. However, significant oil and gas reserves were discovered in Algeria's Sahara in the late 1950s. The Evian Accords (1962) and the Franco-Algerian Agreement (1965) established a framework for energy cooperation and management between Algeria and France until the nationalisation of hydrocarbon resources in 1971, granting Algeria control over its hydrocarbon industry (ITA, 2023).

Egypt has a diverse economy. However, its energy sector, natural gas and oil has been key contributors to its gross domestic product (GDP). The country has made efforts to increase the integration of renewable energy and energy efficiency. Meeting Egypt's National Determined Contribution (NDC) emission target, which entails a 65% reduction in the oil and gas sector and a 33% reduction in the electricity sector, requires more than just reducing energy-intensive consumption. It necessitates a shift in the country's population towards adopting renewable energy sources while simultaneously reducing dependence on fossil fuels. As of 2019, fossil fuel consumption constitutes 95% of Egypt's primary energy mix, with renewable energy accounting for a mere 5%. Despite the industry sector representing the largest share of renewable energy consumption in 2019, fossil fuels still contribute 77% to Egypt's overall energy supply. Egypt may decrease its emissions by shifting from fossil fuels to renewable energy sources, reducing energy consumption, or implementing other policies aimed at limiting the release of emissions (Carnegie, 2023).

Given that climate change exacerbates the country's existing socioeconomic issues, estimates suggest that the cost of inaction on climate change could soar as high as USD 80.7 billion by 2040

Economic and energy components

Socioeconomic indicators

Countries in the Southern Mediterranean region have been dealing with significant socio-economic difficulties and weak regulatory frameworks which are presented in Table 1. These countries with a high dependence on carbon-intensive industries will confront some challenges in complying to CBAM requirements. Table 1 presents the main socio-economic indicators and data for some SMC targeted countries.

Table 1. Socioeconomic numbers of SMCs

	Unit	Lebanon	Algeria	Egypt
Population (2024)	Thousands	5,220,000	46,280,000	114,500,000
GDP (2022)	Billion USD	21.79	195.06	490.00
GDP per capita current USD (2022)	USD/capita	3,200.00	4,400.00	4,700.00
Unemployment rate (2024)	%	14.85	11.63	7.45
Unemployment people (2024)	Thousands	278,800	1,500,000	2,470,000
Employment rate (2024)	%	49.69	41.86	43.06
Total labour f orce (2024)	Thousands	1,880,000	12,860,000	33,090,000
Labor productivity (2024)	USD	6.09	9.79	5.71
Number of households (2024)	Thousands	910,000	7,440,000	23,240,000

Elaborated by author, sourced from Statista (2024).

Exports of goods from Egypt were about 48.84 billion USD in 2022 with estimated exports of commodities including: 7.04 billion USD agricultural products; 19.35 billion USD fuels and mining products; and 20.14 billion USD manufactures. The main export partners were in 2021 the United States (US) (8%), Türkiye (7%), Greece (7%), Italy (6%) and India (5%) (Statista, 2022c).

Exports of goods from Lebanon were about 4.37 billion USD in 2022 with estimated exports of commodities including: 781.75 billion USD agricultural products; 401.81 billion USD fuels and mining products; and 2,419.02 billion USD manufactures. The main export partners were in 2019 Switzerland (27%), the United Arab Emirates (15%), South Krea (11%), Saudi Arabia (7%) and Kuwait (6%) (Statista, 2022a).

Exports of goods from Algeria were about 60.92 billion USD in 2022 with estimated exports of commodities including: 391.95 billion USD agricultural products; 54,908.61 billion USD fuels and mining products; and 5,567.71 billion USD manufactures. The main export partners were in 2019 Italy (13%), France (12%), Spain (12%), the US (7%), the United Kingdom (UK) (7%), India (5%) and South Korea (5%) (Statista, 2022b).

Energy and emission indicators

Despite facing socioeconomic obstacles, there has been a swift rise in energy demand in these nations over the past few decades. This surge can be attributed not only to population growth but also to shifts in behaviour patterns. Despite having significant potential for renewable energy

Despite facing socioeconomic obstacles, there has been a swift rise in energy demand in Southern Mediterranean nations over the past few decades

(RE) utilisation, these countries continue to rely on fossil fuels, including oil and natural gas, to meet their energy requirements (meetMED, 2019). Table 2 shows the main energy and economic indicators and data for the selected SMCs.

Table 2. Energy and economic numbers of SMCs

	Unit	Lebanon	Algeria	Egypt
Total energy supply (2021)	TJ	234.967	2.688.576	407.511
Total energy supply per capita (2021)	MJ / Capita	41. 993.604	60.876.072	37.304.388
CO2 emissions from fuel combustion (2021)	Mt CO2	16.319	143.249	206.831
CO2 emissions per capita (2021)	tCO2 / Capita	2.863	3.243	1.893
Total energy production (2021)	GWh	10.302	85.390	209.677
Electricity consumption per capita (2021)	MWh / Capita	1.789	1.704	1.575
Total energy supply per unit of GDP (2021)	MJ/thousand 2015 USD	1.994.859	6.458.911	3.913.762
Share of modern RE in final energy (2020)	%	4.03	0.07	0.83
Total oil supply (2021)	TJ	216.005	902.997	1.504.708
Total natural gas supply (2021)	TJ	N/A	1 775 215	2 249 170
Domestic natural gas production (2021)	TJ	N/A	3 734 001	2 431 548
Total coal supply (2021)	TJ	4744	N/A	96 135
Emissions from coal (2021)	Mt CO2	0.448	N/A	9.255

Elaborated by author, sourced from IEA (2024a).

In 2019, half of Lebanon's total greenhouse gas (GHG) emissions came from the energy sector, making it the biggest contributor to both GHG emissions and air pollution, accounting for 50%.

With a carbon dioxide (CO2) emission rate of 3.5 tons per person, Egypt falls below the global average and emits less than half of the levels in the EU. Despite constituting only 0.73% of GHGs, the country has experienced a substantial 74% increase in emissions within a span of less than three decades (1990-2019). To achieve energy security and foster a more environmentally sustainable economy, Egypt needs to reverse this upward trajectory. Between 2005 and 2019, Egypt witnessed a significant surge of approximately 44% in its GHG emissions. This rise was primarily attributed to the energy sector, particularly in electricity and heat generation (Carnegie, 2023).

In the industrial sector, it is crucial to advocate for energy management practices and the adoption of exceptionally efficient equipment, particularly since some nations lack comprehensive policies for industrial energy efficiency. This includes implementing energy management protocols and specific policies, integrating high-efficiency industrial equipment and systems, introducing locally efficient industries, and establishing appealing financing mechanisms (meetMED, 2019).

The current treatment of indirect emissions within the CBAM framework presents a strategic challenge for SMCs. While the CBAM currently only considers indirect emissions in specific sectors like aluminium and potentially hydrogen (European Commission, 2024c), the incentive to reduce these emissions remains. The EU's stated intention to expand the CBAM to encompass more sectors and potentially a wider range of upstream emissions (European Commission, 2023) suggests that a proactive approach is necessary. By closely monitoring the development of the CBAM, particularly regarding the inclusion of additional sectors and the potential broadening of emissions considered, SMCs can make informed strategic decisions. Investing in clean energy sources for production offers a win-win scenario, simultaneously benefiting the environment and potentially reducing future compliance costs under the CBAM. Monitoring CBAM developments and investing in clean energy positions will allow SMCs to reach a future where the CBAM plays a more prominent role in regulating embodied carbon emissions.

The current treatment of indirect emissions within the CBAM framework presents a strategic challenge for SMCs, as the EU has stated its intention to expand the CBAM to encompass a wider range of upstream emissions

Furthermore, SMCs are likely to consider indirect emissions, such as those from electricity used to produce goods, in their strategies to comply with the CBAM. To achieve this, they will have to develop and implement measures to reduce emissions from electricity generation, such as increasing the share of renewable energy sources in their energy mix or improving energy efficiency in industrial processes. Additionally, countries may consider introducing carbon pricing mechanisms or emission trading schemes to incentivise industries to reduce their indirect emissions. These efforts would not only help them comply with the CBAM but also contribute to their overall climate goals and sustainable development objectives.

SMCs opportunities

The EU CBAM, while initially posing obstacles, presents a unique opportunity for SMCs like Egypt, Lebanon and Algeria. By proactively implementing strategic economic and industrial adaptations, these nations can potentially achieve technological leapfrogging over competitors in other regions who may exhibit slower response times. A swift transition driven by the CBAM could unlock a cascade of long-term benefits for SMCs. This includes increased accessibility to cost-effective renewable energy sources as production capacity expands. Additionally, a reduction in reliance on fossil fuels can demonstrably improve air quality, leading to measurable public health benefits and a potential decrease in healthcare burdens. Furthermore, a reputation for environmental responsibility could attract environmentally conscious businesses and investments, further bolstering the economic prospects of these countries. From a scientific standpoint, the CBAM presents an opportunity for SMCs to leverage recent advancements in clean technologies and capitalise on their potential to drive rapid economic and environmental progress. By embracing this challenge and strategically adapting their economies, SMCs can potentially position themselves as leaders in the global transition towards a low-carbon future.

Existing energy policies for sustainable development

The commitments of SMCs to climate targets and the alignment of their policies and regulations with global climate goals has been identified during this study, as well as existing strategies and policies targeting to reduce carbon emissions and promote sustainability. Energy sources and efficiency of the energy sector of SMCs have been examined, because a transition towards cleaner energy sources can effectively impact SMCs' preparedness.

The adoption of strategies and policies focusing on energy efficiency and renewable energy is crucial for the sustainable development of any nation. Algeria, Egypt, and Lebanon have actively addressed these issues. These countries have established national energy strategies, along with action plans for energy efficiency and renewable energy, allocating investment funds to support the dissemination of best practices. Despite the presence of government commitment and regulatory and institutional frameworks, the implementation of these programmes is progressing slowly in these nations (IEA, 2024a). These policies and plans are presented in Table 3. Some of these are detailed in Annex 1.

Table 3. Laws, national renewable energy policies and strategies in selected SMCs

Policy	Country	Year
Solar and Renewable Energy Fund	Lebanon	2023
Red Sea Wind Energy - Green Egypt	Egypt	2023
First National Determined Contribution (NDC)	Algeria	2021
National Renewable Action Plan of Lebanon (NREAP 2016-2020)	Lebanon	2016
Egypt Renewable Energy Law (Decree No 203/2014)	Egypt	2015
Egypt renewable energy tax incentives (Presidential Decree No 17/2015)	Egypt	2015
Feed-in tariff for solar PV installations	Algeria	2014
Feed-in tariff for wind and solar PV projects	Egypt	2014
Renewable energy custom tax reduction for renewable equipment	Egypt	2014
Egyptian Solar Plan	Egypt	2012
Renewable Energy National Fund	Algeria	2009
New National Renewable Energy Strategy	Egypt	2008
Law 04-90 on Renewable Energy Promotion in the Framework of Sustainable Development	Algeria	2004
Law 04-92 on the Diversification of Power Generation Costs (REFIT)	Algeria	2004
Law 99-09 on the Management of Energy	Algeria	1999

Elaborated by author, sourced from IEA (2024c).

Existing NDCs for sustainable development Countries worldwide committed to establishing a new global climate agreement at the United Nations Framework Convention on Climate Change (UNFCCC) Conference of the Parties (COP21) in Paris in December 2015. As part of this commitment, countries agreed to outline their emission reduction

efforts at the national level under this new international agreement. These efforts, which can include specific targets or actions to mitigate emissions, are known as NDCs. Additionally, countries may choose to include other relevant information in their NDCs, such as plans for adaptation to climate change impacts. The mitigation targets and actions outlined in countries' NDCs will play a crucial role in determining whether the world moves towards a future that is low-carbon and resilient to climate change (MOE & UNDP, 2024).

Although Egypt contributes minimally to GHG emissions, it ranks among the world's five most vulnerable countries to climate change, largely due to its heavy reliance on the Nile River for water resources. The key sectors facing heightened climate risks include agriculture, water resources, energy, tourism, and health, as they contend with rising temperatures, heat stress, water deficits for irrigation, and sea level rise. Egypt's long-term national development framework, the Sustainable Development Strategy (SDS): Egypt's Vision 2030 is structured around economic, social, and environmental dimensions, with its 10 pillars aligned with the Sustainable Development Goals (SDGs). Egypt's Intended Nationally Determined Contributions (INDC) are likewise harmonised with both the SDS and the SDGs (UNDP, 2019).

Lebanon's NDC prioritises adapting to climate change, recognising the various challenges that make different sectors highly sensitive to its effects. Climate models indicate that future temperature increases could pose a significant threat to Lebanon's diverse natural environment. By 2040, temperatures are projected to rise by approximately 1°C along the coast and 2°C inland, with further increases of 3.5°C and 5°C by 2090, respectively. These rising temperatures will place additional strain on the local electricity infrastructure, which must meet the growing demand for cooling. Lebanon's arid to semi-arid climate already limits its water resources, making it highly vulnerable to the impacts of climate change. Projected changes in precipitation patterns are expected to further stress national water security and affect the agricultural sector, which currently consumes about 70% of the available water for irrigation (MOE & UNDP, 2024). The NDC addresses key sectors like energy, industrial processes, agriculture, forestry, land-use change, and waste. Despite Lebanon's minimal global emission share (0.07%), the country aims to reduce GHG emissions by 30% and cut power demand by 10% through energy efficiency, with support from the international community. Additionally, Lebanon plans to reduce emissions by up to 15% and power demand by 3% by 2030 without conditional support (MOE & UNDP, 2024).

Furthermore, Algeria's NDC includes a target to reduce GHG emissions by 7%-22% by 2030. The 7% reduction will be achieved using national resources and applies to all greenhouse gases, focusing on the Land Use, Land-Use Change, and Forestry (LULUCF), waste, energy, and transport sectors. Specific objectives for methane reduction in various sectors include: in the energy sector, reducing gas flaring to less than 1% by 2030, achieve 27% of electricity generation from renewable sources by 2030, and increase the share of liquefied petroleum and natural gas in the fuel mix between 2021 and 2030. In fact, it is very important to promote and implement energy recovery and methane recycling from landfill sites and wastewater treatment plants in the waste sector (IEA, 2024b).

Energy and climate partners

Based on extensive literature review, various energy and climate partners that support

Egypt, Lebanon's and Algeria's efforts in these areas have been identified. These partners play a crucial role in supporting the countries' transition to a more sustainable and climate-resilient energy sector. Some key partners are presented in Table 4.

Table 4. Main energy and climate partners in Egypt, Lebanon and Algeria

Partner	Achievement
European Union (EU)	The EU has been a significant partner for Egypt, Lebanon and Algeria in the energy and climate sectors. The EU has provided funding and technical assistance to support the countries' renewable energy projects and energy efficiency initiatives. The EU has also supported these countries in developing its climate policies and strategies (EU, 2024a).
United Nations Development Programme (UNDP)	The UNDP has worked closely with Lebanon on energy and climate-related projects. For example, the UNDP has supported Egypt, Lebanon and Algeria in developing their National Energy Efficiency Action Plan and implementing renewable energy projects (UNDP, 2024).
World Bank	The World Bank has provided financing and technical assistance to Egypt, Lebanon and Algeria for various energy and climate projects. This includes support for renewable energy development, energy efficiency initiatives, and climate change adaptation efforts (World Bank, 2024a).
International Renewable Energy Agency (IRENA)	IRENA has supported Egypt, Lebanon and Algeria in advancing their renewable energy goals. IRENA has provided technical assistance and capacity-building support to these countries in the renewable energy sector. IRENA has also supported the countries in integrating renewable energy into its energy mix (IRENA, 2024).
Global Environment Facility (GEF)	The GEF has funded several projects in Egypt, Lebanon and Algeria aimed at addressing climate change and promoting sustainable energy practices. This includes support for energy efficiency measures, renewable energy projects, and climate change adaptation efforts (GEF, 2024).

Elaborated by author, sourced from EU (2024a), GEF (2024), IRENA (2024), UNDP (2024) and World Bank (2024a).

The way forward

How countries could move forward

SMCs are taking various measures to align with EU standards and adapt to the CBAM. Some of these measures include:

- **Emission reduction targets:** Egypt, Lebanon and Algeria have set ambitious targets to reduce GHG emissions. These targets align with global climate goals and demonstrate their commitment to mitigating climate change like reducing GHG emissions by 30% by 2030 for Egypt; increasing the share of renewable energy in the electricity mix to 30% by 2030 in Lebanon, and reducing carbon intensity of the economy by 4.5% annually between 2021 and 2030 in Algeria.
- **Renewable energy development:** Egypt, Lebanon and Algeria are investing in renewable energy sources, such as solar and wind power, to reduce their reliance on fossil fuels and lower emissions. These efforts contribute to both climate mitigation and energy security. Increasing the share of renewable energy in the energy mix and improving energy efficiency in industrial processes would be a good solution to reduce overall carbon footprint.
- **Energy efficiency improvements:** Improving energy efficiency in various sectors, such as industry, transportation, and buildings, is a key focus for Egypt, Lebanon and Algeria. Energy efficiency measures help reduce emissions and decrease energy costs.
- **Policy and regulatory reforms:** Egypt, Lebanon and Algeria are developing and implementing policy and regulatory reforms to align with EU standards and practices. These reforms cover areas such as emission trading, renewable energy deployment, and energy efficiency standards, and should address potential challenges like implementing domestic carbon pricing mechanisms, investing in cleaner technologies, and diversifying export markets. In fact, implementing carbon pricing mechanisms or emission trading schemes to incentivise industries would help countries reduce their carbon footprint.
- **Adaptation strategies:** Egypt, Lebanon and Algeria are developing adaptation strategies to cope with the impacts of climate change, such as sea-level rise, water scarcity, and extreme weather events. These strategies aim to enhance resilience and minimise the adverse effects of climate change.
- **CBAM preparation and impact assessment:** In preparation for the EU's CBAM, Egypt, Lebanon and Algeria should assess the potential impact on their economies and exports, particularly for high-carbon industries. They will also have to explore ways to adjust their production processes and export strategies to comply with CBAM requirements. This will allow them to anticipate potential changes in production costs, competitiveness, and market access. A sectoral analysis should be conducted to identify the most vulnerable industries based on carbon intensity, export reliance on the EU, and adaptation capacity. This will help them prioritise mitigation efforts. Building the necessary capacity to comply with CBAM requirements is primordial, including robust emissions reporting systems and a focus on sustainable practices to enhance competitiveness.

However, while the CBAM approach offers significant potential, limitations must be acknowledged:

- **Resource constraints:** SMCs might face resource limitations in implementing these measures, requiring international support and capacity-building programmes.
- **Political will:** The political will to implement potentially challenging domestic policies like carbon pricing can be a hurdle.
- **Technological innovation:** The pace of technological innovation in clean technologies will determine their affordability and effectiveness for SMCs.

To accelerate the shift to green energy, the UNDP's CEDRO project has supported for example over 150 renewable energy projects with a total capacity of 19.37 MW. These projects, funded by various donors, including the EU, have led to a yearly reduction of 6,657 tons of carbon dioxide (UNDP, 2023).

Transitioning Lebanon's energy sector to low-carbon alternatives would bring three key benefits: a 41% reduction in economic costs, a 43% decrease in emissions, and improved macro-fiscal outcomes by reducing fuel imports. Scaling up renewable energy would not only cut costs and meet rising energy needs but also slow emissions generation and create more employment opportunities. The energy sector, which requires significant capital investment, would need around USD 4 billion to transition to a more diverse generation mix that relies more on cleaner and cost-effective renewable energy sources, as well as to shift from liquid fuels to natural gas (World Bank, 2024b).

Algeria possesses favourable geographical and climatic conditions that position it well to harness opportunities in renewable energy generation. With its desert covering 80% of the country's surface area, Algeria benefits from 2,000 to 3,000 hours of sunshine annually, presenting the potential to generate over 169,400 terawatts per hour across the entire landmass. This capacity is 5,000 times the country's yearly electricity consumption. Additionally, owing to Algeria's proximity to European energy import centres, vast geographical expanse, and a reliable reputation as an energy exporter, scenarios for exporting renewable energy are highly feasible. The National Renewable Energy and Energy Efficiency Programme primarily focus on solar and wind power, constituting 85% of the total projected capacity by 2028. The Algerian Renewable Energy Resource Atlas, introduced in 2019 by the Centre for the Development of Renewable Energy (CDER), provides geographical representations highlighting Algeria's energy potential, encompassing solar, wind, geothermal, and bioenergy resources (tni, 2022). The 2020-approved plan of Algeria, aiming to achieve a renewable energy generation capacity of 15,000 MW by 2035, was activated in December 2021 (tni, 2022).

Egypt has demonstrated an important progress in adopting clean energy and enhancing energy efficiency through initiatives such as its decarbonisation strategy, green housing projects, and organic agriculture methods. Nevertheless, the absence of clear and transparent mitigation targets, coupled with the failure to support these targets with coordinated efforts across various government entities and sectors, stands as a potential impediment to Egypt's ongoing advancements (Carnegie, 2023).

SMCs are on track for a clean energy revolution, mirroring the global shift towards renewables. Solar and wind are expected to dominate the energy mix, with demand projected to grow sixfold by 2050 compared to 2018 levels (OME, 2021). This builds

on a trend of steady renewable energy increase in the region, even though the current share is modest. Geothermal energy also holds promise due to its resilience against weather variations (ECMWF, 2024). The near carbon zero proMed scenario, which anticipates the implementation of more ambitious strategies for enhancing energy efficiency, substantial advancements in technology to reduce CO2 emissions further, and an expanded range of energy sources in the mix, predicts that, by 2050, non-fossil fuel-based electricity generation could reach 90% in the South (OME, 2021). With growing momentum behind clean energy, SMCs are positioned for a dynamic and sustainable energy future (ECMWF, 2024; OME, 2021).

Partnerships and collaborations play a crucial role in helping SMCs build resilience to climate change and adapt to new carbon regulations

How international partnerships and collaborations could support SMCs

SMCs are engaging in partnerships and collaborations with international organisations and the EU to receive support and capacity-building in adapting to new carbon regulations. These partnerships and collaborations play a crucial role in helping SMCs build resilience to climate change and adapt to new carbon regulations. They provide access to funding, technical expertise, and best practices, enabling countries to implement effective adaptation measures. Some key partnerships and collaborations are presented in Table 5.

Table 5. SMCs partnerships and collaborations

Collaboration	Description
European Union	SMCs have established partnerships with the EU to access funding and technical assistance for climate change adaptation. The EU provides support through various programmes and initiatives, such as the European Neighbourhood Instrument (ENI) and the Partnership Instrument (PI).
United Nations Framework Convention on Climate Change (UNFCCC)	SMCs collaborate with the UNFCCC to implement climate change mitigation and adaptation projects. The UNFCCC provides technical expertise and facilitates access to climate finance for these countries.
International Financial Institutions (IFIs)	SMCs work with IFIs such as the World Bank, the International Monetary Fund (IMF) and the European Investment Bank (EIB) to access funding for climate change adaptation projects. IFIs also provide technical assistance and capacity-building support.
Regional organisations	SMCs collaborate with regional organisations such as the Union for the Mediterranean (UfM) and the Arab League to address climate change challenges. These organisations facilitate cooperation and coordination among countries in the region.

Bilateral partnerships	SMCs engage in bilateral partnerships with countries that have expertise in climate change adaptation. These partnerships enable knowledge exchange and capacity-building in adapting to new carbon regulations.
Research institutions and non-governmental organizations (NGOs)	SMCs collaborate with research institutions and NGOs to access research findings and best practices in climate change adaptation. These collaborations help countries develop effective adaptation strategies.
Private sector partnerships	SMCs partner with the private sector to access technology and expertise for climate change adaptation. Private sector partnerships can help countries develop innovative solutions to climate change challenges.

Elaborated by author.

Existing cooperation frameworks and trade agreements between the EU and SMCs have been identified, as these can influence negotiation and implementation of the CBAM.

The Barcelona Declaration, also known as the Euro-Mediterranean Association Agreements (EMAAs) or Euro-Med Partnership, was a 1995 agreement that aimed to create a partnership between the EU and countries in the Southern Mediterranean region. Its goal was to establish a comprehensive partnership based on political, economic, and social cooperation. The EMAAs have been signed and entered into force in several SMCs like Tunisia (signed in July 1995; entry into force in March 1998), Morocco (signed in February 1996; entry into force in 2000), Jordan (signed in November 1997; entry into force in May 2002), Egypt (signed in June 2001; entry into force in June 2004), Lebanon (signed in June 2002; entry into force in April 2006) and Algeria (signed in April 2002; entry into force in September 2005) (European Commission, 2024d).

The EMAAs are a series of bilateral agreements between the EU and individual Mediterranean countries. These agreements are part of the broader Euro-Mediterranean Partnership and are designed to promote political dialogue, trade liberalisation, and economic cooperation between the EU and its Mediterranean partners. The EMAAs aim to create a free trade area between the EU and the Mediterranean countries, promote economic development in the region, and strengthen political ties between the parties. They cover a wide range of areas, including trade in goods and services, investment, agriculture, fisheries, and intellectual property rights.

In 2020, the Southern Mediterranean region represented 4.6% of total EU external trade. Total trade in goods between the EU and the Southern Neighbourhood countries amounted to EUR 149.4 billion. The EU's imports were worth €58.0 billion, whereas its exports totalled EUR 91.4 billion (European Commission, 2024d).

Conclusion: proactive adaptation for a sustainable future, with limitations

The implementation of the EU's CBAM presents both challenges and opportunities for SMCs like Egypt, Lebanon and Algeria. While the CBAM might initially pose hurdles, it can also serve as a catalyst for positive change. By proactively assessing potential impacts and implementing strategic domestic measures, SMCs can not only mitigate negative consequences but also emerge as leaders in the transition to a low-carbon economy. The key to success lies in a comprehensive approach that considers several crucial steps discussed in this paper.

By embracing these measures, Egypt, Lebanon and Algeria can transform the CBAM challenge into an opportunity for a sustainable future. This will not only ensure their long-term economic competitiveness in the global market but also solidify their role as responsible members of the international community, committed to combating climate change and building a greener future for all.

This strategic adaptation to the CBAM is not just a necessity, but an opportunity for SMCs to demonstrate their leadership in environmental responsibility and set the stage for a more sustainable and prosperous future for their economies and citizens. However, success will hinge on overcoming resource constraints, securing international cooperation, and fostering the political will to implement necessary changes.

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Annex 1

Energy policies in Lebanon:

- In partnership with the Lebanese Ministries of Environment, Energy and Water, and Industry, the United States Agency for International Development (USAID) through the Trade and Investment Facilitation Project (TIF) and the Lebanon Investment Initiative (LII) launched a USD 20 million Solar and Renewable Energy Fund to support solar panel installations in Lebanon in 2023 and it is currently in force (IEA, 2024c).
- The National Renewable Action Plan of Lebanon (NREAP 2016-2020) is a strategic plan for the Renewable Energy Sector in the country that outlines various scenarios to achieve the 12% target set in 2009 by implementing Renewable Energy projects. These projects are projected to produce approximately 767 kilotons of oil equivalent (ktoe) in 2020, equivalent to 12% of the projected total electricity and heating demand in Lebanon that year. To reach this target, three main paths are considered. Wind energy for electricity production is expected to represent a significant milestone, contributing around 2.06% of the total Lebanese energy demand in 2020. Solar energy, including solar photovoltaic (PV), concentrated solar power (CSP), and solar water heaters, would also play a crucial role, accounting for approximately 4.20%. Additionally, utilising hydro resources for electricity production is deemed essential, with a projected contribution of around 3.24%. Finally, biomass is expected to cover approximately 2.50% of the target. It started in 2016 and is still in force in 2024 (IEA, 2024c).

Energy policies in Algeria:

- The primary goal of the Algerian Renewable Energy and Energy Efficiency Development Plan (2011-2030) is to increase the use of renewable energies and diversify energy sources in the country. The plan has several objectives:
  - Install 22,000 MW of power generating capacity from renewable sources between 2011 and 2030, with 12,000 MW for internal use and 10,000 MW for export.
  - Achieve 20% of electricity generation from renewables by 2030.
  - Drive sustainable economic development, enhance energy security, and create jobs in Algeria.
- Solar energy, including both PV and solar thermal, is considered a primary renewable technology for development. The potential for wind, biomass, geothermal, and hydropower energies is comparatively limited (IEA, 2017).
- Renewable Energy National Fund: Established under the Renewable Energy Promotion in the Framework of Sustainable Development (Law 04-90), the fund was created in 2009. It is financed by a 0.5% levy on oil tax revenues and provides financial support for initiatives outlined in the "Renewable Energy and Energy Efficiency Development Plan 2011-2030" and other eligible renewable projects (IEA, 2024c).
- Established in 2009 under the Renewable Energy Promotion in the Framework of Sustainable Development (Law 04-90), the fund is financed by a 0.5% levy on oil tax revenues. It offers financial assistance to projects outlined in the "Renewable

Energy and Energy Efficiency Development Plan 2011-2030" and other qualifying renewable initiatives (IEA, 2024c).
- Algeria adopted on 23 April 2014 a feed-in tariff framework for solar PV installations. The aim of the programme is to assist Algeria in completing its renewable energy capacity goals (IEA, 2024c).

Energy policies in Egypt:

- The Red Sea Wind Energy Project that was launched in 2023 supports the green transition of Egypt with the financial assistance of the EBRD. The loan of USD 100 million of the EBRD will lead to the creation of a 500 MW onshore wind farm in the Gulf of Suez region, with USD 50 million provided by the EBRD and USD 50 million by the Green Climate Fund (IEA, 2024c).
- In 2014, Egypt adopted the Renewable Energy Law (Decree No 203/2014) to encourage the private sector to produce electricity from renewable energy sources. The law outlines many development frameworks for the private development of renewable energy projects, with feed-in tariff, competitive bids, and independent power production through third party access. It was activated in 2015 and is still in force (IEA, 2024c).
- Egypt renewable energy tax incentives (Presidential Decree No 17/2015): To further attract investments in Egypt's energy sector, including renewable energy, the country implemented significant amendments to its 1997 Investment Law in 2015. These amendments include reducing the sales tax from a maximum of 10% to 5% and setting customs duties on production equipment at 2%. Non-tax incentives offered to energy producers include:
    - Refunding expenses incurred to extend infrastructure facilities to the project's land after the project commences.
    - Subsidising technical training programmes for employees and covering social insurance subscriptions.
    - Allocating government-owned land free of charge or at discounted prices.
- Renewable energy custom tax reduction for renewable equipment: Feed-in tariff programme for renewable generation is complemented by a 2% reduction in customs on renewable and new energy equipment. Since 2014 and still in force (IEA, 2024c).
- The Egyptian Solar Plan was approved in July 2012. It aims to install by 2027 around 3,500 MW of solar power plants (2,800 MW CSP + 700 MW PV). Private investment share of these installations is estimated for 67% through competitive bidding, feed-in tariff and third-party access frameworks. The incentives allocated to wind energy projects will be used for solar projects. Since 2012 and still in force (IEA, 2024c).
- New National Renewable Energy Strategy: The Supreme Council of Energy of Egypt announced in February 2008 an ambitious strategy to produce by 2020 20% of the country's electricity from renewable sources, with a 12% contribution from wind energy, translating into 7,200 MW of grid-connected wind farms (IEA, 2024c).

The Carbon Border Adjustment Mechanism and Egyptian Competitiveness: A Trade Facilitator or a Trade Barrier?*

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Introduction

The European Union (EU)'s Carbon Border Adjustment Contribution (CBAM) stands as an important strategy in the global fight against climate change. The main findings of the empirical literature raise concerns about the implications that this measure would have for more vulnerable low-income and middle-income countries. Accordingly, discussing how the implementation of the CBAM would affect the Egyptian economy is timely and critical for three reasons. First, the industry sector is a key source of economic growth and contributes one third of Egypt's gross domestic product (GDP). It is also the third largest consumer of energy at 28%. Moreover, according to the World Bank (2022), the most polluting industries in Egypt are iron and steel, aluminium, cement, and oil refineries, which emitted about 9% of total greenhouse gas (GHG) in 2015. Second, by looking at trade figures between Egypt and the EU, bilateral trade quadrupled over the last twenty years from 8.6 to 37.2 billion euros with the EU representing 22% of the country's overall trade (European Commission, 2024). The top five EU imports from Egypt consist of 44% mineral products (mineral fuels, oils, and distillation products), 15% products of the chemical or allied industries (e.g., fertilisers), 8.4% base metals and articles thereof, 7.3% plastics, rubber and articles thereof, and finally 5.9% vegetable products (European Commission, 2023). More specifically, CBAM sectors cover almost 20% of Egypt's exports to the EU, with some sectors highly exposed. For example, 79% of aluminium exports are destined to the EU (European Commission, 2024). Third, given that CBAM sectors fall at the core of trading relations between Egypt and the EU, and given that the EU is allowing only more sustainable products to find their way to its markets, Egypt has to green its production processes and energy sources. Yet, with the lack of best available energy efficient industrial production technologies and green management practices in Egyptian firms, it is expected that the intensity of emissions continues to increase, hindering the competitiveness of Egyptian exports.

The analysis of the chapter is conducted in three sections. Section one discusses the exposure of the Egyptian economy to the CBAM. Section two examines the current preparedness of the Egyptian government and assesses the preparedness and potential impact of the CBAM on Egyptian firms. Section three discusses the way forward and identifies some policy options to mitigate all the challenges and obstacles that are imposed by the CBAM.

The exposure of the Egyptian economy to the CBAM

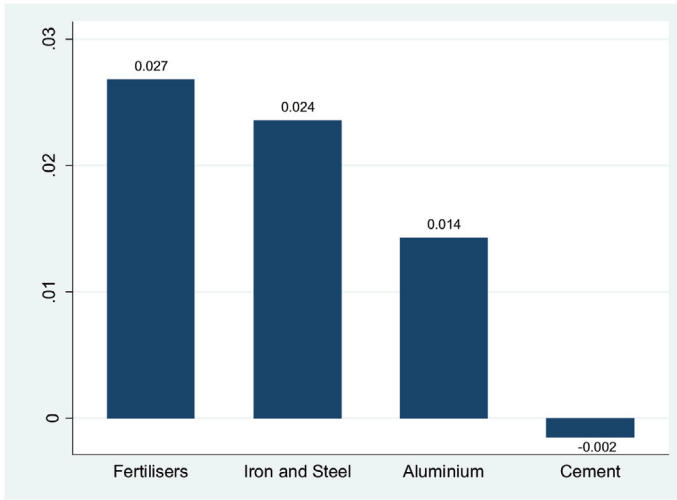
The EU is a main destination for Egypt's exports of CBAM products, where its share in Egypt's total CBAM exports increased from 37.8% in 2019 to 52.4% in 2022. Egypt's CBAM exports to the EU constituted nearly 6% of its total merchandise exports and about 16% of its exports to the EU in 2022. According to the World Bank, the aggregate relative CBAM exposure index[5] for Egypt (0.02) places it as the top CBAM affected country in the Middle East and North

[5] The World Bank has constructed the aggregate relative CBAM exposure index for 120 countries using data on carbon emission intensity of exports by sector, and export data for 2019 to avoid the effects of global shocks such as the pandemic and Russia's invasion of Ukraine. The index is based on the trade weighted CO2 emissions intensity of exports compared to EU average, the share of the EU in a country's total exports of CBAM products, and a carbon price of USD 100/ton CO2eq.

Africa (MENA) region, preceding Türkiye, Iran and Tunisia.[6] This exposes it to the risk of losing export competitiveness for the aggregate CBAM products due to its higher carbon emission intensity compared to the EU average.

At the sectoral level, the EU received most of Egypt's total exports of aluminium (69.4%) and fertilisers (61.1%) in 2022. Also, about half of Egypt's total exports of iron and steel was destined for the EU. On the other hand, the EU's share in Egypt's total cement exports was low at 2.5%. Figure 1 depicts the relative CBAM exposure index for the four sectors. Considering the share of the EU in the total exports of each sector in Egypt and the average sector carbon intensity compared to the EU average, fertilisers are expected to be the most affected sector in Egypt by the CBAM, followed by iron and steel, and then aluminium. Meanwhile, the negative value for cement signifies a potential competitiveness gain for Egypt's exports of cement due to its relatively low emission intensity. Thus, while Egypt is expected to witness a loss of competitiveness in three out of the four sectors, Morocco is doing relatively well in all four sectors due to its lower carbon intensity compared to the EU average despite its higher dependence on the EU market for cement and aluminium exports.

Figure 1. Relative CBAM exposure index in Egypt, by sector, for the year 2022.



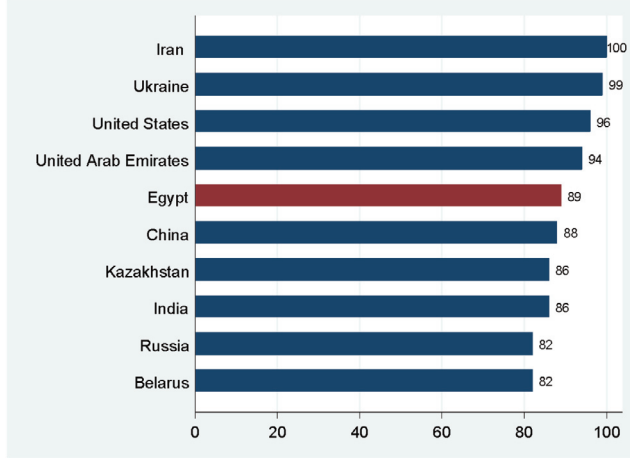
Elaborated by authors, sourced from World Bank (2024).

Besides considering the level of a country's trade with the EU and the carbon intensity of its CBAM sectors, Overland and Sabyrbekov (2022) added three dimensions in constructing a CBAM opposition index. These are a country's track record of initiated disputes in the World Trade Organization (WTO), the degree of domestic public concern about climate change, and innovation capacity (patent applications). The intuition is that a country that is more engaged in WTO litigiousness, has a larger share of its population who do not view climate change as a serious threat, or is

[6] On the other hand, according to the aggregate index, Jordan and Morocco are the least CBAM exposed countries in the MENA region. In the fertiliser sector, for example, while the carbon intensity of Egypt's exports is 1.37 kg/USD, it is only 0.32 for Morocco and 0.27 for Jordan, rendering them less affected by CBAM payments.

not much technologically innovative will be more likely to object to the CBAM. Figure 2 shows the top countries in the CBAM opposition index.

Figure 2. CBAM opposition index, top countries for the year 2022.



Elaborated by authors, sourced from Overland and Sabyrbekov (2022).

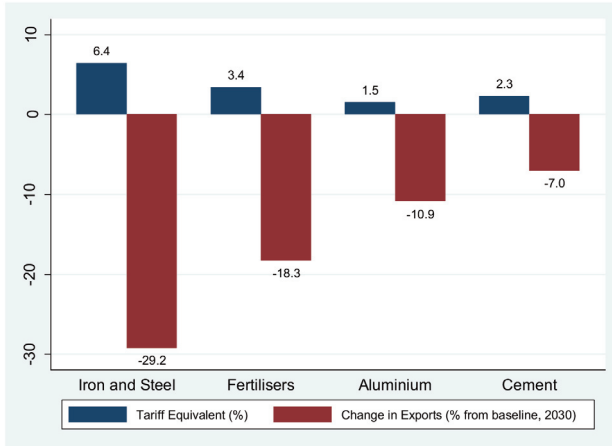
Egypt is among the top five potential opponents of the CBAM

As depicted, Egypt is among the top five potential opponents of the CBAM. The large level of trade of CBAM products with the EU and the relatively high-carbon intensity both make Egypt largely exposed to CBAM costs. Moreover, Egypt has a relatively low innovation capacity, where, according to the World Intellectual Property Organization (WIPO), it ranked 94th among 132 countries in the Global Innovation Index in 2021 (WIPO, 2021). This increases the difficulty of adapting the economy to the international decarbonisation trends through developing and implementing new technologies.[7] Indeed, as shown in Peszko et al. (2020), Egypt is only moderately prepared for a low-carbon transition. Although its exposure to the risk of such transition is not relatively high given the non-heavy reliance on the export of fossil fuels and carbon-intensive manufactured products, the degree of the economy's resilience is considered low. Thus, more progress is needed in maintaining macroeconomic stability, easing the business environment, improving the capacity of technology absorption, and strengthening institutional quality and governance to enable a smoother low-carbon transition.

A study by Xiaobei et al. (2022) simulated the medium-run impact of the CBAM on 24 countries including Egypt using a dynamic computable general equilibrium (CGE) model. Assuming a conservative EU carbon price of USD 75 per ton of CO2 and using sectoral level carbon emission data from the GTAP database, they computed the tariff equivalents of CBAM sectors based on carbon payments of exporting countries for direct emissions (Scope 1), and the value of their exports. Figure 3 plots the tariff equivalents and the impact on Egypt's exports to the EU for CBAM sectors in 2030 compared to a baseline of no CBAM.

[7] The remaining dimensions are of less importance for Egypt's potential opposition of CBAM, where Egypt is not active in raising WTO disputes, and a slight majority of its adult population (55%) view climate change as a serious threat (WTO, 2024; World Risk Poll, 2019).

Figure 3. Simulated tariff equivalents and changes in Egypt's exports to the EU for CBAM sectors in 2030 (%).



Elaborated by authors, sourced from Xiaobei et al. (2022).

Egypt is expected to witness a reduction in its export values to the EU for the four sectors due to the increase in cost (measured by the tariff equivalent). Iron and steel, and fertilisers will be the most negatively impacted, declining by 29% and 18%, respectively, compared to a baseline scenario of no CBAM, whereas the adverse effects on exports of aluminium and cement will be less severe. Simulated effects translate into an expected decline in Egypt's total exports to the EU by 2.4% and a reduction in its GDP by 0.03%, which corresponds to a loss in welfare due to the CBAM implementation of USD 200 million in 2030 (Xiaobei et al., 2022).

Assessing the current preparedness of the Government of Egypt and firms

The preparedness of the Government of Egypt

The Government of Egypt (GoE) exerts important efforts to enhance its climate actions and to promote decarbonisation, especially by focusing on improving its energy efficiency and enhancing its reliance on renewable energy for its sustainable development (see Table 3 in the chapter "The CBAM and Renewable Energy Interlinkages in Algeria, Egypt and Lebanon"). Table 1 presents recent key climate promises, initiatives and regulations.

Egypt is expected to witness a reduction in its export values to the EU for iron and steel, and fertilisers compared to a baseline scenario of no CBAM

Indeed, Egypt has been among the top 10 developing countries in international investments in renewable energy over 2015-2022.[8] To capitalise on this progress, more investments need to be attracted in renewable energy generation (as wind, solar and hydropower generation), clean/low-emission technologies (as nuclear power, hydrogen, and biogases), components of renewables (as solar panels, and wind turbines) and carbon capture and storage. Under its Integrated Sustainable Energy Strategy (ISES) 2035, Egypt intends to increase the supply of

[8] According to UN Trade and Development (UNCTAD) (2023), Egypt ranked 7th in the value of international investment in renewable energy, preceded by Brazil, Vietnam, Chile, India, Kazakhstan, and Taiwan.

electricity generated from renewable sources to 20% by 2022 and 42% by 2035 with wind energy accounting for 14%, hydroelectricity making up 2%, and solar energy accounting for 25% of the total electricity generated by renewable energy resources (Egypt Energy, 2022). The total renewable energy capacity in Egypt has increased sharply going from 3.3 gigawatts in 2009-20210 to 19.2 gigawatts in 2021-2022, with the government aiming for greater capacities of 50.5 gigawatts by 2029-2030 and 62.6 by 2034/2035. The greatest reliance should be on wind power, followed by solar and hydropower (IRENA, 2018).

Table 1. Egypt's recent key climate actions.

Climate promises
Egypt's **second updated NDC 2030 to the United Nations Framework Convention on Climate Change (UNFCCC)** strengthens its commitments and targets as needed to be 1.5°C-compatible and to adjust its emission reduction targets in the power sector to reduce 65% of GHG emissions from oil and gas, 33% in electricity generation, transmission, and distribution, and 7% in the transport sector, all compared with 2030 "business-as-usual" levels (CCPI, online 2024).
Climate policies and initiatives
Egypt 2030 vision stresses the importance of achieving a balance between the priorities of economic growth and the environmental dimension. It stresses the importance of reducing the impact of climate change, and sets a target to reduce GHGs by 10% from the energy sector, including oil and gas, by 2030 compared to 2016 levels. **National Climate Change Strategy 2050** (NCCS 2050) was unveiled by the National Council on Climate Change (NCCC) in May 2022 in conjunction with the EU's "fit for 55 package" and prior to the COP27. It aims to achieve sustainable and low-emission economic growth while enhancing Egypt's resilience and adaptive capacity through effective climate change action and governance, as well as the development of climate financing infrastructure. Also, it aims to **promote energy-saving measures** in industry fields to replace current transport fuels with natural gas **and to expand the use of renewable energy, green hydrogen, and nuclear power** in the electric power field (Lynx, 2023). In the light of its NCCS 2050, the Egyptian government plans to spend the equivalent of approximately USD 324 billion through the issuance of green bonds and procurement of funds via the International Monetary Fund (IMF), the World Bank, the European Bank for Reconstruction and Development (EBRD), and other financial institutions (Mashino, 2023). Thereby, USD 211 billion are allocated to **the mitigation programme** including seven sectors (industry, electricity, petroleum, transport, civil aviation, housing and utilities, and waste), and USD 113 billion are allocated to the adaptation programme including five sectors (agriculture, transport, civil aviation, irrigation

and water resources, and biodiversity). The timeframe for the mitigation programme is from 2021-2035 and the one for the adaptation programme is from 2021-2050[1] (Egyptian Environmental Affairs Agency, 2022).

The **Integrated Sustainable Energy Strategy** (ISES) 2035 was launched in 2020 and other regulatory measures are implemented, such as the development of feed-in tariffs and the development of net-metering regulations and the development of low-carbon hydrogen (Lynx, 2023).

Green Financing Framework was established in 2020 and a debut USD 750 million green bond was issued, marking the first sovereign green bond in the MENA region.

The **national green hydrogen strategy** was approved in 2023. It aims at capturing from 5 to 8% of the global hydrogen market, at achieving energy security by 2040, and at significantly reducing carbon dioxide emissions by 40 million tons annually (Bakr, 2023).

Climate laws and regulations

GoE issued the **Renewable Energy Law** no. 203/2014, the **new Electricity Law** no. 87/2015, as well as the **Investment Law** no. 72/2017 to support the growth of renewable energy power generation capacity and to attract further investments in this sector.

[1] The timeframe changes across sectors inside each programme with agriculture having the longest time span 2022-2050 in the adaptation programme.

Elaborated by authors.

As an important step towards green transition, a newly ratified legislation has provided several tax and non-tax incentives to encourage Egypt's green hydrogen industry. These include a cash investment incentive equivalent to from 33% to 55% of the tax paid on revenues generated by the project, exemptions from value added tax (VAT) for equipment and raw materials, and other incentives such as facilitations in licensing and trade. Moreover, these generous incentives are conditioned on having at least 70% of the investment project or its expansion financed by foreign currency, which opens a large opportunity for foreign investments in Egypt in this promising technology. With more production of green hydrogen, firms operating in carbon-intensive sectors such as steel and fertilisers can increasingly rely on it as a clean alternative fuel.

The preparedness of Egyptian firms

Assessing the impact of the CBAM on Egyptian firms and their preparedness level is based on a qualitative analysis that relies on findings from three meetings held at the Federation of Egyptian Industries (FEI) with representatives from firms concerned with the CBAM. In total, the attendees presented 25 firms, i.e., six firms from iron and steel and aluminium, seven firms from fertilisers, and 12 firms from the cement and ceramic sectors.

Firms in Egypt are greatly aware of the introduction of the new CBAM regulation, especially those from the iron and steel, cement, and fertiliser sectors. The Environmental Compliance and Sustainable

Development Office at the FEI,[9] with the cooperation of Chapter Zero Egypt Climate Forum,[10] conducted a CBAM workshop with firms. The objective is twofold: one to raise awareness about the CBAM and its implications, and, second, to provide capacity-building by training firms on the use of the CBAM communication template, the calculation of embedded emissions and the preparation of carbon footprint reports.

The earlier the firms start greening their production techniques and acquiring carbon offsets certificates, the better their ability to enhance their exports to the EU

Firms see that they can reap several benefits from the implementation of the CBAM regulations. *First,* since some firms already have experience with preparing carbon footprint reports that cover their emissions under scopes 1, 2 and 3, they are expected to face less difficulty reporting actual embedded emissions of their products under the CBAM. With the assistance of the Environmental Compliance and Sustainable Development Office, some fertiliser firms completed the CBAM communication template released by the European Commission to facilitate emissions' reporting. *Second,* some multinational firms already have a decarbonisation roadmap, and many have worked on energy efficiency programmes to decrease their operation costs. Thereby, these firms see the CBAM as an opportunity to enhance further their energy efficiency and to improve their competitiveness. Moreover, for firms that are still lagging behind, they may benefit from the flexibility provided by the transitional phase to become early adopters to the system. *Third,* the earlier the firms start greening their production techniques and acquiring carbon offsets certificates, the better their ability to enhance their exports to the EU and to diversify their export markets in Africa and East Asia will be. Some steel firms that particularly use scrap-based electric arc furnace (EAF) production route regard that the CBAM can enhance their competitiveness in the EU market given their relatively low-carbon emissions compared to firms using blast furnace–basic oxygen furnace or direct reduced iron (DRI)-based EAF routes. Also, while cement exporters mainly target Africa and the United States (US), they will be most likely affected by the CBAM if US legislators try to pass a US CBAM equivalent (Leahey, 2023) and if African countries counter the CBAM act by establishing their carbon market or by implementing carbon tax.

However, several concerns were raised as firms expect to face technical, financial, and other types of challenges that can undermine their competitiveness especially in the short run. For example, fertiliser firms worried that the CBAM threatens their market share in the EU after they became the first fertiliser exporters to the EU with the exit of Russian suppliers.[11] Their raised issues could be summarised as follows. *First, f*irms are highly concerned with the costs of establishing their own carbon intensity accounting system, the administrative costs of communicating emission information, and the verification costs after the

[9] The office was established within the FEI in compliance with presidential decree No. 64 for the year 2001. It provides consultancy services to the industry sector in the field of environmental compatibility, environmental management systems, energy conservation and renewable energy (ECO-FEI, 2024).

[10] The forum is the 27th active Chapter in the Climate Governance Initiative's global network and the first in the continent of Africa. The main mission is to make climate change a boardroom priority for Egyptian organisations and to unite efforts between different stakeholders across the public and private sectors to advance the net-zero transition in the country (Climate Governance Initiative, 2023).

[11] According to the Chemicals and Fertilizers Export Council, Egyptian exports of fertilisers to the EU witnessed a remarkable increase reaching about EUR 1.8 billion in 2022, compared to 521.7 million euros in 2021, achieving an increase of 187.5%, which represents about 11% of total exports and about 19% of non-oil exports to the EU. This increase was attributed to the suspension of fertiliser import tariffs from several countries, except Russia and Belarus (CFEC, 2021).

end of the transitional period. Moreover, firms are concerned about the penalty fees they may bear in case of data inaccuracy or declaration violation. Some firms face challenges related to financing their decarbonisation projects, where they seek loans with facilitated terms that enable repayment over a period that exceeds five years. Also, they need to be aware of the benchmark emissions under the EU Emission Trading System (ETS) for concerned products in each year given the presence of free allowances that EU firms receive, which will be gradually cut over time and hence influence carbon payments. Knowing these EU benchmarks will help firms gauge their carbon intensity and hence plan the required investments towards decarbonisation in a timely manner. *Second,* firms stressed the lack of technical capacity to calculate accurate embedded direct emissions.[12] Moreover, some firms raised concerns about reporting embedded emissions of their used precursors (such as the emissions of clinker used in the production of cement) in the case of non-provision of such data by suppliers after 31 July 2024. They also highlighted the challenges imposed by the weak national infrastructure and statistical capacity, and the lack of workers trained in data processing and reporting procedures, which would have significant impacts on the pricing of their exports to the EU. They also worried about some confidential information they are digitally reporting to the EU declarant according to the communication template such as detailed production and input use data. Some also raised potential technical challenges related to carbon capture and storage and the lack of regulation for this technology. Carbon capture utilisation and storage has a potential to reduce emissions deeply in CBAM industries; as it is considered as a viable cost-competitive technology solution for decarbonisation challenges that result from long-lived industrial plants, high temperature heat requirements, and process emissions (IEA, 2020). Indeed, a large fertiliser firm is demanding a concessional loan to undergo a project that utilises its emitted carbon in producing other goods (such as soda ash) within the factory premises. Therefore, firms seeking decarbonisation need to overcome financial challenges to be able to invest in material efficiency as well as adopt technically feasible — yet costly — deep emission reduction technologies such carbon capture, utilisation and storage (CCUS) and hydrogen technologies. Since this will require large upfront investment costs, governmental support is needed in facilitating access to finance (loans, grants and guarantees) partly through international partnerships. *Third,* some challenges were raised related to the great reliance of Egypt on oil and gas to generate electricity, since this would greatly affect their reported indirect emission intensity under the CBAM. According to Abdallah and El-Shennawy (2020), electricity generation is responsible for the emission of approximately 40% of CO2 emissions in Egypt, as it is predominantly dependent on oil and gas (90%), while renewables such as solar, wind, and hydroelectric constitute only 10%, which is much lower than the global average of 28% (Statista, 2022; IEA, 2021).

The way forward: what are the future steps?

The Government of Egypt

While the GoE is aligning its climate and environment priorities with those of the EU, we have identified five policy actions

[12] Firms may need to avoid using the default values as they be higher than actual emission intensities and they are adjusted regularly by a proportionally calculated markup.

to deal with CBAM implications and to accelerate the country's green transition.

The Government of Egypt must seek to become a hub for developing and exporting green hydrogen

First, while the GoE aims at increasing its electricity generation capacity[13] by establishing new power plants to enhance generating capacities to reach approximately 90 GW by 2030 (Abdallah & El-Shennawy, 2020), it needs to adopt a diversified green energy mix scenario. This scenario needs to place more dependence on renewable energy and green hydrogen and nuclear power, followed by natural gas while eliminating coal to shift away from the fossil fuel-based scenario. Owing to its hot climate, high wind speed, and big quantity of available land, Egypt gains a competitive advantage in the production of renewable energy. This edge also is compounded by close proximity to European energy markets and energy equipment manufacturers (Moharram et al., 2022). This makes the country an attractive location for attracting investment in the energy sector. Based on REmap analysis, Egypt needs to increase its yearly investments in renewable energy from USD 2.5 billion per year until 2030 to USD 6.5 billion per year until 2030 in order to reap the benefits of an accelerated deployment of renewable energies. In this case, Egypt has a potential to supply 53% of its electricity mix from renewables by 2030. Thereby, this would result in a reduction of the energy system cost by USD 0.9 billion annually in 2030. Yet, when accounting for the reduction of external costs from air pollution, important social and health benefits would be generated amounting to USD 4.7 billion annually in 2030. By doing this, it is expected that Egypt will enhance the potential of greening the production of its CBAM products to ease their access to EU markets. This must be coupled with an accelerating phasing out of fossil fuel subsidies representing higher shares of Egypt's GDP compared to other MENA counterparts such as Libya and Morocco (See Table 2 in the chapter "Implications of the CBAM for EU Trade Partners in the Mediterranean").

Second, the GoE must seek to become a hub for developing and exporting green hydrogen. By focusing on incorporating the green hydrogen into its energy mix, Egypt will not only reduce GHG emissions, but it will also attract investment that drives multi-sectoral economic growth. Important changes could happen in the transportation sector by adopting hydrogen fuel cell vehicles and the establishment of hydrogen refuelling infrastructure, which could stimulate important investments in various sectors such as the manufacturing of vehicles (Dargin, 2023). Moreover, Egypt can benefit from already existing infrastructure to enhance its exports of green hydrogen to the EU, doing this by relying on the network of exporting natural gas after ensuring compliance with higher safety standards. Moreover, it needs to enhance the linkages between industries producing ammonia and the green hydrogen to deliver a CBAM-friendly product that is the low-carbon/zero-carbon ammonia (Bakr, 2023).

Third, the GoE must come in assistance to firms that are producing and exporting CBAM goods. This is because While firms, especially those in the cement sector, are designed to be "Alternative Fuel"-ready (Vanderborght et al., 2016), they face challenges to secure green alternatives to their production techniques. The GoE must pay greater attention to pricing strategies and the availability of inputs used in production for CBAM sec-

[13] Electricity production has increased from 18,106 GWh in October 2022 to 21,300 GWh in September 2023 (CEIC, 2024).

tors in Egypt.[14] Moreover, exporting firms need to be empowered by establishing an appropriate infrastructure to enhance national data ecosystem and statistical capacity to improve data processing and reporting; and by establishing and identifying the national institutions/parties that are specialised and accredited in providing technical assistance to firms.

It is worth noting that the GoE needs to consider targeted help for small and medium-sized enterprises (SMEs) as they often face higher difficulty in accessing information and securing the necessary capital for engaging in green transition. Specifically, SMEs need to be more aware of the benefits of going green in terms of boosting their resilience and adaptation to increasing global demand for green products and improved market access opportunities. Coordinated efforts by the government and business support organisations are required to provide technical support, advisory services, and training for SMEs, help with acquiring green certifications, and respond to their financing needs through matching them with concessional green finance opportunities. As highlighted by the ITC (2021), the government may also need to adopt policies to help accelerate green efforts by SMEs such as their provision of tax incentives or investment subsidies for emission-reduction activities.

Fourth, since the CBAM provides no exemptions for developing countries and not even for least developed countries (LDCs),[15] and there is no guarantee that CBAM revenues will be used to finance these countries' efforts to decarbonise, the GoE needs to seek a path to localise the revenues from carbon pricing. One way to do this is to tax CBAM exports to the EU.[16] While this type of tax would encourage the greening of production techniques, it will, however, most probably be rejected by the EU and WTO as it falls outside of the WTO rule requiring an equal treatment of all trading partners (Pleeck & Mitchell, 2023). Alternatively, establishing a domestic system for carbon pricing such as a carbon tax or an ETS would allow revenues to be localised instead of being transferred to the EU. This could also stimulate trade with the EU because "when two trading partners impose similar regulations, trade between them should not suffer and could actually benefit" (Ghodsi, 2023). *Fifth and finally,* since imposing a carbon tax in Egypt is not regarded as a current priority, Egypt should accelerate the development of the regulatory framework for its voluntary carbon market — especially in relation to the certification of low emission projects — to enable the trading of carbon credits in the Egyptian Exchange. This market will greatly help firms achieve green transition, where issuers of carbon credits resulting from their reduction of emissions can mitigate their decarbonisation costs by mobilising funds, and buyers of these credits can use them to offset their carbon footprints (FEAS, 2023).

[14] Representatives from cement factories complained about the insufficiency of Refuse-derived fuel (RDF) and demanded its importation for use instead of coal, which would lower their emissions. They also reported the lack of access to traditional energy sources (fossil fuel and natural gas) for production, especially with the decrease of government subsidies to energy and the struggle of Egypt to become self-sufficient in natural gas.

[15] An exemption is provided only if the country has a carbon pricing system and the producer in the exporting country is already paying a carbon price in form of tax, levy, or fee in the form of emission allowances under a GHGs trading system. Yet, most developing countries lack a carbon pricing mechanism, and LDCs are very far from this pathway (Pleeck & Mitchell, 2023).

[16] Likewise, India proposed a similar tax that is equivalent to the CBAM but is collected by the government as the product leaves the country of origin (an export tariff).

Finally, the GoE can envisage the creation of a platform for a green dialogue involving different stakeholders from the private and public sectors in order to identify, analyse and develop ideas into projects that pave the way for a greener economy. This platform also must engage the EU and international donors that help developing countries in their green energy transition. It is very important to focus also on extending the role of Just Energy Transition Partnership (JETP) not just in mobilising climate finance but also in accelerating the restructuring of firms and their supply chains in the hard-to-abate CBAM sectors.

Egyptian firms

Despite the concerns raised by Egyptian exporting firms, they reject the idea that the CBAM would negatively affect their export competitiveness. Based on the findings of El-Enbaby et al. (2015),[17] it is suggested that Egyptian firms must focus on short-term compliance to safeguard their export intensive margins and consider long-term mitigation and adaptation strategies. This implies the following:

Egyptian firms must focus on safeguarding their export shares in EU markets. Hence, they must seek to enhance their productivity since exporting firms are the most productive ones (Zaki, 2022). Thereby, they need to hire more skilled workers and to provide capacity-building for their existing ones. They need to raise awareness among their employees about the CBAM and its implications and to train them for the use of new production techniques and for the calculation and reporting of emission levels. Firms also need to start establishing their own accounting system to measure the carbon intensity of their production, and, the earlier the better, they need to report their actual emissions using the EU methodology to avoid the use of default values.[18] Moreover, they need to trace the emission-intensity of their support chain to evidence about whether they are integrated in low- or high-emission supply chains. This requires maximum transparency in disclosing detailed information about the raw materials used in the production of CBAM products, the suppliers of raw materials and the country of origin. Firms must keep close relationships with their suppliers to ensure their compliance with detailed data provision and carbon accounting through the entire value chain. At some point, by reviewing their supply chain, firms may need to shift to new suppliers that better align with their carbon footprint strategy.

Regarding their decarbonisation strategies, firms need to be aware about the importance of conducting a cost/benefit analysis for their decarbonisation strategies. First, a firm should decide whether to continue with their "grey" production techniques and pay the CBAM carbon levy when exporting to the EU or transform into greener techniques that entail a production cost premium; yet this will improve a firm's future competitiveness in the EU and other export markets that might as well apply similar carbon pricing on foreign producers. Second, a firm should also conduct the same analysis when sourcing green alternatives (recycled steel, green cement, etc.). The CBAM will cause an increase in the demand for these environmentally friendly alternatives and would make them more

[17] El-Enbaby et al. (2015) found that while non-tariff measures have a negative impact on exporting a new product or a new variety (extensive margins of trade), the intensive margin of trade is not significantly affected.

[18] The use of default values for the calculation of the embedded emissions is only temporary and is also increased by a proportionally designed mark-up.

scarce resources sought after by all firms aiming to minimise their carbon footprint (Geerts, 2023). Moreover, Egyptian firms could greatly benefit from the development of Egypt's low-carbon hydrogen for the decarbonisation of their industrial activities. They also should be specific about their needs for capacity-building and decarbonisation projects and seek appropriate finance. Five-year loans for equipment purchase with a limit value of LE 7 million can be provided through the Environmental Compliance and Sustainable Development Office. Green finance can also be sought through the Ministry of Environment and the Ministry of International Cooperation that provide lending opportunities to the private sector through international partnerships.[19] Firms should participate in technical assistance workshops and trainings organised by national institutions concerned with the CBAM implementation such as the General Organization for Export and Import Control (GOEIC) and the FEI to get familiarised with measuring the embedded emissions of their products. According to the European Commission Director-General for Taxation and Customs Union, while most Egyptian cement exporters to the EU have already provided information on their emissions using the EU methodology, exporters in steel, fertiliser and aluminium sectors relied largely on default values.

Table 2. Key policy recommendations.

Key recommended policies for encouraging mitigation and improving CBAM readiness in Egypt can be summarised as follows:

- Boosting more investments in renewable energy to ambitiously increase renewables' share in the electricity mix to above 50% by 2030.
- Encouraging foreign investments in green hydrogen in light of the wide incentives under the new law. This will enable producing zero-carbon ammonia for fertilisers.
- Assisting firms in securing green alternative inputs for their production such as the importation of Refuse-derived fuel (RDF) as a coal alternative in cement production.
- Accelerating the development of the regulatory framework for the voluntary carbon market to enable the trading of carbon credits in the Egyptian Exchange and their possible recognition by the EU within the CBAM.
- Provision of necessary technical assistance to firms, especially smaller-sized ones, through relevant bodies such as the Ministry of Trade and the FEI to enhance their capacities in monitoring, reporting, and verifying (MRV) carbon emissions.
- Matching firms with available green finance opportunities such as concessional loans from the Federation and blended finance provided by the Ministry of Environment and the Ministry of International Cooperation through international partnerships.
- Creating a platform for a green dialogue and action involving different stakeholders across the public and private sectors to accelerate the transition to a greener economy. 16 levels.

Elaborated by authors

[19] For example, the Egyptian Pollution Abatement Programme (EPAP), which is now in its third phase, is an initiative of the Ministry of Environment with support from the EU that provides a mix of loans and grants to help industries improve environmental performance and reduce energy and resource consumption (EPAP, 2024).

Conclusion

The analysis shows that Egypt is among the top exporters that are negatively affected by the new regulations due to its high reliance on the EU as a destination market especially for fertilisers, iron and steel, and aluminium, and due to the high carbon-intensity of its exports for most CBAM products. Despite the pessimistic quantitative results presented by some empirical studies and the insights driven from the World Bank's relative CBAM exposure index, the qualitative results show that the CBAM may have an ambiguous/heterogeneous effect on firms. For firms that already have in place a monitoring system for the emissions and are using relatively clean production techniques and energy sources, the new regulation may be perceived as an opportunity to enhance their trade competitiveness. Some firms, however, may face important challenges to access European markets as they still need technical assistance in providing emissions' information and establishing a carbon accounting system, and others demand concessional finance to enable them to implement their decarbonisation plans.

Empirical findings indicate that Egypt is among the top 10 opponents to the CBAM (Overland & Sabyrbekov, 2022) and that tariff equivalents of the CBAM for Egypt are higher than other competitors such as Mozambique and Türkiye, especially for fertilisers, aluminium, and iron and steel (Xiaobi et al., 2022). Yet, policies and measures that are implemented by the GoE and actions undertaken by firms are consequential to adapt to the system and reap its potential benefits. The country needs to use the CBAM for its advantage, i.e., to maintain its market share in the EU export destination vis-à-vis competitors, including top regional exporters of CBAM goods to the EU such as Türkiye, the United Arab Emirates (UAE), and Algeria, and to further enhance its export competitiveness and increase its trade integration. Moreover, Egypt can benefit from its relatively well-placed ability to green its energy sources compared to Mauritania, Morocco and Tunisia, which rely heavily on imported fossil fuels (IRENA, 2023). Yet, sounder climate actions must be undertaken especially given that some EU trade partners, such as Morocco and Türkiye, have the implementation of a carbon tax or ETS under consideration (World Bank, 2023).

Hence, the cooperation between Egypt and the EU is crucial to that end, including technical assistance in CBAM implementation and financial support to green projects specifically targeting the industrial sector, investments in low-emission technologies, and recognising the under-establishment voluntary carbon market in Egypt, especially given that the regulation grants this transitional phase to improve adaptation in the short and medium terms and to increase mitigation efforts in the long run.

Finally, the CBAM is an addition to the EU's international efforts to decarbonise the global economy. While the new regulation is taking the form of an environmental policy, it has been approached by several developing countries as being a trade protectionist measure. Yet, the CBAM can help trade to become a better tool to promote sustainable development. Compliance with the CBAM could enhance exports to the EU and create more jobs by increasing labour demand mainly for the development of carbon accounting systems and calculation of emissions. It also requires leveraging on existing workers (mostly production labour) by providing them

more capacity-building and skill upgrading, which can boost their wages (*SDG 8: Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all*). Moreover, CBAM compliance must increase innovative efforts related to the introduction of new and green production techniques (*SDG 9: Build resilient infrastructure, promote sustainable industrialization and foster innovation*). Also, the call for EU help is a type of global partnership for sustainable development (SDG 17: Partnerships for the goals).

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Morocco's CBAM Implementation: Challenges and Opportunities

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Introduction

Since the Industrial Revolution, the lifestyle of Western societies has been inextricably linked to the availability of affordable, easily accessible energy. This "modern", energy-intensive model of civilisation has since spread around the globe and continues to gain ground in developing countries. However, the oil crises of 1973 and 1979 also highlighted the vulnerability of industrial societies to energy impasses. The environmental consequences of global energy consumption due to the depletion of conventional oil sources are at stake. At the start of the 21st century, a far-reaching energy transition is needed. This must be part of the transition to a decarbonised economy, which will be necessary if the climate is to stabilise. It is with this in mind that the European Union (EU), as the world's third largest energy consumer in volume terms, behind China and the United States (US) (10% of global primary energy consumption, compared with 26.5% for China and 15.6% for the US) (Batiweb, 2023), has set up its Green Deal, which aims to achieve climate neutrality by 2050.

One of the measures helping the EU to achieve its climate ambitions is the introduction of the Carbon Broader Adjustment Mechanism (CBAM) to green its industrial imports by charging for the carbon emissions linked to the production of these imported products. This "border carbon adjustment" scheme will be a crucial pillar of European climate policies to encourage trading partners to decarbonise their industry. In practice, the importer will have to declare the emissions linked to the production process, and if these exceed the European standard, acquire an "emission certificate" at the price of CO2 in the EU. If a carbon market exists in the exporting country, the importer will only have to pay the difference.

Furthermore, the success of the European Green Deal and its externalisation remain dependent on the strengthening of the existing green partnership between the EU and its southern neighbours (Della Ragione et al., 2022). It is in this context that the present policy study aims to examine and analyse the implementation of the CBAM and its impact on the economies of the EU's southern neighbours. Indeed, the EU has set ambitious climate targets to reach the European goal of carbon-neutrality by 2050. By taxing imported goods based on their embedded carbon emissions, the implementation of the CBAM introduced by the European Green Deal aims at countering carbon leaking, i.e., the transfer of carbon intensive EU companies to countries with less stringent climate regulations. The CBAM is the EU's tool to put a fair price on the carbon emitted during the production of carbon intensive goods that are entering the EU and to encourage cleaner industry production in non-EU countries (European Commission, 2023).

The transition to a green economy that respects the ecological balance and is likely to open new opportunities for the creation of wealth and sustainable jobs is now a major objective of the new strategic approaches to sustainable development adopted by Morocco. The decarbonisation process is a major challenge for the Moroccan industries, and several sectors are concerned by the implementation of the CBAM, such as automotive, para-chemicals, electricity, fertilisers, the agri-food industry, and textiles, among others.

Regarding the fertiliser sector, it is one of the main strategic areas for the trade

relationships between Morocco and the EU. Morocco is one of the top four exporters of fertilisers in the world with Russia, China and Canada. It possesses 67.5% of the planet's known phosphorus reserves (Jasinski, 2024). 50% of Europe's phosphate imports come from Morocco. However, the EU should increase its fertiliser importations from its southern neighbours such as Morocco to address the rising prices of raw materials linked to the current war crisis between Russia and Ukraine and its consequences on the EU's food security.

The chapter will analyse the implementation of the CBAM in Morocco focusing more on the fertiliser sector, based on the Moroccan statute as a green partner for the EU. It aims to identify the challenges and opportunities for Morocco and to analyse the role of the CBAM in fostering the green partnership between Morocco and the EU. Concretely, it will answer the following research questions:

- -What is the Moroccan strategy and preparedness to maintain its potential for exporting fertilisers to the EU under the framework of the CBAM implementing?
- -What are the possible negative effects? How can mitigate them?
- -How can the CBAM help foster the green partnership between Morocco and the EU?

The methodological approach consists of the combination of capitalisation of studies examining the impact of the implementation of the CBAM on the trade between Morocco-EU, data collection, and semi-structured interviews with actors involved in the fertiliser sector such as agriculture, industry and energy transition experts.

Morocco fertiliser sector outlook

Global fertiliser market: Morocco a major actor

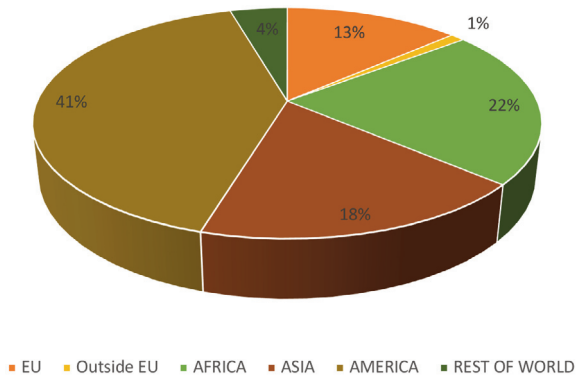
The global fertiliser market size is estimated at 212.8 billion USD in 2023 and is expected to reach 285.01 billion USD by 2032, with a registered compound annual growth rate (CAGR) of 3.30% over the forecast period 2023 to 2032 (Precedence Research, 2023). This growth trend can be explained by several factors, including worldwide population that will surpass 9 billion people by 2050, loss of arable land across the globe due to urbanisation that forces farmers to use fertilisers to enhance their agricultural output. In addition, the constraints emerging from climate change and the needs for smart agriculture are driving different governments in emerging and established nations to encourage farmers to convert their land into organic farming, which is contributing towards the growth of global fertiliser market. It is also being driven by the expansion of various industries such as agriculture (grain, cereals, oilseeds, horticulture, and gardening). The world's main fertiliser-producing regions are, in order of importance, Asia-Pacific (64%), North America (24%), Europe (20%), Latin America (6%) and Middle East and Africa (4%) (Precedence Research, 2023).

Concerning the Middle East and North Africa (MENA) region, Morocco and Saudi Arabia are emerging among the six biggest fertiliser exporters in 2022 with respectively 5.8% and 5.1% of total exported fertilisers (Workman, 2022). The Morocco's leading position is largely thanks to its phosphate reserves.

During the first quarter of 2022, Morocco's state-owned OCP Group, the country's phosphate rock miner and phosphoric acid manufacturer and fertiliser producer, recorded a turnover of 2.4bn euros — up by 77% compared to last year, over the same period. Morocco is expected to increase its production capacity, potentially reaching seven million tons of phosphate fertiliser annually between 2023 and 2027 (OCP, 2022).

Thanks to this company, Morocco has strengthened its position as a global actor in the fertiliser market since the current crisis and the sanction against Russia is persisting and fertiliser prices are raising. Moroccan fertiliser exports are distributed throughout the world, with the largest market shares in America (41%), Africa (22%), Asia (18%) and the EU (13%) (Figure 1).

Figure 1. Breakdown of Moroccan fertiliser exports worldwide for the year 2023.



Elaborated by author, sourced from Office des Changes (2023).

Morocco has strengthened its position as a global actor in the fertiliser market since the current crisis and the sanction against Russia is persisting and fertiliser prices are raising

Indeed, the company's reputation is not confined to America or Africa, but is also sought after by farmers in Europe, especially as manufacturers in these regions are cutting back on production and raising prices. An increased Moroccan presence in the global fertiliser market can bring a positive impact for the North African country's economy, as well as global food security, with more competition ultimately making fertilisers easier to access for farmers.

EU fertiliser imports from Morocco

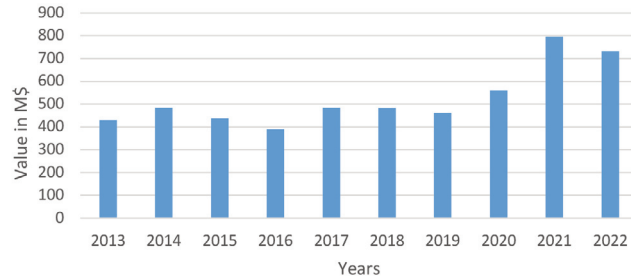
Over the last 10 years (2013-2022), EU imports of fertilisers[20] from Morocco have increased in value from 429 to USD 732 million, an increase of 41% (Fig. 2). The EU's reliance on Moroccan fertilisers can be explained by several factors, such as the disruption of fertiliser availability on the world market due to the food crisis, the reduction in fertiliser production attributable to soaring natural gas prices in Europe, and coal prices and electricity rationing in China, which forced fertiliser producers to reduce production and exports to ensure domestic availability (Baffes & Chian Kho, 2022).

The food crisis is caused by rising fertiliser prices as a result of the interaction between supply and demand. On the supply side, i) energy prices are high and rising,

[20] Mineral or chemical fertilisers, other fertilisers, phosphatic, potassic, nitrogenous, animal or vegetable fertilisers.

ii) trade and transportation are disrupted, and transport costs are high; while on the demand side, iii) crop prices are high due to high affordability (Schmidhuber, 2022).

Figure 2. EU imports of fertilisers from Morocco in terms of value (million USD) (2013-2022).



Elaborated by author, sourced from UN Comtrade (2022).

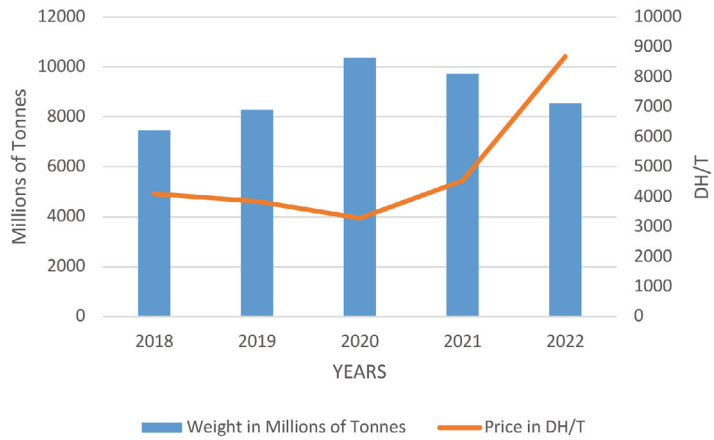
Challenges for the development of fertiliser exports in Morocco

With 70% of the world's phosphate reserves in its subsoil, Morocco plays a key role in ensuring global food security. Indeed, phosphate is the essential raw material to produce many fertilisers. High food fertiliser prices have highlighted the vulnerability of the food supply chain, with international sanctions and supply problems contributing to the situation. In fact, the war between Russia and Ukraine has led to a global fertiliser shortage following the sanctions. The United Nations (UN) is warning of a growing crisis in the fertiliser market, due to Russia's invasion in Ukraine where export restrictions have driven prices up by 300% since the beginning of this war (Ait Hmadouch, 2022).

This situation represents an opportunity for Morocco, which has seen its exports increasing in 2022 by 33.1%, mainly due to fertiliser exports that have doubled compared to 2021 (Office des Changes, 2022). This rise is attributable to the increase in exports of fertilisers due to the price effect, which almost doubled (8,678DH/T in 2022 versus 4,539DH/T in 2021). On the other hand, export quantities fell by 12.1% (Figure 3).

With 70% of the world's phosphate reserves in its subsoil, Morocco plays a key role in ensuring global food security

Figure 3. Fertiliser exports in terms of weight and price (2018-2022).



Elaborated by author, sourced from Morocco World News (2022) and Office des Changes (2023).

As demand for phosphate for technological applications increases, it is imperative to strike a balance between economic growth and environmental preservation

However, despite this trend, which remains linked to demand for Moroccan fertilisers, questions persist about the sustainability of phosphate mining. Besides its vital role in food production, phosphate is becoming increasingly important in the energy transition, notably in electric car batteries, which are gaining in popularity. As demand for phosphate for technological applications increases, it is imperative to strike a balance between economic growth and environmental preservation. Hence the importance for Morocco to develop sustainable practices for phosphate extraction and think about environmentally-friendly alternatives.

Moroccan strategy to maintain its exportation potential

Aware of the stakes involved in maintaining its export potential in a global market undergoing geopolitical and economic upheaval, Morocco has opted since 2007 for an ambitious investment policy aimed at increasing the OCP Group's downstream integration and boosting its ore and fertiliser production capacities. This should enable to respond to the increase in global demand, but also to the growing intensity of competition between producers exacerbated by China's pro-cyclical export behaviour and the decisive weight of certain consumer countries, notably India, which alone absorbs half the world's di-ammonium phosphate exports (Agénor & El Aynaoui, 2015).

However, price volatility, the risk of price rises and increasing competitive intensity are major challenges for this investment policy. In order to strengthen OCP's ability to correctly anticipate long-term demand for phosphate, its understanding of how market expectations are formed, and its ability to flexibly adjust to changes in the utilisation rate of its production force, greening its production process and diversifying its potential clients, will be key factors for asserting its leadership. At the same time, the ability to innovate, control production costs and pursue international expansion, especially in fast-growing markets such as Africa, is of particular importance to the success of this policy (Agénor & El Aynaoui, 2015).

In this perspective, and as part of a policy of greening its production process, OCP Group is pursuing a USD 13 billion green investment programme to achieve its demanding goals of total carbon neutrality by 2040, water self-sufficiency by 2024, and 100% renewable energy power supply by 2027. The company is immediately stepping up production of green fertilisers, which will be essential for ensuring food security for the world's growing population, while preserving the environment and the climate. This programme aims to sustainably increase the production capacity from 12 million tons to 20 million tons of fertiliser during the period 2023-2027 and encourages the creation of local businesses, helping consolidate the competitiveness of the national industrial ecosystem with a 70% integration rate, the participation of 600 national enterprises, and the creation of 25,000 direct and indirect jobs (OCP, 2024).

In addition, the OCP Group has opted for a trading strategy based on optimising the product portfolio, strategic positioning in OCP's key regions (leadership in America, Europe, Africa, and South Asia) and the development of distribution channels and business models adapted to each region and customer while securing the supply of raw materials at the best price (OCP, n.d.).

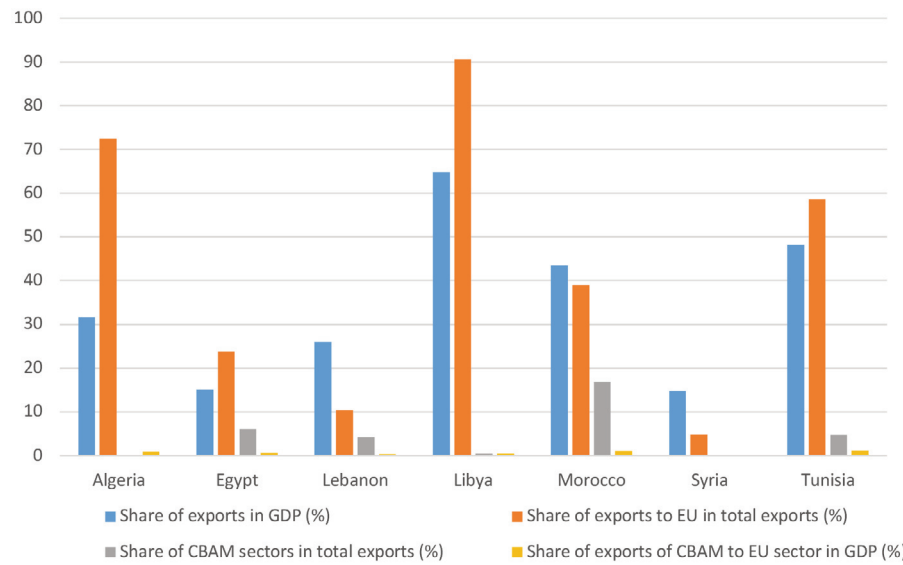
CBAM implementation: expected negative effects and possibles mitigations

To better understand the potential impacts and challenges of the EU CBAM for the fertiliser sector in Morocco, we carried out

three interviews with experts from the fertiliser, energy, and agriculture sectors. They agree that introduction of this mechanism represents a potential risk of loss of competitiveness for Moroccan exports considering the increasing cost of importing products from non-EU countries. This risk depends first and foremost on the exposure of Moroccan exports, i.e., the proportion of EU-bound exports of goods covered by the CBAM in relation to the country's total exports. Secondly, this risk can be quantified by measuring the country's vulnerability — understood as a loss of competitiveness — to the new regulation.

Indeed, the share of the CBAM in Morocco's total exports is the highest (16.8%), compared with MENA countries such as Egypt (6%), Tunisia (5%) and Lebanon (4.2%). Likewise, in terms of gross domestic product (GDP), CBAM exports to the EU from Morocco and Tunisia represent 1% and 1.12% respectively, an important share compared with Egypt (0.71), Lebanon (0.36), Algeria (0.92) and Syria (0.14%) (Figure 4). This shows the extent to which Morocco's exports are exposed to this new regulation, which in terms of GDP does not seem to have too much impact on the initial sectors covered by the CBAM. However, if it is extended to other sectors, Morocco will be heavily exposed, even though the share of Moroccan exports to the EU represents 39% of total exports (Figure 4).

Figure 4. Share of CBAM exports from selected MENA countries fot the year 2022.



Elaborated by author, sourced from UN Comtrade (n.d.).

On the other hand, indirect effects are to be expected for industries that are linked to the sectors that are heavily reliant on carbon intensive exports, such as transportation and logistics, due to changes in prices and demand. In addition, shifting to renewables in phosphates and industry will require investments that will make production cost soar and therefore reduce Moroccan exports' competitiveness. Experts emphasise the role of adaptation, as this measure will slow down trade, resulting in a loss of earnings for Moroccan exporters. Businesses and entire sectors could eventually find themselves in difficulty, with very negative consequences for the Moroccan

Shifting to renewables in phosphates and industry will require investments that will make production cost soar and therefore reduce Moroccan exports' competitiveness

economy as a whole, particularly in terms of jobs. In fact, countries with a weak Social Protection Coverage (less than 25% of the labour force is covered) are most vulnerable than the other countries with a better system of social protection. In these countries, more than 250,000 jobs are exposed to the CBAM impact (Magacho et al., 2022).

By analysing the CBAM index exposure and CO2 Intensity of CBAM sectors exports[21] (Figure 5 and Figure 6), Cement is expected to be the most affected sector in Morocco by the CBAM followed by fertiliser. Meanwhile, iron, steel and aluminium present a potential competitiveness gain for Morocco's exports due to their relatively low emission intensity and CBAM Exposure Index.

Figure 5. CO2-intensity of exports in Morocco by sector, for the year 2022

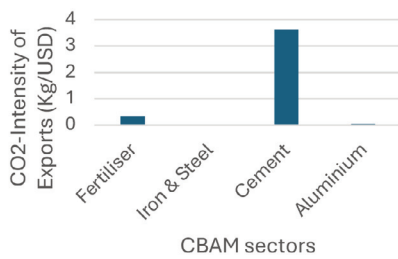
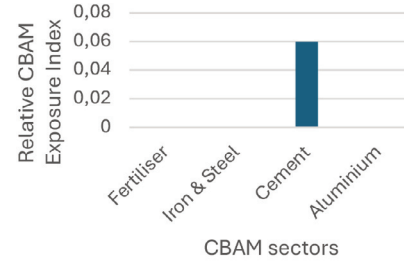


Figure 6. Relative CBAM exposure in Morocco by sector, for the year 2022



Elaborated by author, sourced from World Bank (2023, 2024).

Focusing on the first phase of CBAM implementation, it is clear that the Moroccan fertiliser sector, thanks to its relatively low-carbon content could gain in competitiveness over the next few years. The above-mentioned green investment plan will certainly make phosphate-derived products more competitive in the long term, but, in the meantime, Morocco's exports to the EU are likely to be adversely affected, which will have a negative impact on its balance of payments and overall economic output.

Furthermore, with Moroccan electricity still largely dominated by coal, the high carbon content of cement could undermine Moroccan competitiveness in this sector. The country could then turn to other markets without this type of regulation, or work to reduce the carbon content of its electricity production. In this respect, the inclusion of hydrogen in the latest revision of the European CBAM reinforces the importance of producing green hydrogen in Morocco.[21]

As mentioned above, industries unable to quantify the carbon content of their production will have to pay a tax equivalent to that paid by the least efficient European industries. There is therefore a national issue at stake in measuring, listing and inventorying the carbon emissions of Moroccan industries throughout their value chains. In addition to helping reduce national emissions by increasing the cost of polluting activities, the introduction of

[21] On 11 March 2024, Morocco launched the "Morocco Offer" for the development of the green hydrogen industry, an operational and incentive offer covering the entire green hydrogen value chain. The aim is to position Morocco as a competitive actor in this emerging, high-potential sector (Masen, 2023).

a carbon tax could accelerate the country's development of expertise in carbon emissions assessment.

In the same vein, experts consider the European carbon tax to be an opportunity for companies, who should first and foremost seize this opportunity to make their decarbonisation a lever for attractiveness and competitiveness, as well as to strengthen their export strategies. They emphasise the concept of Common But Differentiated Responsibility (CBDR), an important aspect in this context that should open the possibility of providing financial support for developing countries to invest in adapting to the CBAM.

The CBAM scheme should also encourage Morocco to decarbonise its economy, thereby boosting its economic growth, attractiveness, and sovereignty. These far-reaching changes will create jobs all along the value chain and foster regional economic development. Morocco could even gain market share and develop its commercial partnerships by positioning itself as an essential hub between Africa, the Middle East and Europe.

For Morocco to take full advantage of the CBAM as an opportunity, it is necessary to:

- Adopt more stringent climate policies to minimise the effects of the CBAM on Moroccan exporters by increasing investments in renewable energy and energy-efficient technologies to reduce embedded carbon emissions in export products (ERTL et al., 2023).
- Implement one's proper carbon pricing mechanisms, using rigorous monitoring and objective tracking, easily recognised by EU partners as equivalent, which could help in preventing additional taxes through the CBAM (ERTL et al., 2023).
- Communicate concerns over specific aspects of the CBAM to the EU via the Morocco-EU Green Partnership, suggest adaptations that take into consideration the challenges for countries of the Global South and recognise Morocco's advanced efforts to reduce its carbon emissions, and to support the country's transition towards a low-carbon economy (ERTL et al., 2023).
- Negotiate an exemption or a reduced rate for Moroccan exports to the EU or at least a gradual adaptation that would allow for more time than what is envisaged in the CBAM – as long as such adaptations do not threaten the WTO compatibility of the CBAM (ERTL et al., 2023).
- Follow the example of fertiliser exportation strategy in terms of diversifying export markets beyond the EU through increasing exports to other regions, such as Africa, the Americas, the Middle East and Asia. A diversification policy would reduce Morocco's dependence on the EU market and would also provide opportunities for the country to promote its low-carbon products and services to new markets.

The CBAM scheme should also encourage Morocco to decarbonise its economy, thereby boosting its economic growth, attractiveness, and sovereignty

How does the CBAM foster the Morocco-EU Green Partnership?

The EU and the Kingdom of Morocco have consolidated their cooperation on protecting the environment, conserving biodiversity and fighting climate change with the launch of the Morocco-EU Green Partnership. This is the first green partnership the EU has signed with a partner country. It aims to advance the external dimension of the European Green Deal through action on the ground. It is expected to become a model for similar partnerships on the African continent, where Morocco

already leads in terms of environmental and climate ambitions.

This green partnership will allow the EU and Morocco to:

- Progress towards their common goals of becoming low-carbon, climate-resilient economies and transition to a green economy;
- Strengthen early policy dialogue and coordination on energy, climate change, environmental protection and the green economy at bilateral, regional and multilateral levels;
- foster innovative, sustainable, job-creating and environmentally-friendly projects;
- develop triangular cooperation with other international actors to encourage a stronger commitment to achieving the goals of the Paris Agreement and collectively advance the global climate agenda.

Within the framework of this win-win green partnership, the CBAM could be a valuable tool for this partnership to achieve its objectives, by:

- Sharing knowledge and best practices, transferring clean technologies, and developing joint projects and initiatives, as well as financial support for energy efficiency measures in the main sectors affected by the CBAM. The revenue distribution from the implementation of CBAM is an important financial support from the EU that could help Morocco in the renovation of its energy infrastructure to minimise energy losses and to adapt the networks to renewable-energy-based electricity.
- Promoting policy dialogue to ensure that CBAM is implemented in a way that enhances the competitiveness of its industry, while contributing to decarbonisation goals. Theoretically, the CBAM aims to encourage the decarbonisation of industries without necessarily imposing specific obligations on developing countries.
- Stressing the business potential presented by the CBAM and how the Morocco-EU Green Partnership can support the Moroccan economy to accelerate its low-carbon transition. This could take the form of training programmes, exchange of best practices, and financing of energy transition projects.

The Morocco-EU Green Partnership it is expected to become a model for similar partnerships on the African continent, where Morocco already leads in terms of environmental and climate ambitions

Conclusion and policy implications

The chapter analyses the impact of the CBAM implementation on the Moroccan fertiliser sector. Although our analysis shows that the fertiliser sector will not be affected in the short term by the CBAM, and that Morocco's strategy of diversifying its fertiliser exports should not be confined solely to the EU, Morocco is called upon to consider the carbon tax as an opportunity to move forward in the decarbonisation of its economy, as certain sectors will be more exposed and vulnerable to the carbon tax, including the fertiliser sector, if certain countries from America and Asia apply this carbon tax in their trade with Morocco. High-carbon-emitting industries could face major challenges in complying with CBAM requirements, which could lead to job losses and negative economic repercussions on a national scale.

In addition, the mechanism of implementation, which requires Moroccan exporters to declare annually the quantity of products exported into the EU and the associated gas emissions, may be restrictive and will require additional administrative management and the ability to measure and report emissions accurately. Although the transitional period may seem adequate

to allow Moroccan enterprises to prepare for the operational phase, this will depend on the extent to which Moroccan companies are able to comply. However, this will depend on the complexity of the reporting and compliance processes required.

In light of the potential impacts of the CBAM on Morocco's economy and in order to improve this mechanism, it is strongly recommended that the Morocco-EU Green Partnership provides technical and financial support to help Morocco decarbonise its industries. The revenue distribution from the CBAM implementation could be an important financial tool to support this decarbonisation. The proposed CBAM regulation estimated that the mechanism could generate EUR 1.5-3.1 billion in potential additional revenue, depending on the price of the EU allowance. The reallocation of this funding is also necessary to address the shortcomings of global green finance (Ulgen, 2023) and the negative economic impact that the mechanism will have in a welfare loss of 0.9% for least developed countries, rising to 1.6% for African nations (Perdana et al., 2022). Then, the EU should create an accompanying instrument that redistributes the revenue generated by the CBAM to the EU's trade partners like Morocco.

At the national level, Morocco should develop a comprehensive roadmap for the decarbonisation of critical sectors, even if not impacted directly by the CBAM, such as energy, agriculture, transport, extractive and other industries. The roadmap should include clear targets, timelines, and specific policy measures to achieve these goals.

A relaunch of the Tatwir green growth programme[22] with a reinforced "investment support" line could help the relevant actors to prepare themselves by aligning with the requirements of European standards, over the period 2024-2026. Additionally, Morocco should revise and strengthen the regulatory framework in order to set incentives and provide legal certainty and visibility for companies and enable an accelerated decarbonisation process.

Indeed, the green finance strategy to be deployed in Morocco by Bank Al Maghreb, the Ministry of Economy and Finance, and other financial regulators, should play a crucial role in the adoption of a green financial taxonomy in Morocco. This taxonomy is essential for channelling financial flows towards sustainable projects and preventing "greenwashing", i.e., the misleading presentation of activities as being environmentally-friendly.

Accelerating the adoption of this green taxonomy will be beneficial not only for the financial sector, but also for Morocco's exports to the EU, particularly in the context of the implementation of the CBAM mechanism. A clear and well-defined green taxonomy will make it easier for Moroccan enterprises to demonstrate the sustainability of their products and services, thereby strengthening their competitiveness on the European market.

It is therefore crucial that Morocco speeds up the adoption of this green taxonomy in order to ensure the credibility and transparency of green investments and to support exports to the EU under the CBAM. This will help strengthen the confidence of international investors and business partners in Morocco's green economy, while pro-

[22] The "Tatwir green growth" programme was launched in Morocco in January 2021 to support the decarbonisation of very small, small and medium-sized industrial companies (Ministry of Industry and Trade, 2021).

moting a more rapid transition to sustainable and environmentally-friendly economic practices.

Under the framework of the Morocco-EU Green Partnership and to overcome the challenges and impacts mentioned above on the implementation of the CBAM, it is highly recommended that this partnership focuses more on the following areas:

Technological cooperation and innovation: Morocco could benefit from the transfer of knowledge and clean technologies from the EU to help decarbonise its industry. Technological innovation programmes[23] could provide a great deal of support in this respect.

Access to green financing: The green partnership can facilitate Morocco's access to green financing from the EU and other international institutions.

Exchange of best practices and capacity-building: Morocco can benefit from the exchange of best practices and technical assistance provided by the EU.

Promoting policy dialogue to ensure a win-win green partnership.

[24] The EU invests close to half a billion euros through its Horizon Europe Programme, which boosts collaborative research and development across the Union and beyond (European Commission, 2021).

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List of acronyms and abbreviations

CAGR	Compound Annual Growth Rate
CBAM	Carbon Border Adjustment Mechanism
CDER	Centre for the Development of Renewable Energy
CBDR	Common But Differentiated Responsibility
COP	Conference of the Parties
CSP	Concentrated solar power
DH	Moroccan Dirhams
DRI	Direct Reduced Iron
EAF	Electric Arc Furnace
EBRD	European Bank for Reconstruction and Development
EC	European Commission
EIB	European Investment Bank
EMAAs	Euro-Mediterranean Association Agreements
ENI	European Neighbourhood Instrument
EU	European Union
ETS	Emission Trading System
FEI	Federation of Egyptian Industries
GEF	Global Environment Facility
GDP	Gross Domestic Product
GHG:	Greenhouse Gas
GoE	Government of Egypt
GOEIC	General Organization for Export and Import Control
GTAP	Global Trade Analysis Project
GW	Gigawatt (Billion Watts)
GWh	Gigawatthour (Billion Watt-Hours)
IFIs	International Financial Institutions
IMF	International Monetary Fund
IRENA	International Renewable Energy Agency
ISES	ntegrated Sustainable Energy Strategy
LDCs	Least developed countries
LE	Egyptian Pounds
LII	Lebanon Investment Initiative
LULUCF	Land Use, Land-Use Change, and Forestry
MENA	Middle East and North Africa
MJ	Megajoule(s) (Million Joules)
Mt	Megaton(s) (Million Tons)
NCCC	National Council on Climate Change
NCCS	National Climate Change Strategy 2050
NDC	Nationally Determined Contribution
NGO	Nongovernmental organisation
NREAP	National Renewable Action Plan of Lebanon
OCP	Office Chérifien des Phosphates
PI	Partnership Instrument
PV	Photovoltaic
RDF	Refuse-derived Fuel
RE	Renewable Energy
SDGs	Sustainable Development Goals
SDS	Sustainable Development Strategy

SMCs	Southern Mediterranean Countries
TIF	Trade and Investment Facilitation Project
TJ	Terajoule (Trillion Joules)
UAE	United Arab Emirates
UfM	Union for the Mediterranean
UNFCCC	United Nations Framework Convention on Climate Change
UNDP	United Nations Development Programme
USAID	United States Agency for International Development
USD	US Dollars
VAT	Value Added Tax
WB	World Bank
TIF	Trade and Investment Facilitation Project
WTO	World Trade Association

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