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Energy Efficiency and Green Practices: Unlocking GVC Participation for Euro-Mediterranean Firms [1]

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[1] This Policy Brief is part of the FEMISE Policy Brief Series and is based on the FEMISE Conference Paper entitled: Exploring The Role Of Environmental Regulations And Green Practices In Global Value Chains (Gvcs) Participation: Evidence From Firms In The Euro-Mediterranean Region by the same authors.

1. Executive Summary

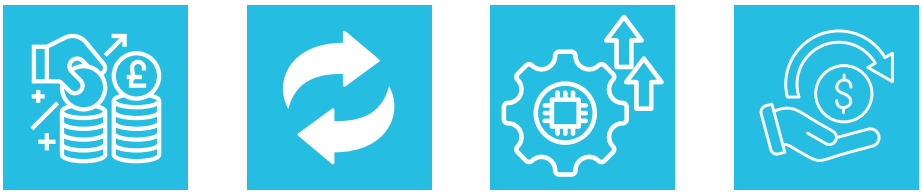
This policy brief explores the association between environmental regulation, green practices, and global value chains (GVCs) participation for firms in the Euro-Mediterranean (Euro-Med) region. More specifically, it examines the role of enforcing energy regulations and promoting firms' adoption of energy practices such as energy innovation and energy management systems in driving GVCs participation. The empirical evidence from 16894 private firms across 23 Euro-Med countries indicates that energy regulation and the adoption of energy management practices foster greater GVCs integration, particularly among firms that are weakly integrated.[2]

The effects of energy regulations are more pronounced for European Union (EU) firms than for their Southern and Eastern Mediterranean (SEMED) counterparts. This can be attributed to the comparatively weaker enforcement of environmental regulation in SEMED countries and their shallow GVCs integration compared to their EU counterparts. Also, EU firms benefit most from adopting energy management practices to enhance GVCs participation, whereas the limited impact in SEMED firms reflects the limited awareness of the importance of improving energy efficiency, and their concentration in upstream activities, where energy efficiency is less approached when assessing firms' environmental footprint in the supply chains (EBRD & EC, 2020; Xavier et al., 2024). Moreover, while energy regulation improves GVCs integration of firms in energy-intensive sectors, undertaking energy innovation and developing energy management system are more effective for driving GVCs participation of firms in energy-efficient sectors. Given these findings, the policy brief underscores the main policy implications and recommendations at the national and regional levels in order to improve regional integration and to enhance sustainability of value chains in the Euro-Med region.

[2] For an extensive discussion of the literature see also Neaime (2000, 2004, 2008, & 2010, 2012, 2015a, 2015b, 2016, 2017, 2018a, 2018b), Mansoorian and Neaime (2003), and Neaime et al (2023).

2. Introduction

In recent decades, GVCs have become a prominent feature of the international trading system with approximately 70% of international trade now involving GVCs (OECD, 2024). As firm- and country-level participation has expanded, GVCs are increasingly recognized for fostering productivity, efficiency, job creation, and economic growth. Meanwhile, mounting concerns over climate change and its impact on the global economy have urged the importance of addressing the environmental implications of deeper GVCs participation, which is often associated with higher pollution and massive greenhouse gas (GHG) emissions especially in energy-intensive and upstream production stages in different countries (Meng et al., 2023b; Osabohien et al., 2024).



Thereby, firms and countries engaged in GVCs are required to undertake actions to green their supply chains and to enhance their sustainability and climate resilience. On one hand, firms must develop their green resources and capabilities and foster environmental awareness and self-ruling as a foundation for their performance (e.g. adopting energy management practices and energy innovations) (Rehman et al., 2023). And on the other hand, governments must play a central role in reducing firm's environmental footprint through the enactment and enforcement of energy regulations.

Thereupon, the main objective is to explore the nexus between energy regulation, energy practices and firm-level GVCs participation in Euro-Med countries. The importance of the study stems from the following. First, while the rapid expansion of GVCs foster many positive outcomes for firms and countries, they generate many environmental problems due to lengthier shipping routes and over-exploitation of natural resources and energy in countries with poor institutions (De Melo, 2014; World Bank, 2020; Meng et al., 2023a).

Second, while strengthening Euro-Med firms' participation in GVCs is vital for promoting their export dynamics, attracting foreign investments, and advancing regional integration (Zaki, 2019), equal attention must be given to building the resilience of firms and GVCs to climate-related chocks and reducing their ecological footprint through energy regulation and sustainable energy practices (Marvasi, 2022; Chatterjee et al., 2024). Third, SEMED countries are still lagging behind their EU counterparts in the decarbonization of their energy and manufacturing sectors (European Economic and Social Committee, 2023). Fourth, prioritizing the implementation of green energy practices is crucial for firms and countries integrated in GVCs because energy accounts for more than 75% of total GHG emissions globally (International Energy Agency, 2024c). Also, policymakers around the world are increasingly emphasizing the urgent need to shift from heavy reliance on fossil fuels to more sustainable and efficient energy system, driven by rising energy prices and mounting climate concerns (Capozza et al., 2021). Fifth, the study fills the gap in the literature as most of the empirical analyses of GVCs remain at the country level (Wang et al., 2021; Liu et al., 2022), while existing firm-level evidence examine the nexus of environmental performance and GVCs participation but without considering the mediating roles of energy innovation and energy management practices (Paschoaleto & Martinez-Zarzoso, 2024; Siewers et al., 2024).

3. Mediterranean Context

3.1 GVCs participation of firms in the Euro-Med region

Promoting firm-level GVCs participation is a key pillar for boosting regional integration in the Mediterranean region. However, by looking at SEMED firms (except Turkish ones), the evidence shows that the share of firms participating in GVCs is rather low, and significantly below EU and Turkish counterparts. Between 2000 and 2018, the share of GVCs participation in total gross exports remain below 50%, whereas the shares of Turkey and EU have exceeded 55% and 65% respectively (EBRD & EC, 2020). Also, based on EBRD-EIB-WB enterprise surveys 2018-2020, around 15.1% of EU firms export and import simultaneously, whereas only 10.7% of SEMED firms do so. The low levels of SEMED firms' integration in GVCs could be explained by several impediments such as inadequate skills endowments, inefficient business environment, and low investments in physical and digital infrastructure. Inadequate skills endowments are reflected in the prevalence of higher endowments of unskilled blue collar (production workers), whereas higher GVCs participation implies higher demand for skilled production workers.

Moreover, several obstacles to foreign direct investment (FDI) persist rendering the business environment facing small and medium firms (SMEs) highly inefficient. These obstacles include political instability, financial constraints, lack of electricity supply, high corruption, complex tax administration systems and unfair competition from firms in the informal sector. Finally, SEMED countries are not investing enough in the physical infrastructure and they face difficulties for road transportation and high costs of air freight (Zaki, 2019; EBRD & EC, 2020).

Furthermore, SEMED firms and countries face numerous challenges, inhibiting a deeper integration in regional value chains with their EU counterparts. Although the Euro-Mediterranean Association Agreements have already established a free trade area, regional integration between the EU and SEMED neighbours remains shallow due to weak regulatory harmonization, particularly regarding environmental regulations, sanitary and phytosanitary standards and technical barriers to trade. The low compliance with EU standards further restricts the access of SEMED firms and their manufacturing products to EU markets (Zaki, 2019).

Also, most SEMED firms are operating either in the oil and gas sector where they receive most of the FDI or in upstream activities characterized by low level of economic complexity (e.g. horticulture, chemical, and some manufactured and textile products). This concentration creates a lock-in effect, confining most SEMED firms in low value-added and more vulnerable activities, making their ability to adapt to the new paradigms imposed by energy regulations and energy practices highly questioned.

3.2 Energy efficiency, regulations and practices in Euro-Med region

Amid the ongoing geopolitical tensions in the Arab region and the Russia-Ukraine war, energy security has emerged as a pressing concern in the Euro-Med region. At the same time, the region is highly vulnerable to climate change disasters (Ertl & Zegzouti, 2023), underscoring the need to reconcile energy transition with climate change mitigation. Energy transition entails shifting from a fossil-fuel based energy system towards low-carbon and renewable energy production system. Yet, renewable energy is unlikely to fully meet growing energy demand as the global share of renewables in final energy consumption is expected to jump from 13% in 2023 to only 20% by 2030 (International Energy Agency, 2024b). Hence, enhancing energy efficiency becomes a critical lever for meeting energy needs, mitigating climate-related challenges, and accelerating the energy transition.". Energy efficiency refers to “using less energy for the same output or producing more with the same energy input, and minimizing energy waste” (European Environment Agency, 2024c). This could be achieved through the development of energy-efficient technologies and the implementation of energy management systems for measuring, monitoring and auditing energy consumption at the firm level.

Since the energy supply sector is a major contributor to GHG emissions, the European Green Deal (EGD) has set energy efficiency as a key priority for a clean energy transition given that enhancing energy efficiency represents more than 40% of the emissions abatement needed by 2040 (International Energy Agency, 2021). However, by looking at energy efficiency progress in the Euro-Med region as a whole, the evidence shows that the region is still highly relying on oil, natural gas and coal as major sources of energy supply.

For example, in 2022, oil represents 32.32% of Europe's total energy supply compared to an average of 50.6% for SEMED countries (Egypt, Jordan, Lebanon, Morocco, Tunisia, and Turkey). In addition, energy-related CO2 emissions (MT CO2) average to 1092.34 in Europe in 2022, compared to 122.02 for SEMED countries and with 53.27% of emissions originating in Turkey. Also, the evidence shows that both EU and SEMED regions are characterized by high energy intensity, where total energy supply per unit of GDP (PPP) averages to 1585.55 (MJ/thousand 2015 USD) in Europe, whereas it averages to 2972.62 (MJ/thousand 2015 USD) in SEMED countries (International Energy Agency, 2024a).

Furthermore, various challenges hinder the green energy transition and energy efficiency improvements in SEMED countries. While most SEMED countries have put in place their national energy efficiency action plans (NEEAPs), their regulatory framework is weakly enforced. By contrast, the EU has already developed an external strategy to prioritize energy efficiency. Also, despite the existence of several financing schemes and incentives that reduce the overall cost of energy efficiency investments, the limited awareness of the importance of improving energy efficiency reduces the effectiveness of such initiatives (meetMed, 2019). Finally, there exist several barriers to investment in the energy sector in SEMED countries mainly due to lack of competition in energy sector and the non-liberalization of electricity markets (European Economic and Social Committee, 2023). Accordingly, based on EBRD-EIB-WB enterprise surveys 2018-2020, while 60.8% and 46.3% of EU and SEMED firms respectively adopt energy innovation, only 33.3% of EU firms and 33.7% of SEMED firms adopt energy management practices. Thus, SEMED firms adopt process innovations that reduce energy consumption more than undertaking pro-active energy management practices.

4. Approach and Results

4.1 Data definition and sources

The study is based on EBRD-EIB-WB's enterprise surveys 2018-2020 focusing on 16894 private firms operating in manufacturing and service and retail industries across 23 Euro-Med countries (16 EU and 7 SEMED).[3] The main objective is to examine the association between energy regulations, energy practices (energy innovation and energy management practices), and firm-level GVCs participation at the extensive and intensive margins. Regarding the main variables of interest in the study, they are defined as the following. The main dependent variable is GVCs participation proxied by four extensive and four intensive variables following Dovis & Zaki (2020). For the extensive GVCs participation, it is a dummy taking the value of 1 if the firm exports and imports simultaneously (one weak definition); if the firms exports and imports simultaneously and holds either an internationally-recognized quality certification or foreign shares (two intermediate definitions); and if the firm exports and imports simultaneously, holds an internationally-recognized quality certification, and has foreign shares (one strict definition); and zero otherwise.

For the intensive participation, following Urata and Baek (2020), an index is calculated as the product of the share of direct exports in total sales, the share of indirect exports in total sales, and the share of foreign inputs in total purchases of materials and supplies for the same four definitions of GVCs participation following Dovis & Zaki (2020). For the main explanatory variables, energy regulation is proxied by a dummy variable that takes the value of 1 if the firm is levied an energy tax or energy performance standard, and zero otherwise. And for energy practices, energy innovation is a dummy variable taking the value of 1 if the firm adopts at least any of the following five measures: heating and cooling improvements; lighting system improvements; machinery and equipment upgrades; vehicle upgrades; and more climate-friendly energy generation on site, and zero otherwise. Also, energy management is proxied by a dummy variable taking the value of 1 if the firm monitors its energy consumption, completes an external audit of its energy consumption, or if the firm sets targets for energy consumption, and zero otherwise. Other covariates are included such as firm size, firm age, labour productivity, financial constraints, and digitalization level of the firm.

[3] The 16 EU countries include Bulgaria, Croatia, Cyprus, Czechia, Greece, Estonia, Hungary, Italy, Latvia, Lithuania, Malta, Poland, Portugal, Romania, Slovak Republic, and Slovenia. The 7 SEMED countries encompass Egypt, Jordan, Lebanon, Morocco, Tunisia, Turkey, and West Bank and Gaza.

4.2 Identification strategy

The analysis is conducted in two steps. The first step consists of estimating a model composed of two equations the probit equation for extensive GVCs participation and the fractional response equation for intensive GVCs participation[4]. It is estimated using the generalized two-part fractional response model (GTP-FRM) to examine the direct association between energy regulation, energy practices, and GVCs participation, in addition to assessing the moderating role of energy practices. Also, in order to solve the endogeneity bias due to reverse causality and selection bias, we use the instrumental variable (IV) approach and a two-step Heckman analysis. We instrument for environmental regulation by using two instruments; the interaction term between country's legal origin and firm's green strategies and the shift share IV of environmental regulation aggregated by country-region-sector-year minus each firm's own status in terms of subjection to environmental regulations.

Furthermore, heterogeneity analysis is conducted by estimating sub-sample regressions for firms operating in energy-intensive and energy efficient sectors[5] and for firms in EU and firms SEMED countries. The main objective is to draw inferences on the underlying heterogenous and moderator factors. Finally, we test the robustness of our model by including additional covariates such as technological capabilities and obstacles to trade. The second model assesses the mediating roles of energy innovation and energy management by adding two other equations to the baseline ones; to estimate the direct effect of energy regulation on energy innovation and energy management, and the indirect effect of energy regulation on GVCs participation mediated through energy innovation and energy management practices, and the total effect of environmental regulation on GVCs participation. The model is estimated using the generalized structural equation model (GSEM) adapted for multilevel generalized (binary) outcomes.

[4] The GVC intensity index is divided by 100 to convert it into a variable between 0 and 1 in order to conduct the FR modelling.

[5] In order to calculate the energy intensity of sectors, we divide total energy cost (costs of fuel and electricity) by total annual sales, then we calculate the median value of energy intensity and divide the sector into energy-intensive one if their energy intensity is greater than the median value, and energy efficient sectors if their energy intensity is lower than the median values.

4.3 Main results

The main results show a significant positive association between energy regulation and the probability and intensity of GVCs participation. In line with the Porter Hypothesis (PH), with the imposition of environmental regulations and improved environmental performance, firms are able to enhance their GVCs participation at both the extensive and intensive levels. The effect is more pronounced for firms that are weakly integrated in GVCs. Regarding energy practices, energy management practices exhibit a more effective role in driving GVCs participation compared to energy innovation. In addition, the inclusion of energy management practices in the baseline models reduces the size and significance of energy regulation coefficients with a significant effect of energy management, implying a mediating effect of energy management. After accounting for endogeneity bias, the results are robust and the coefficients of energy regulation and energy practices increasing in magnitude and significance. Results also confirm the more effective role of energy management practices and their mediating effect in the nexus between energy regulation and GVCs participation, especially for firms that are weakly integrated. The sub-sample regressions for EU and SEMED firms show that energy regulation and energy management practices enhance GVCs participation for both EU and SEMED firms, but with a more pronounced effect for EU and SEMED firms that are weakly integrated. Also, the effect of energy regulation and energy management practices is more pronounced for EU firms than SEMED ones. The other sub-sample regressions for energy-intensive and energy-efficient sectors shows that energy regulation enhances GVCs participation for firms operating in both sectors. Yet, firms operating in energy-efficient sectors tend to benefit more from adopting energy innovation and energy management system to improve their GVCs integration.

5. Conclusion

Empirical findings shows that imposing energy-related regulations and adopting energy practices such as energy management are key driving forces for enhancing firm-level GVCs participation, whereas the evidence shows no significant effect for energy innovation. In line with the PH, when firms are levied an energy regulation, they are able to improve their environmental performance because regulations incentivize firms to adopt energy-saving technologies and encourage them to adopt new environmental management practices such as environmental accounting and environmental training programs that may generate information, facilitate investments in environmental R&D, enhance green innovativeness of firms, and finally improve GVCs integration.

Regulatory Push for Low-GVC Integration Firms

The role of regulations is particularly important for firms that are weakly integrated in GVCs, i.e. they lack international quality certification and foreign ownership. Hence, the latter are highly relying on a regulatory push to improve their environmental performance.

Energy Management Versus Energy Innovation

In addition, the analysis shows that energy management practices are more effective in driving GVCs integration than energy innovation. This could be explained by the fact that energy innovation refers to only incremental upgrades undertaken by firms to improve energy efficiency of lighting systems, machinery and equipment, vehicles and energy generation processes. Hence, it is crucial for firms to climb up the innovation ladder and to shift from incremental to radical innovation to enhance its GVCs participation.

EU–SEMED Differences in Regulatory Impact

Furthermore, the more pronounced effect of environmental regulations and energy management practices for EU firms compared to SEMED ones could be explained by the lower level of awareness with the importance of promoting energy efficiency measures among SEMED firms and the weaker enforcement of environmental regulations in SEMED countries. Also, it is important to account for the fact that most SEMED firms are operating in upstream activities within GVCs where energy efficiency is not highly approached due to the of lack of standards and methods to assess their energy use (EBRD & EC, 2020; Xavier et al., 2024).

Sectoral Patterns and Innovation Incentives

Finally, firms operating in energy-intensive sectors rely more on a regulatory push to improve their GVCs participation, whereas firms operating in energy-efficiency sectors are already adopting pro-active measures to improve their energy efficiency and are more likely to benefit from these actions.

6. Implications & Recommendations

6.1 Policy Implications

In line with empirical findings, policymakers need to focus on enforcing environmental regulatory framework and on promoting the adoption of green practices for energy conservation among firms in order to improve firms' participation in GVCs.

Enforcing regulations with better incentives, definition of responsibilities and regional dialogue

While SEMED countries have already put in place their national action plans and regulations for energy efficiency, enforcement remains weak in some countries like Jordan, Lebanon and West Bank and Gaza. Regulation enforcement could be improved by defining road map for different sectors (agriculture, industry, transport, building, etc.) where different ministries and entities consolidate their action steps through well-defined commitments and a better coordination of responsibilities and interventions. Dealing with the lack of coordination among governmental institutions is also important in SEMED countries in order to improve decision making especially in Egypt and Lebanon. Furthermore, a regional dialogue involving different EU and SEMED stakeholders (ministries and governmental institutions, private and public sector, energy efficiency service providers, etc.) should tackle the weak harmonization of environmental regulations, particularly energy standards. For instance, energy efficiency building codes (EEBCs) are not consistently enforced and not mandatory across SEMED countries. Also, SEMED firms often prioritize investments that expand industrial productive capacity over energy-efficiency improvements. Therefore, it is crucial for governments to adopt some policies to promote the adoption of energy efficient industrial systems, mainly by conducting mandatory energy audits to identity inefficiencies, by setting energy efficiency standards and codes for different equipment and production processes, and by incentivizing compliance with international standards, mainly EU ones (e.g. penalty for non-compliance, financial and non-financial incentives for compliance).

Proactive energy practices are crucial for firms but with better financing and technical help

While firms operating in energy-intensive sectors (e.g. chemicals, metal, machinery and equipment) can benefit from the establishment and enforcement of environmental regulations that promote green practices. However, it is equally essential for these firms to recognize the importance of environmental self-ruling, undertaking voluntary and pro-active environmental initiatives. Firms need to develop a robust environmental accounting system and to adopt a comprehensive approach to assess their energy performance environmental footprint (e.g. through energy monitoring and measurement, energy accounting and reporting, etc). The EU Carbon Border Adjustment Mechanism (CBAM) that entered into force since October 2023, underscores the urgency for SEMED firms to develop their environmental accounting system. These firms are expected to adopt rigorous measurement, reporting, and verification (MRV) system to address their environmental footprint and emission levels. Moreover, the CBAM regulation incentivizes both EU and SEMED firms to track their emissions along the whole supply chain, where they are required to tackle indirect emissions (Scope 3) that emerge from other suppliers in the upstream and downstream activities. Consequently, firms are urged to undertake proactive environmental actions to develop their energy management systems to track energy use and related emission levels, and to develop new more energy-efficient technologies. To this end, firms are requited to conduct a cost–benefit analysis to assess the advantages and costs of adopting energy-efficiency practices, thereby identifying their financing gaps and technical requirements. At the same time, governments can tailor public policy instruments (e.g. tax credits, reductions, exemptions, or subsidies) to firms' specific needs. Furthermore, improving the access to finance is crucial by matching firms to different financing schemes including concessional loans for green energy investments. Better coordinated effort between the governments and business support sector is also important to provide firms with better technical support and advisory services (e.g. access to energy efficiency service providers to help firms upgrade their industrial systems and monitor results), and training programs on best practices (e.g. for engineers, managers, and energy managers).

Better integration in GVCs: deeper, higher value-added, and higher sustainability

SEMED governments need to deepen their firms' integration in GVCs through a three-part strategy. First, they should remove barriers to trade and FDI in manufacturing and service sectors. SEMED governments need to ensure the existence of a business-friendly environment by cutting red tapes, enhancing governance, enforcing property rights, removing discriminatory policies, and facilitating investments in services (transports and logistics). Such measures can attract more FDI into the manufacturing sector, helping SEMED firms to move into higher-value added, and more labour- and technological-intensive activities that create jobs and promote economic growth. Second, industrial policies should target SMEs firms by promoting their specialization in productive manufacturing activities. To this end, it is essential to work on human capital by enhancing blue workers skills through better quality vocational training and on-the-job training. Also, improving access to foreign technology is crucial, allowing firms harness technological spillovers of GVCs participation. These recommendations are linked to findings of the empirical literature showing that trade liberalization in Jordan, Morocco, and Tunisia have increased demand highly-skilled workers in high-value-added and technology-intensive industries such as pharmaceuticals, aeronautics and automobile industries. Third, the harmonization of regulations and standards is important because trading within value chains requires not only the reduction of tariffs, but also the harmonization of non-tariff barriers (e.g. environmental standards, technical barriers to trade and sanitary and phytosanitary standards), protection of intellectual property rights, and harmonization of market conditions and procedures to attract more FDI.

6.2 Policy Recommendations

We need incentive-based regulations

The implementation of a well-enforced regulatory framework based on the use of market-based instruments such as environmental taxation (e.g. energy taxation) is highly required to incentivize the adoption of green innovation and management practices in energy fields, which allow firm to improve their integration in GVCs while also improving their environmental performance. Governments must pay special attention to firms that are weakly integration in GVCs and lack the ownership of international quality certification and the existence of foreign shares in their ownership. These firms are highly relying on the existence of well-enforced environmental regulations to provide them with an external push to adopt environmentally-friendly practices.

Complemented with public policy interventions that must be coupled with higher awareness level

Enforcing environmental regulations needs to be coupled with public policy interventions. In fact, most SEMED governments have already established energy efficiency funds that provide loans and grants for energy efficiency investment projects and have also developed some supporting financing schemes based on the provision of fiscal incentives (tax credits, reductions, and exemption or subsidies) to boost investments in energy efficiency and to encourage firms develop their energy management system at a lower cost. However, these financing schemes remain highly ineffective due to the lack of awareness.

Thus, addressing the knowledge gap on the benefits of energy conservation especially in Jordan and West Bank and Gaza is crucial, especially when firms prioritize increasing productive capacity more than investing in energy efficiency. In this regard, governments can promote the use of digital platforms among firms to access information about available options of financing schemes that are designed to support investments in energy-efficient technologies. Moreover, while competent energy efficiency service providers are lacking in SEMED countries, governments should promote their importance because they help firms to identify good investment opportunities in energy-saving technologies and they provide them with technical guidelines for the implementation for energy management system.

Reforming the energy sector

Governments must couple the enforcement of energy regulation with the gradual phasing-out of non-renewable energy (fossil fuel) subsidies which remain relatively high in some SEMED countries, especially Egypt and Turkey. By keeping energy prices too low, the persistence of relatively higher non-renewable energy subsidies constitutes a barrier towards energy efficiency investments. Also, attracting foreign investment in the energy sector is important to improve SEMED firms' access to energy-saving technologies and energy management practices. In this regard, it is important to conduct institutional reforms to liberalize the electricity market and to attract more foreign and private investments.

Establishing a regional voluntary carbon market

In response to the EU CBAM, it is highly advised that SEMED governments agree on establishing a regional voluntary carbon market especially that some SEMED countries such as Egypt and Morocco have already undertaken steps to develop their local carbon markets. The establishment of regional carbon markets would allow the exchange of carbon credits in foreign exchange markets, which would generate secured revenues for assisting firms in developing their green practices and adopting energy-saving technologies. The establishment of a regional voluntary carbon market is more recommended than developing a regional energy market since the latter is not well developed and still lack the regulatory and technical guidelines for its establishment. Hence, it is more efficient for governments to rely on voluntary carbon markets to promote the development of energy-efficient technologies.

A better coupling of trade, industrial and environmental policies through regional cooperation

With most of SEMED firms operating in upstream activities characterized by low level of economic complexity and higher vulnerability to external chocks, the creation of deep regional value chains involving these firms requires the upgrade of their industrial policies. These policies need to emphasis their shift towards downstream and higher-value added activities that are more productive labour-intensive and technology-intensive activities. For instance, SEMED governments can encourage firms' specialization in the production of renewables and energy-efficient technologies (e.g. solar panel assembly and components, energy-efficient appliances and equipment) capitalizing on the abundant renewable resources, strategic geographical location and proximity to Europe, and already existing manufacturing hubs in Egypt and Morocco. Industrial policies need to be coupled with more harmonized trade regulations to attract foreign investments and to ensure compliance of SEMED firms with EU

requirements. More specifically, regional trade agreements must be revised to increase the legal enforceability of environmental provisions and more specifically those related to energy efficiency for all trading partners. Finally, well enforced environmental policies must be targeted toward firms operating in energy-intensive sectors (e.g. by setting sector-specific standards, by adopting effective enforcement mechanisms through regular inspection, monitoring, and reporting, etc.) as they need the regulatory push to better align their environmental performance with EU standards, further enhancing their GVCs participation. Also, a regional platform for negotiation and cooperation between EU and SEMED countries is crucial for the exchange of knowledge, best practices, technologies and guidance for deeper EU-SEMED integration.

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